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Our Ref: PSM5665-090L

11 August 2025

Director
Weir Legal and Consulting Pty Ltd
C/-
Mornington Peninsula Shire Council
90 Besgrove Street,
Rosebud VIC 3939
bweir@weirlc.com

Attention: Bronwyn Weir

Dear Bronwyn

RE: MCCRAE LANDSLIDE - MITIGATION

1. Introduction

1. The letter serves as a cover letter for reports containing my opinions regarding temporary and long-term rectification works for a series of landslides that have impacted multiple properties at McCrae.
2. I have been requested to prepare these reports by Bronwyn Weir of Weir Legal and Consulting (WL), who act for MPSC.
3. My brief was provided by WL on 8 August 2025 and is included in Appendix A. Supporting documents have been supplied by MPSC and Harwood Andrews since October 2023 and more recently from January 2025 onwards.
4. This letter has been prepared by Mr Dane Pope; resume attached in Appendix B.
5. I have 19 years of experience in the Civil and Mining industries with the following experience I consider relevant to this project:
   (a) My ongoing engagement on the 2022 Landslide matter since November 2023.
   (b) Bogong Village temporary access cut in deeply weathered granite.
   (c) Deviation Road / Hamilton Highway landslide risk assessment of a significant escarpment with an extensive history of landsliding events. Technical project data sheet by others included in Appendix C.
   (d) Cliff Road landslide risk assessments, Frankston.
   (e) Great Ocean Road and inland routes landslide slope remediation projects.
6. In preparing the reports attached to this letter I have been provided with a copy of the Expert Witness Code of Conduct (refer to the Brief) and the VCAT Practice Note (PNVCAT2). I have read both the Expert Witness Code of Conduct and the VCAT Practice Note and agree to be bound by them. Although I have made significant enquiries into this matter, there are still active investigations underway that may be of significance to my opinions which include:
   (a) Ongoing groundwater monitoring.
   (b) Predicted effects analysis for 6 View Point Road.

7. The reports attached to this letter only include information and opinions that have not been reported elsewhere. For consistency I have used geotechnical terms adopted in the PSM reports outlined in Table 1. For example, the geotechnical units identified in Section 3.2 and Table 3 of the PSM LRA have been adopted throughout my report.

1.1 Definitions and Abbreviations

8. Definitions and abbreviations used in the reports attached to this letter are provided in Table 1.

Table 1 - Definitions and abbreviations

Abbreviation/Term	Abbreviation Description or Definition
2022 Landslide	A landslide event that initiated on 10-12 View Point Road near the western property boundary between 14 to 15 November 2022
The 2025 Landslides	Two landslides that occurred on 5 and 14 January 2025 on the escarpment slope immediately below properties located at 6 View Point Road and 10-12 View Point Road
2022 RW	A retaining wall constructed on 10-12 View Point Road at some time in 2022 near the location of the 2025 Landslides
2024 RW	A retaining wall constructed on 10-12 View Point Road at some time in 2024 near the location of the 2025 Landslides
AC	Asbestos Cement
AHD	Australian Height Datum
Antecedent Rainfall	The rainfall that occurs before a specific event, like a flood or landslide, or a particular time period of interest
AS	Australian Standard
AS4678 (2002)	Australian Standard for Earth Retaining Structures
BH	Borehole
CCTV	Closed-Circuit Television
CPT	Cone Penetration Test
CRB	Country Roads Board
DCP	Dynamic Cone Penetration
DDO	Design and Development Overlay
Dromana to Portsea water main	A 900 mm diameter water main
DTP	The Department of Transport and Planning
EO	Evacuation Order
EO Area	A series of properties evacuated in response to the 2025 Landslides
FH	Fulton Hogan
FOI	Freedom of Information
FOS	Factor of Safety
GIS	Geographic Information System
GFR	Geotechnical Factual Report
LiDAR	A method of aerial survey completed by a drone or aeroplane
LRA	Landslide Risk Analysis
Margaret Street Drain	A natural gully that was backfilled between now 23 Coburn Avenue and 8 Margaret Street, McCrae
MBS	Municipal Building Surveyor
MPF	Mornington Peninsula Freeway
MPSC	Mornington Peninsula Shire Council

Abbreviation/Term	Abbreviation Description or Definition
NCC	National Construction Code
NDT	Non Destructive Testing
NDD	Non Destructive Drilling
Outlook Road Water Main Failure	A South East Water main that failed at some time in 2024 in a reserve near Outlook Road and Bayview Road, McCrae
Pointerra Reality Model	A three dimensional photogrammetry model of the 2025 Landslides
Reln Drain	A proprietary type of effluent disposal trench with a plastic arch
RL	Reduced Level
RW	Retaining Wall
SES	State Emergency Service
SEW	South East Water
SPT	Standard Penetration Testing reported in an “N” value which is blows per 300 mm penetration
WL	Weir Legal and Consulting

2. Work Undertaken

9. I have undertaken the following work in providing my opinions in this matter:
   (a) I have reviewed the Brief.
   (b) I prepared the reports listed in Table 2. Contributions from other members of my team are included in those reports.
   (c) I completed Site inspections on the dates listed in Table 3 of the PSM Causation Report.
   (d) I assembled my understanding of facts as they relate to the opinions I provide. I have provided an Annexure of these facts in Appendix A of PSM5665-075R (21 July 2025).
   (e) I prepared this information with the assistance of the following staff under my direct supervision:
      i. Mei Ling Teoh who prepared temporary works advice for the 2022 and 2025 Landslides.
      ii. Oliver Stirzaker who assisted with assessment and preparation of long-term remedial options.
      iii. Andrew Wilson who assisted with assessment and preparation of temporary works and long-term remedial options.
      iv. Garry Mostyn who is the Technical Director for PSM and the McCrae landslide project. Garry assisted with technical review of the PSM LRA.
   (f) I have reviewed all work undertaken under my direction, and notwithstanding the assistance provided by my colleagues under my instruction, the opinions in the reports are my own and ones that I believe to be true and correct.
   (g) I considered the question I have been asked to address in the Brief in the light of my experience and understanding of engineering principles.
   (h) I prepared this letter.
      i. I note that due to time constraints the reports attached to this letter are not provided in expert format. Notwithstanding, the opinions provided in the reports attached to this letter are my own and ones that I believe to be true and correct.

Table 2 – PSM reports

Report Title	File Name	Abbreviation	Revision	Date
McCrae Landslide – Causation	PSM5665-075R	PSM Causation Report	Rev0	21 July 2025
GFR	PSM5665-GFR	PSM GFR	Rev0	9 April 2025
LRA	PSM5665-LRA	PSM LRA	Rev1	28 May 2025
McCrae Landslide – Stormwater and Sewer Investigation Geotechnical Factual Report	PSM5665-070R		DRAFT RevA	13 June 2025
Expert Opinion Report – Rectification 10-12 View Point Road, McCrae	PSM5226-005R	PSM 2022 Rectification Report	Rev0	11 June 2024
Expert Opinion Report – Landslide Assessment 10-12 View Point Road, McCrae	PSM5226-006R	PSM 2022 Causation Report	Rev0	11 June 2024
McCrae Landslide Incident – Temporary Works Advice	PSM5665-085L	2025 TW	Rev1	18 July 2025
McCrae Landslide – 2022 Landslide Temporary Works Advice	PSM5665-088L	2022 TW	Rev1	8 August 2025

Yours Sincerely

Irrelevant & Sensitive

DANE POPE
PRINCIPAL

Encl:

Appendix A Brief

Appendix B Dane Pope CV

Appendix C Hamilton Highway Slope Stabilisation Design

Appendix D PSM5665-085L Rev1

Appendix E PSM5665-088L Rev1

Appendix F PSM5665-087R Rev0

Appendix A
Brief

W E I R
Legal & Consulting

www.weirlegalconsulting.com
E bweir@weirlc.com
M I & S

Our Ref: BW:FH:25:434
Your Ref:

8 August 2025

Dane Pope
Principal
PSM Consult Pty. Ltd.
Office 16,
Level 4, 60 Moorabool Street
Geelong VIC 3220

Sent by email to: Dane.Pope@psm.com.au

Dear Dane,

Brief to prepare report regarding mitigation of hazards resulting from 2022 and 2025 landslides in McCrae

We continue to act for Mornington Peninsula Shire Council in relation to various matters arising from the landslides in 2022 and 2025 on properties at 6 and 10-12 View Point Road, McCrae.

In addition to the numerous reports you have now prepared for Council in relation to the McCrea landsides, we are instructed to brief you to provide a further report on mitigation (Mitigation Report). This report is to be provided to the Board of Inquiry on Monday 11 August 2025.

The question to be answered in the Mitigation Report is as follows:

> **What works are required to mitigate the hazards resulting from the November 2022 and January 2025 landslides at McCrae?**

In preparing your report please have regard to:

- relevant codes, standards and engineering principles for residential properties;
- safety in design;
- any requirement for temporary works.

The Mitigation Report that you produce should comply with the requirements of Order 44 of the Supreme Court (General Civil Procedure) Rules 2015. A copy of the Expert Witness Code

of Conduct set out in Form 44A is attached to this letter and you should read it prior to producing the Causation Report and include the matters referred to in clause 3 of the Code.

Should you require clarification of your instructions or further briefing material, please let us know.

Please contact Frances Hall via fhall@weirlc.com or I & S or Bronwyn Weir via bweir@weirlc.com or I & S if you have any queries or would like to discuss this matter further.

Yours faithfully
Weir Legal and Consulting Pty Ltd

I & S

Bronwyn Weir
Director

Form 44A—Expert witness code of conduct

Rule 44.01

EXPERT WITNESS CODE OF CONDUCT

Application of Code

1. This Code of Conduct applies to any expert witness engaged or appointed—

   (a) to provide an expert's report for use as evidence in proceedings or proposed proceedings; or

   (b) to give opinion evidence in proceedings or proposed proceedings.

General Duties to the Court

2. An expert witness is not an advocate for a party and has a paramount duty, overriding any duty to the party to the proceedings or other person retaining the expert witness, to assist the Court impartially on matters relevant to the area of expertise of the witness.

Content of Report

3. Every report prepared by an expert witness for use in Court must clearly state the opinion or opinions of the expert and must state, specify or provide the following—

   (a) the name and address of the expert;

   (b) an acknowledgment that the expert has read this code and agrees to be bound by it;

   (c) the qualifications of the expert to prepare the report;

   (d) the assumptions and material facts on which each opinion expressed in the report is based (a letter of instructions may be annexed);

   (e) the reasons for and any literature or other materials utilised in support of each such opinion;

   (f) (if applicable) that a particular question, issue or matter falls outside the expert's field of expertise;

   (g) any examinations, tests or other investigations on which the expert has relied, identifying the person who carried them out and that person's qualifications;

   (h) to the extent to which any opinion which the expert has expressed involves the acceptance of another person's opinion, the identification of that other person and opinion expressed by that other person;

   (i) a declaration that the expert has made all the inquiries which the expert believes are desirable and appropriate (save for any matters identified explicitly in the report) and that no matters of significance which the expert regards as relevant have, to the knowledge of the expert, been withheld from the Court;

   (j) any qualification of an opinion expressed in the report without which the report is or may be incomplete or inaccurate;

   (k) whether any opinion expressed in the report is not a concluded opinion because of insufficient research or insufficient data or for any other reason; and

   (l) where the report is lengthy or complex, a brief summary of the report at the beginning of the report.

Supplementary Report Following Change of Opinion

4. Where an expert witness has provided to a party (or that party's legal representative) a report for use in Court, and the expert thereafter changes his or her opinion on a material matter, the expert must without delay provide to the party (or that party's legal representative) a supplementary report which must state, specify or provide the information referred to in paragraphs (a), (d), (e), (g), (h), (i), (j), (k) and (l) of clause 3 of this code and, if applicable, paragraph (f) of that clause.

5. In any subsequent report (whether prepared in accordance with clause 4 or not) the expert may refer to material contained in the earlier report without repeating it.

Duty to Comply with the Court's Directions

6. If directed to do so by the Court, an expert witness shall—

   (a) confer with any other expert witness;

   (b) provide the Court with a joint report specifying (as the case requires) matters agreed and matters not agreed and the reasons for the experts not agreeing; and

   (c) abide in a timely way by any direction of the Court.

Conference of Experts

7. Each expert witness shall—

   (a) exercise the expert witness's independent judgment in relation to every conference in which the expert participates pursuant to a direction of the Court and in relation to each report thereafter provided, and must not act on any instruction or request to withhold or avoid agreement; and

   (b) endeavour to reach agreement with the other expert witness (or witnesses) on any issue in dispute between them, or failing agreement, endeavour to identify and clarify the basis of disagreement on the issues which are in dispute.

Appendix B
Dane Pope CV

Curriculum Vitae

Dane Pope
Principal Geotechnical Engineer

Dane Pope is a Principal Geotechnical Engineer at Pells Sullivan Meynink. He graduated from Griffith University, Gold Coast in 2006 with Bachelor of Engineering in Civil Engineering (Honours 1) and was awarded the University Medal. Dane joined PSM in November 2011, during which time he completed his master's degree in geotechnical engineering at UNSW in 2015.

Dane moved to Victoria in early 2016 and has actively been involved in civil infrastructure and property development projects throughout Victoria. Dane re-joined PSM in late 2019 to help to establish PSM's Victorian office.

Educational Qualifications:

- BE Hons Bachelor of Engineering (Civil), Griffith University, Gold Coast, 2006
- MEngSc. in Geotechnical Engineering, University of New South Wales, 2015

Professional Associations:

- Chartered Professional Engineer (CPEng)
- Registered Professional Engineer Queensland (RPEQ)
- Engineers Australia
- RPEV

Experience:

- 2020 – Current: Principal Geotechnical Engineer, Pells Sullivan Meynink
- 2019 – 2020: Associate Geotechnical Engineer, Pells Sullivan Meynink
- 2015 – 2019: Senior to Associate Geotechnical Engineer, P.J. Yttrup & Associates
- 2011 – 2015: Senior Geotechnical Engineer, Pells Sullivan Meynink
- Mar 2011 – Oct 2011: Geotechnical Engineer, MEC Mining
- 2006 – 2011: Geotechnical Engineer, Golder Associates
- 2005 – 2006: Undergraduate Engineer, Macdonald Sheet Piling

Field of Competence:

- Landslide Risk Assessment for Local Government and Road Authorities
- Unsaturated Soil Mechanics
- Industrial and residential subdivisional geotechnics including pavement design
- Surface Coal Mining and Quarry Operations and slope design
- Detailed instrumentation planning, installation and analysis
- Deep basement excavations

CIVIL PROJECTS

Bogong Village, Temporary Access Track, VIC

Geotechnical assessment and cut slope design for a temporary access track in deeply weathered granite and migmatite.

Great Ocean Road and inland routes, Landslide Remediation, VIC

Ongoing landslide remediation for over 20 sites from mid-2020 onwards. Sites include sideling fill batters, cut slopes and embankments in steep to very steep terrain. Remediation included rock bolt/anchor systems, rock fall netting, catch bunds, light weight fills, bored pile walls with capping beams and reconstruction of fill batters. All projects included the provision of IFC drawings and Construction Supervision Services.

Strzelecki Ranges flood recovery, Landslide Remediation, VIC

Detailed design of landslide remediation for a flood recovery site in the Strzelecki Ranges. Provision of IFC drawings.

Otway Ranges 2016 flood recovery, Landslide Remediation, VIC

Detailed design of landslide remediation for three flood recovery sites in the Otway Ranges in 2016. Designs included post and panel retaining walls, gabion walls and reconstruction of fill embankments. Provision of IFC drawings.

Cliff Road, Frankston, VIC

Landslide Risk Assessments for complex soil profile in existing landslide domain. Detailed field reconnaissance of the area. Managing complexities relating to the application of the Erosion Management Overlay (EMO) to existing properties which predate the recent application of the EMO.

Peer review, Mornington Peninsula, VIC

Peer review of Landslide Risk Assessment for development application in calcareous dune deposits.

Deviation Road, Fyansford, VIC

Landslide Risk Assessment for complex profile of Newer Volcanic Basalt overlying Gellibrand Marl. Groundwater monitoring to identify multiple aquifers.

McCurdy Road, Fyansford, VIC

Regression analysis of escarpment to inform permanent development offsets.

Wye River, Landslide Assessments, VIC

Landslide risk assessments for properties affected by the recent bushfires. Established structural domains of township to aid in better understanding mode of failure across the town. Assessment for proposed new stormwater network. Land Capability Assessments were generally completed for each proposed dwelling (for effluent disposal).

Cumberland River, Rockfall Assessment, VIC

Rock fall assessment for VicRoads included mapping by hand and photogrammetry methods. Detailed assessment of the structural controls of a 90 m high slope.

Sunshine North, Quarry infill sub-division, VIC

Rock Face Assessment of abandoned Basalt quarry for potential sub-division. Key inputs into landslide risk assessment.

Western Sydney Airport, Pavement Tender

Part of the successful bid team for the Pavement Tender. Worked with the Pavement Designers to assess risk of collapse settlement of engineered fill and differential settlement at cut/fill interfaces.

Geelong & Melbourne, Site Classification, VIC

Managing geotechnical investigations, analysis and reporting for residential developments in highly to extremely reactive soils with a focus on residual Basalt and Limestone profiles. Coordinating activities for a small team of engineers and a technician. Establishing and managing borehole reporting standards. Specialise in measuring total suction profiles to provide ground movement estimates for sites with abnormal moisture conditions. Land Capability Assessments for non-sewered properties.

Geelong Subdivisions, VIC

Geotechnical support from site investigation, pavement design and construction supervision for numerous greenfield sub-divisions in the Geelong region including Manzene Village, Lara West, Armstrong creek, Charlemont Rise, Leopold and Point Lonsdale Golf Course.

Bulk Earthworks Supervision, City of Greater Geelong, Colac Otway Shire, VIC

Provision of Level 1 certification of bulk earthworks for residential and commercial projects. Assessment and re-classification of lots to AS2870-2011.

Wintringham Social Housing, Travancore VIC

Geotechnical investigation and temporary works for basement excavation in Old Volcanics.

Barwon Water Easement Investigations, City of Greater Geelong, Colac Otway Shire, VIC

Forensic investigations into collapse settlement in stormwater and sewer easements at three sites. Development of backfill specification to reduce risk of collapse settlement.

Brownfield Basalt quarry redevelopment, Tottenham VIC

Geotechnical investigation and design advice for industrial development on complex landfill site. Ground improvement strategies including rigid inclusions.

Armstrong Creek Town Centre, Investigation & Pavement Design, VIC

Geotechnical investigation for $20M town centre including earthworks specification, detailed ground movement assessment in extremely reactive ground and pavement design.

Due Diligence - Dandenong South, VIC

Due diligence assessments for property developers across several large industrial sites throughout Dandenong South. Constraints typically including buildings approaching the end of their design life, poor quality subgrades and one backfilled sand quarry with inferred collapse settlement issues.

Deer Park, Boral, VIC

Ongoing auditing of bulk earthworks for backfill of existing Basalt quarry. Bulk earthworks design and specification for industrial development.

Campbellfield Industrial Development, Campbellfield, VIC

Investigation, settlement analysis and bulk earthworks design and supervision for proposed automated glass manufacturing facility with a high-performance building specification in a Basalt profile.

High Bay Developments and Expansion, Truganina, VIC

Investigation, design advice and specification for three different high bay shed sites in a Basalt profile. Including validation of total suction profile four years after construction of the initial pavement slabs.

High Bay Development, Moorebank, NSW

Investigation, design advice and specification for proposed high bay sheds.

Greystanes Industrial Development, NSW

Investigation, design advice and specification for proposed industrial subdivision.

ACFS Logistics Terminal, Port of Brisbane, QLD

Subgrade remediation in poor soils. Footing and subgrade inspections including plate load testing.

Soleil Tower, Ten Story Basement Excavation, Brisbane, QLD

Monitored excavation activities for a 10 storey basement car park excavation. Completed anchor inspections and review, ‘hit and miss’ sequencing, detailed instrumentation planning, implementation and reporting.

Vision Apartments, Seven Story Basement Excavation, Brisbane QLD

Geotechnical investigation. Diaphragm wall design using PLAXIS and MSHEET. Supervision of diaphragm wall and secant pile wall construction. Rock bolt design, mapping, anchor supervision and review, ‘hit and miss’ excavation sequencing on all shoring walls.

Infinity Tower, Twelve Storey Basement Design, Brisbane QLD

Geotechnical investigation including pressuremeter testing. Design of shoring walls using PLAXIS.

Springfield to Darra Rail, Pile Design, Brisbane QLD

Successful tender pile design for 6 bridges varying in size from single span to ten span viaducts.

MINING PROJECTS

Lysterfield Quarry, Boral, VIC

Development of photogrammetry model. Geotechnical review of quarry slopes and providing slope stability advice. Review and update of structural model.

Montrose Quarry, Boral, VIC

Geotechnical review of quarry slopes and providing slope stability advice including rock fall mitigation and pit re-design to manage rock fall risk.

Wollert Quarry, Boral, VIC

Geotechnical review of quarry slopes and providing slope stability advice. Biannual inspection.

Clermont Coal Mine, QLD

Western wall review including three dimensional domains using ATV, field mapping and Vulcan. Site visit to calibrate structural model. Stability analysis of structurally complex pit slopes.

Burton Coal Mine, QLD

Maximised coal recovery from large slope failures without incident. Site based geotechnical support for two open cut terrace mines. Maintenance of highwall and lowwall hazard management systems (radar and survey) and monitoring of slope failures. Civil projects included; anchor pull-out tests, wet weather road construction, crane pad selection, plate load testing.

Baralaba Central and North Operations, QLD

Design reviews of pit slopes. Site inspections to provide operational advice for unstable slopes and their interaction with large dams.

Baralaba Expansion, Geotechnical Investigations – Feasibility, QLD

Geotechnical investigation and design of the proposed 200 m deep terrace mining operations. Training of site based rig geologists.

Norwich Park (BMA), Geotechnical Management System, QLD

Seconded to BMA's Norwich Park open cut coal mine. Pit inspections, mapping, radar monitoring and implementation of a revised TARP.

Tutupan Coal Mine, Pressuremeter Testing, South Kalamantan Indonesia

Trained a Jakarta based geotechnical engineer in the use of the pressuremeter at the South Kalimantan Coal Mine.

QC LNG and Pipelines, Pressuremeter Testing and Fieldwork, Gladstone, QLD

Large pressuremeter testing program in various materials from residual clays to high strength rock. Mobilisation of drilling rigs in difficult access conditions for the narrows pipeline project including use of a hover-barge.

TUNNEL PROJECTS

Clem 7 Tunnel, Investigation & Monitoring, Brisbane QLD

Coordinated drilling activities over the tunnel alignment, including permitting, service clearances, supervision and reporting. Installed and monitored settlement monitoring equipment including magnetic and rod extensometers, vibrating wire piezometers, profile gauges and inclinometers.

Burnley Tunnel, VIC

Site based tunnel crack mapping of the tanked section of the tunnel.

Melbourn Metro Tunnel, VIC

Annual inspections and reporting on behalf of the insurer.

EXPERT OPINION/ADVICE

Cut slope instability, Geelong VIC

Geotechnical investigation into wedge failure of cut slope adjacent to a commercial development. Provision of conceptual remediation advice.

Retaining wall settlement, Victoria

Expert Opinion regarding settlement of gravity retaining wall including collapse settlement.

Residential subdivision, Western Sydney NSW

Forensic investigation into collapse settlement including review of property damage and site classification for 100's of dwellings.

Industrial subdivision, Melbourne

Forensic investigation into collapse settlement including review of property damage and remediation.

Preloading soft soils, Pinkenba QLD

Review of settlement controls and effectiveness of preloading activities for deep compressible sediments.

Damaged building assessments, Victoria

Numerous geotechnical investigations to support expert opinion reports for damaged homes on reactive ground. These typically including testing shrink swell, total suction and providing ground movement estimates for seasonal movement and movements due to the growth or removal of trees and removal of old timber floor dwellings prior to construction.

Publications, Articles and Patents

1. 1st Australian Conference on Engineering Geology Brisbane, (July 2025). In Progress Paper: Engineering Geological Models in Remote and Difficult Access Terrain: A Case Study from Bogong High Plains.
2. Developments in Engineering Geology the Geological Society (2016). Published Paper: Geological structural controls on stability of footwall slopes, an example from the Bowen Basin.
3. Field Measurements in Geomechanics (FMGM) Sydney, (Sept. 2015). Published Paper: Real-time monitoring of cut slopes and the importance of identifying the mode of failure.

Appendix C
Hamilton Highway Slope Stabilisation Design

ISCHEBECK TITAN®

Hamilton Highway
Slope Stabilisation
Geelong VIC

July 21

Project Details:

Client:	VicRoads
Design Consultant:	Soilsrock Engineering Pty Ltd
Contractor:	Geovert
Soil Nails:	375 No. 6m to 10m 40/20 Duplex bars with Ø115mm carbide drill bit
Vertical Micropiles:	34 No. 10.5m to 16.5m 52/26 Duplex bars with Ø115mm carbide drill bit
30^0 Raked Micropiles:	17 No. 12m & 8m 52/26 Duplex bars with Ø115mm carbide drill bit

Figure 1 Soil nailed slope stabilised with Titan 40/20 Duplex hollow bar anchors

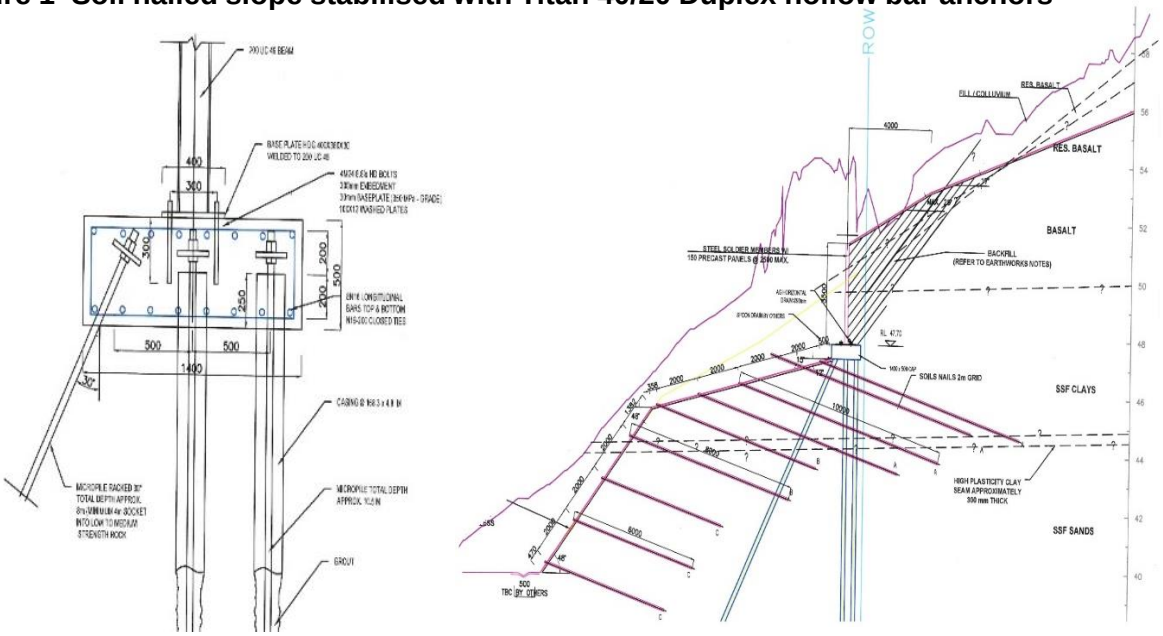

Figure 2 Design by Soilsrock Engineering Pty Ltd

TITAN Self-Drilling Hollow Anchor bars

Independently Certified 100$^+$ years Design Life

Soil Nails
Rock Bolts
Stressed Ground Anchors
Tension and Compression Micropiles

PERMANENT German DIBt Approval Z-34.14-209 100+ Years

Ischebeck Titan Australia
197 Queens Road
Kingston QLD 4114
Tel: +61 7 3208 1158
Email: info@ischebeck-titan.com.au
Web: www..ischebeck-titan.com.au

ISCHEBECK TITAN

Hamilton Highway
Slope Stabilisation
Geelong VIC

July 21

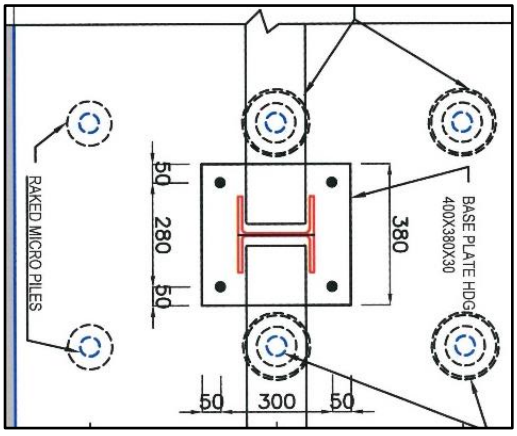

Figure 3 Titan 52/26 A Frame Micropiles for Retaining Wall Footing

Figure 4 Collapsed Slope Prior to Stabilisation

Figure 5 Completed Slope

Ischebeck Titan Australia
197 Queens Road
Kingston QLD 4114
Tel: +61 7 3208 1158
Email: info@ischebeck-titan.com.au
Web: www..ischebeck-titan.com.au

Appendix D
PSM5665-085L Rev1

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Geelong VIC 3220
P +61 3 7068 5699
E mailbox@psm.com.au
www.psm.com.au

Our Ref: PSM5665-088L REV1

7 August 2025

Senior Project Manager
Mornington Peninsula Shire Council
Private Bag 1000
Rosebud VIC 3939
aidan.gallagher@mornpen.vic.gov.au

Attention: Aidan Gallagher

Dear Aidan

RE: MCCRAE LANDSLIDE
2022 LANDSLIDE TEMPORARY WORKS ADVICE

1. Introduction

This letter provides advice to support the implementation of temporary works at, and around, the 2022 McCrae Landslide (the **Site**).

This advice has been prepared at the request of Mr Aidan Gallagher, the Mornington Peninsula Shire Council (MPSC) Senior Project Manager via email on 28 July 2025.

2. Objectives

The Site has an accumulation of landslide debris from the 2022 Landslide, refer Figure 1. The landslide debris covers the extents of Penny Lane, 10 – 12 View Point Road, Unit 3, 613 Point Nepean Road and 2 Penny Lane, referred to as the **Working Area**.

We understand that the MPSC would like to remove the landslide debris at Penny Lane to allow access for investigations for a debris wall design in the Working Area. Removal of landslide debris within the properties, 10 – 12 View Point Road, Unit 3, 613 Point Nepean Road and 2 Penny Lane is not under the scope of this temporary works advice.

3. Hazards

We have identified the following key immediate or short-term hazards at the Site:

- Mobilisation and flow of the 2022 landslide debris
- Failure of undercut natural ground surface during excavation works, leading to volumes of soil and debris sliding or flowing downslope.

4. Design Advice

To mitigate risk from the identified hazards and support the project objectives, the following works (in conjunction with Figure **1** to Figure **3**) are recommended:

1. Establish the cadastral boundaries on Site.
2. Undertake a Site investigation to confirm the depth of the landslide debris at the Penny Lane and 10 – 12 View Point Road boundary. Site investigation to be undertaken by a PSM Geotechnical Engineer.
3. Confirm extents of excavation following Site investigation.
4. Remove landslide debris on Penny Lane with a target slope angle between 30° and 35°. The target slope angle is to be reassessed by PSM Geotechnical Engineer during the works based on the ground conditions.
5. Grade the surface at and adjacent to where landslide debris has been removed following completion of excavation to prevent ponding of water at the surface.

Excavation works should be undertaken in the presence of a PSM Geotechnical Engineer to provide direction and modify the scope of activities as required.

5. Construction

5.1 Approach

We recommend that the excavation is undertaken by a small excavator say 3t to 5t excavator or hand tools to allow greater precision and control in excavation. It is recommended that the excavation commences away from the property boundaries followed by careful excavation near the property boundaries to achieve the target slope.

It is recommended that the surface water is directed to the MPSC stormwater pit located approximately 30 m south-west of the Site.

All excavated spoil must be removed from the Working Area. Spoil may be removed from Site or stockpiled at an appropriate location at MPSC's discretion.

5.2 Risk Management During Works

Works at the Site require careful planning and management by MPSC and its Contractors/ Designers to understand and control the associated risks during works. Contractors and Designers must be experienced in works around landslides. Further, landslides are dynamic, meaning it is difficult to foresee and plan for all hazards in design. Instead, a progressive, observational and collaborative approach to works is necessary, i.e. initial a small amount of excavation is completed, and the performance is observed by the Contractor and Designer with the approach updated as required.

Advice for the management and control of geotechnical risk during the works can be provided in a separate report if required.

Key aspects of risk management that require development prior to commencing works include:

- Requirements for geotechnical inspections, verification and directions during the works
- Monitoring requirements during the works, including:
  - Visual
  - Displacement
  - Groundwater
  - Climate

- Contingency plans
- Exposure to other landslide hazards
  - 2025 landslides (5 January 2025 and 14 January 2025 events) when working near the East side of the Penny Lane.

5.3 Introduced Hazards

Mitigation of existing hazards may create new hazards. Hazards that we anticipate may be created during the works are:

- Sliding of existing landslide debris
- Undermining or damage to vegetation.

These hazards must be considered in works planning and risk management activities and appropriately mitigated during the works.

5.4 Post Construction Matters for Resolution

We have identified the following key post construction matters that require resolution by MPSC:

- Post construction monitoring and inspection requirements
- Maintenance requirements and responsibilities.

6. Service life

6.1 Effective Service Life

The proposed works are short term works only, with expected service life in the order of months, not years. The effective life of the temporary works treatments will be largely dependent on the weather conditions, as high or intense rainfall events will cause episodic deterioration to the slope. Longer term remedial works are required following temporary works to reinstate stability to the area and mitigate landslide risk in the long term.

Yours Sincerely

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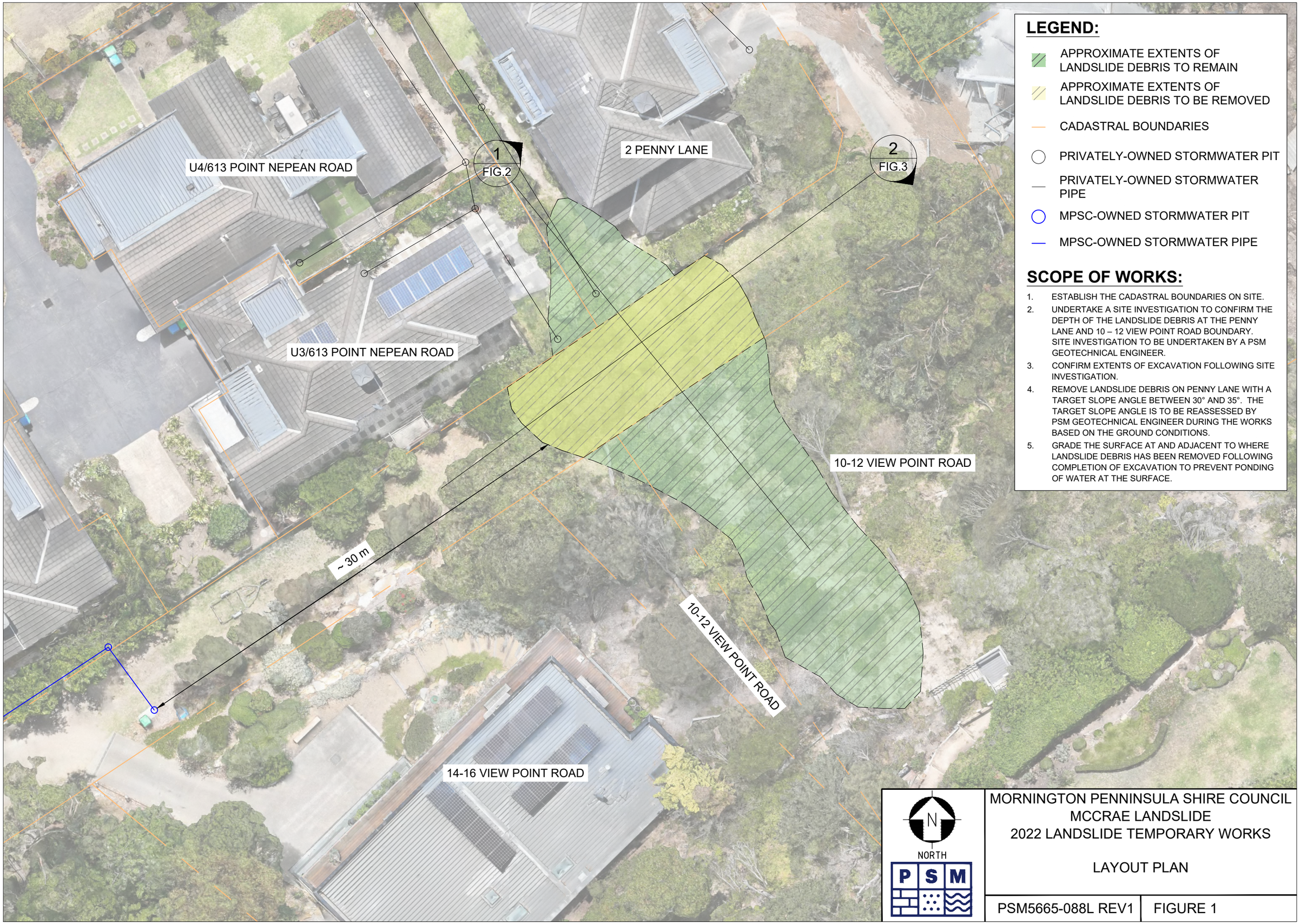
PRINCIPAL

Encl:

Figure 1: Temporary Works – 2022 Landslide – Plan View

Figure 2: Temporary Works – 2022 Landslide – Section 1

Figure 3: Temporary Works – 2022 Landslide – Section 2



LEGEND:

- APPROXIMATE EXTENTS OF LANDSLIDE DEBRIS TO REMAIN
- APPROXIMATE EXTENTS OF LANDSLIDE DEBRIS TO BE REMOVED
- CADASTRAL BOUNDARIES
- PRIVATELY-OWNED STORMWATER PIT
- PRIVATELY-OWNED STORMWATER PIPE
- MPSC-OWNED STORMWATER PIT
- MPSC-OWNED STORMWATER PIPE

SCOPE OF WORKS:

1. ESTABLISH THE CADASTRAL BOUNDARIES ON SITE.
2. UNDERTAKE A SITE INVESTIGATION TO CONFIRM THE DEPTH OF THE LANDSLIDE DEBRIS AT THE PENNY LANE AND 10 – 12 VIEW POINT ROAD BOUNDARY. SITE INVESTIGATION TO BE UNDERTAKEN BY A PSM GEOTECHNICAL ENGINEER.
3. CONFIRM EXTENTS OF EXCAVATION FOLLOWING SITE INVESTIGATION.
4. REMOVE LANDSLIDE DEBRIS ON PENNY LANE WITH A TARGET SLOPE ANGLE BETWEEN 30° AND 35°. THE TARGET SLOPE ANGLE IS TO BE REASSESSED BY PSM GEOTECHNICAL ENGINEER DURING THE WORKS BASED ON THE GROUND CONDITIONS.
5. GRADE THE SURFACE AT AND ADJACENT TO WHERE LANDSLIDE DEBRIS HAS BEEN REMOVED FOLLOWING COMPLETION OF EXCAVATION TO PREVENT PONDING OF WATER AT THE SURFACE.

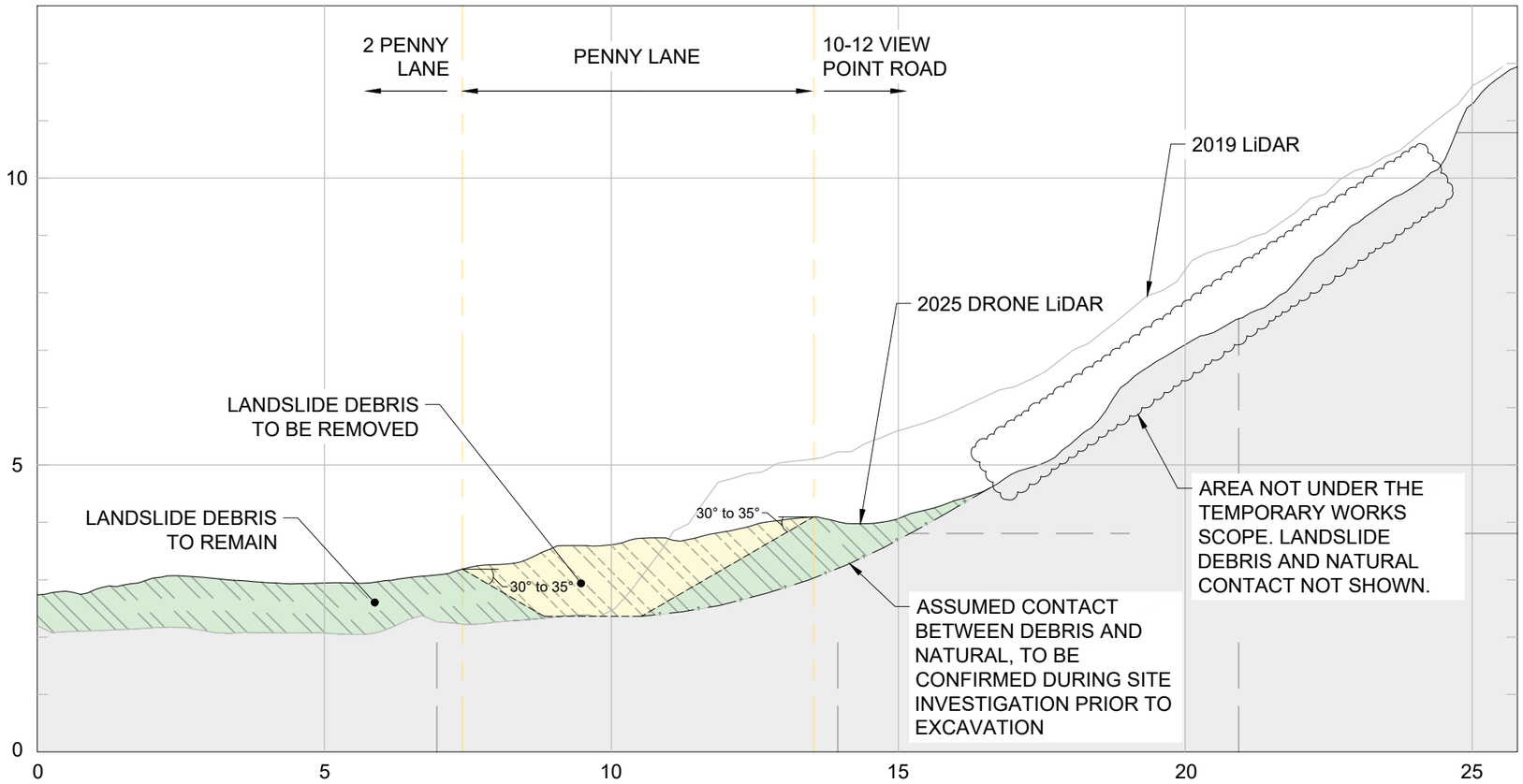
NORTH

PSM

MORNINGTON PENNINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
2022 LANDSLIDE TEMPORARY WORKS

LAYOUT PLAN

PSM5665-088L REV1 | FIGURE 1



SECTION 1

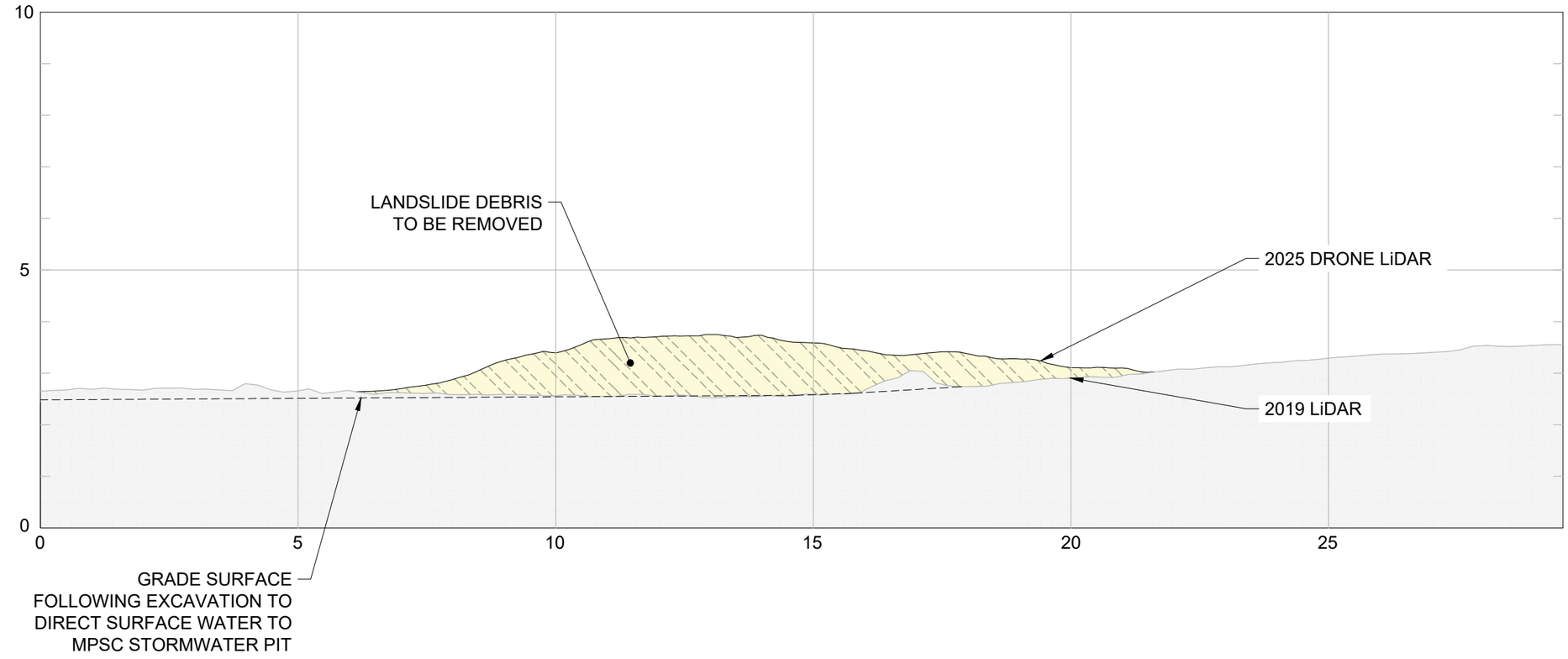
SCALE 1:100

FIG. 1

MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
2022 LANDSLIDE TEMPORARY WORKS

SECTION 1

PSM5665-088L REV1 | FIGURE 2



SECTION 2

SCALE 1:100

FIG. 1

MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
2022 LANDSLIDE TEMPORARY WORKS

SECTION 2

PSM5665-088L REV1 | FIGURE 3

Appendix E
PSM5665-088L Rev1

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Our Ref: PSM5665-085L REV 1

18 July 2025

Municipal Building Surveyor
Mornington Peninsula Shire Council
Private Bag 1000
Rosebud VIC 3939
david.kotsiakos@mornpen.vic.gov.au

Attention: David Kotsiakos

Dear David

RE: MCCRAE LANDSLIDE INCIDENT - TEMPORARY WORKS ADVICE

1. Introduction

This letter provides advice to support the implementation of temporary works at, and around, the McCrae Landslide Incident (the **Site**).

This advice has been prepared at the request of Mr David Kotsiakos, the Mornington Peninsula Shire Council (MPSC) Municipal Building Surveyor (MBS).

2. Objectives

The Site has over steepened and unstable material on the slope because of the 5 January 2025 and 14 January 2025 Landslides. The ground conditions and stability of the ground are anticipated to deteriorate with time. We understand that council is concerned with risks posed by deterioration of ground conditions in and around the landslide.

We understand that the MBS would like to mitigate risk from the landslide hazards to facilitate:

- Partial demolition of 3 Penny Lane
- Temporary repair work to 607-609 Point Nepean Road
- Possible investigations and construction of longer term remedial works.

We also understand that the MBS intends to undertake temporary works in a staged approach with the following staging:

- Stage 1 – Flattening works at head of landslide
- Stage 2 – Building works at toe of slope
- Stage 3 – Midslope works
- Stage 4 – Additional works at landslide head.

3. Hazards

We have identified the following key immediate or short-term hazards at the Site:

- Regression of landslide head scarp, leading to volumes of soil and debris sliding or flowing downslope
- Failure of undercut material in landslide flanks, leading to volumes of soil and debris sliding or flowing downslope
- Mobilisation and flow of previously failed material remaining on upper slope
- Uncontrolled collapse of retaining walls or garden walls, which may tumble or slide downslope. Soil and material behind the wall may also then collapse due to a lack of support
- Failure/overturning of trees
- Undermining of structural foundations with subsequent damage or collapse of structures.

4. Design advice

To mitigate risk from the identified hazards and support the project objectives the following works (in conjunction with Figure 1 to Figure 3) are recommended:

Stage 1 – Landslide head initial works

1. Flatten the landslide headscarp to a target slope angle of 35°. The target slope angle is to be reassessed by the Geotechnical Engineer during the works based on the ground conditions. It may be revised steeper to maximum of 45° or flatter as necessary. Numerous site constraints limit the achievable slope angle, and the target slope angle may not be achieved for the entire headscarp area. The excavated angle will need to be adjusted during the works with different slope angles smoothly blended together. Areas where the target angle may not be achieved include:
    a. In close proximity to the building at 6 View Point Road, slope angles of approximately 65° will be necessary to avoid undermining of the existing building slab and piled foundation.
    b. Behind the retaining wall slope angles of approximately 45° to 50° will be necessary to avoid undermining of the masonry garden wall foundation.
2. Trim over steepened portions of slope in the west flank, matching into surrounding slopes.
3. Trim over steepened portions of slope in the east flank, matching into surrounding slopes and headscarp flattening.
4. Partially demolish existing retaining walls (Post numbers are counted west to east):
    a. Post 4 (already failed) to be removed including concrete pile foundation.
    b. Post 3 to be assessed for stability. Where stable, the steel post shall be cut to the top of concrete pile foundation. Where unstable the post and concrete pile foundation shall be removed.
    c. Post 1 and Post 2 to be assessed for stability. Where unstable they shall be removed post and concrete pile foundations. Where stable they shall remain in place and cut if directed.
    d. Sleepers between Post 2 and Post 3 to be removed.
    e. Sleepers between Post 1 and Post 2 to be removed as directed during works.
    f. Deadman anchors and blocks to be removed (located approximately 3 to 5 m behind Post 2 to Post 5).
5. Remove all planter boxes.
6. Remove trees within the headscarp flattening area. Extent of root grubbing to be confirmed during works.
7. Remove landscaping pavers next to building at 6 View Point Road.

8. Existing rainwater tank at 6 View Point Road:
    a. Locate.
    b. Remove if located within headscarp flattening area. May require partial demolition of overlying concrete slabs.
    c. Redirect plumbing that connects to tank to legal point of discharge.
9. Remove all star picket and timber landscaping treatments. Trim any resulting over steepened slopes.
10. Relocate or decommission monitoring equipment in works area, prior to commencing works.
11. All excavated spoil shall be removed from the slope or spread thinly as directed by Geotechnical Engineer. Soil shall be spread to not allow damming or ponding of water.

Stage 2 – Slope toe works

Demolition of 3 Penny Lane and building repair work at 607-609 Point Nepean Road. Scope to be developed by others.

Stage 3 – Midslope works

12. Remove debris, loose soil and dislodged vegetation at surface including:
    a. Fence materials.
    b. Concrete retaining wall sleepers.
    c. Retaining wall posts.
    d. Timber sleeper and star picket landscaping treatments.
    e. Pots.
    f. Drainage materials (e.g. Agi pipe).
    g. Trees and shrubs.
    h. Excavated spoil, not removed during Stage 1.

Stage 4 – Landslide head additional works

Scope to be confirmed. Refer Section 6.2.

All works (excluding Stage 2) should be undertaken in the presence of a PSM senior geotechnical engineer to provide direction and modify the scope of activities as required.

5. Construction

5.1 Approach

We recommend that the temporary works are undertaken (at least initially) by small scale top-down excavation using hand tools and rope access techniques. Our recommendation is based on our experience in the management of and construction within active landslides as well as consultation with contractors experienced in remediating landslides. Hand excavation is preferred over machine excavation for the following reasons:

- Avoids demolition of existing buildings to accommodate access for machinery
- Limits or avoids removal of vegetation
- Avoids heavy loading from machinery at top of slope
- Not restricted to machinery reach limits (i.e. can work across whole slope, not just where it can reach)
- Allows greater precision and control in excavation.

All excavated spoil must be removed from the slope. Following Stage 2, it may be possible for machinery (e.g. long reach excavator or spider excavator) to access from the toe of slope. Spoil may be removed from Site or appropriately stockpiled at the toe of the slope at MPSC's discretion.

5.2 Risk management during works

Excavation in and work on/around landslides is hazardous. Works at the Site require careful planning and management by MPSC and its Contractors/Designers to understand and control the associated risks during works. Contractors and Designers must be experienced in works on and around landslides. Further, landslides are dynamic, meaning it is difficult to foresee and plan for all hazards in design. Instead, a progressive, observational and collaborative approach to works is necessary, i.e. initially a small amount of excavation is completed, and the performance is observed by the Contactor and Designer with the approach updated as needed prior to the next round of excavation.

Advice for the management and control of geotechnical risk during the works will be provided in a separate report. We understand that MPSC will request PSM to provide this advice prior to commencing works possibly in collaboration with MPSC's preferred Contractor.

Key aspects of risk management that require development prior to commencing works include:

- Requirements for geotechnical inspections, verification and directions during the works
- Monitoring requirements during the works, including:
  - Visual
  - Displacement
  - Groundwater
  - Climate
- Construction methodologies
- Contingency plans
- Exposure to other landslide hazards
  - 2022 landslide if working in Penny Lane
  - Retaining walls that may have been damaged due to landslide and/or are not able to support construction loads from temporary works activities.

5.3 Hold Points

As stated in Section 5.2 a progressive, observational and collaborative approach to works is necessary given the nature of the works and the number of unknowns. At various points during the works, it will be necessary to inspect the works and make assessment of the conditions before deciding on the subsequent course of action to be taken. Works shall be held at these points and shall only proceed following instruction from the appropriate party. Specific and detailed hold points are to be developed as part of the works planning. Key points requiring inspection and further direction prior to proceeding with work include:

- Headscarp flattening slope angle
- Condition of existing retaining walls, including stability of posts
- Nature and stability of material behind existing retaining walls, including possible loose scoria gravels
- Extent of trimming in east and west flanks
- Location of buried structures (e.g. deadmans, foundations, tanks, etc.).

5.4 Introduced hazards

Mitigation of the existing hazards may create new hazards. Hazards that we anticipate may be created during the works are:

- Excavated spoil and debris remaining on the slope with potential to landslide
- Undermining of foundations with potential impacts to stability of the structure, which includes building, retaining walls, garden walls, etc.
- Undermining or damage to vegetation.

These hazards must be considered in works planning and risk management activities and appropriately mitigated during the works.

Excavation works in close proximity to the building structure at 6 View Point Road has potential to impact the building structure. PSM in collaboration with TTW are currently preparing separate advice regarding potential impacts to the building.

5.5 Post construction matters for resolution

We have identified the following key post construction matters that require resolution by MPSC:

- Post construction monitoring and inspection requirements
- Maintenance requirements and responsibilities
- Decommissioning of any assets built as part of temporary works
- Ownership of any built assets.

6. Service life

6.1 Effective service life

The proposed works are short term works only, with expected service life in the order of months, not years. The effective life of the temporary works treatments will be largely dependent on the weather conditions, as high or intense rainfall events will cause episodic deterioration to the slope. Longer term remedial works are required following temporary works to reinstate stability to the area and mitigate landslide risk in the long term.

6.2 Stage 4 - Additional works

Where MPSC wishes to extend the effective life of temporary works they may consider additional works to that recommended in Section 4. The following works may extend the effective life of the temporary works, they are listed in increasing order of effectiveness:

- Surface drainage, which may consist of diversions behind crest of slope and/or more formal drainage on slope to prevent erosion in the flow channel undercutting slopes
- Erosion protection of the slope:
  - Vegetation, possibly with support from stabilising agents such as hydromulch, polymer binders, bonded fibre matrix products, etc
  - Geofabric (e.g. Bidim)
  - Other geotextiles (e.g. geocells, concrete canvas, turf reinforcement mats, etc.)
- Flatter slope angles in constrained areas, this would require demolition of existing built works
- Subsurface drainage (e.g. sub-horizontal drains drilled through face or HDD from street, dewatering wells, etc.)
- Thin shotcrete/fibrecrete with shallow driven soil nails

- Stabilisation:
  - Shotcrete retaining walls (drilled and grouted soil nails and thick shotcrete facing) on the slope face
  - Soil nails (drilled and grouted) with flexible facing on the slope face
  - Cantilever retaining walls (e.g. sheet piles, bored piles, post and panel retaining walls) in front of the slope with backfilling.

Yours Sincerely

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ANDREW WILSON
ASSOCIATE

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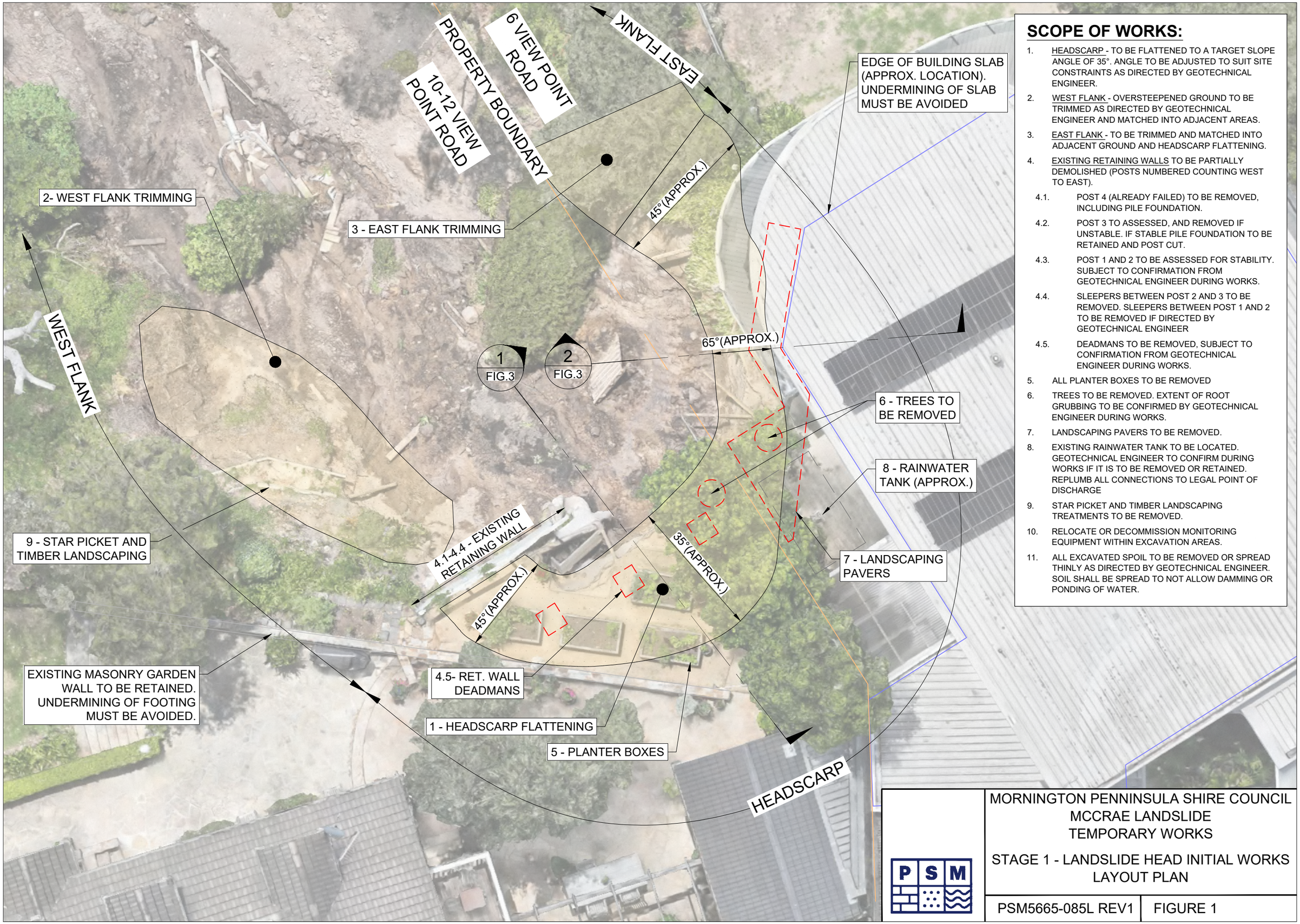
PRINCIPAL

Enclosed:

FIgure 1 – Temporary works - plan view

Figure 2 – Temporary works - oblique view

Figure 3 – Temporary works - typical sections



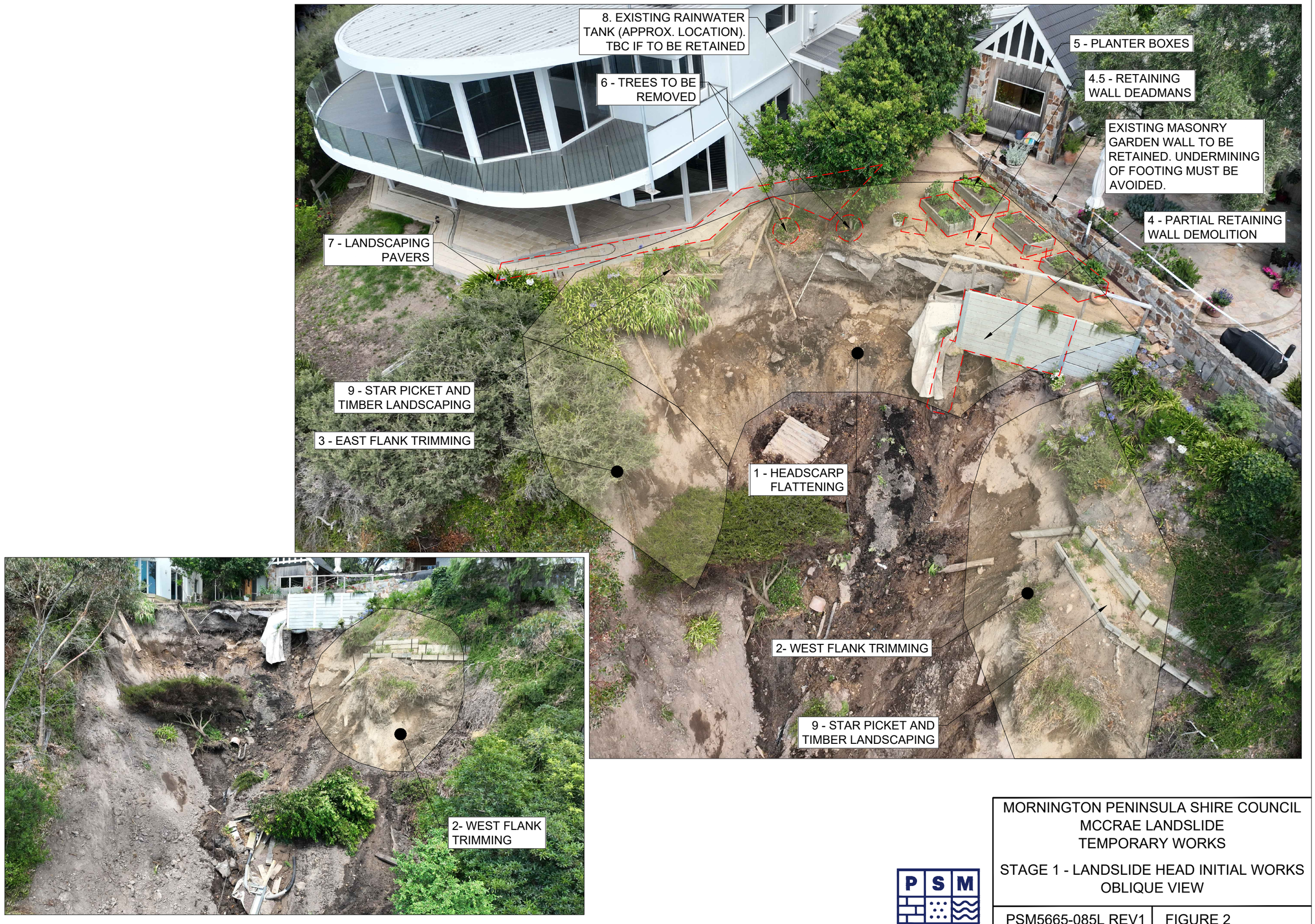
SCOPE OF WORKS:

1. HEADSCARP - TO BE FLATTENED TO A TARGET SLOPE ANGLE OF 35°. ANGLE TO BE ADJUSTED TO SUIT SITE CONSTRAINTS AS DIRECTED BY GEOTECHNICAL ENGINEER.
2. WEST FLANK - OVERSTEEPENED GROUND TO BE TRIMMED AS DIRECTED BY GEOTECHNICAL ENGINEER AND MATCHED INTO ADJACENT AREAS.
3. EAST FLANK - TO BE TRIMMED AND MATCHED INTO ADJACENT GROUND AND HEADSCARP FLATTENING.
4. EXISTING RETAINING WALLS TO BE PARTIALLY DEMOLISHED (POSTS NUMBERED COUNTING WEST TO EAST).
   - 4.1. POST 4 (ALREADY FAILED) TO BE REMOVED, INCLUDING PILE FOUNDATION.
   - 4.2. POST 3 TO ASSESSED, AND REMOVED IF UNSTABLE. IF STABLE PILE FOUNDATION TO BE RETAINED AND POST CUT.
   - 4.3. POST 1 AND 2 TO BE ASSESSED FOR STABILITY. SUBJECT TO CONFIRMATION FROM GEOTECHNICAL ENGINEER DURING WORKS.
   - 4.4. SLEEPERS BETWEEN POST 2 AND 3 TO BE REMOVED. SLEEPERS BETWEEN POST 1 AND 2 TO BE REMOVED IF DIRECTED BY GEOTECHNICAL ENGINEER
   - 4.5. DEADMANS TO BE REMOVED, SUBJECT TO CONFIRMATION FROM GEOTECHNICAL ENGINEER DURING WORKS.
5. ALL PLANTER BOXES TO BE REMOVED
6. TREES TO BE REMOVED. EXTENT OF ROOT GRUBBING TO BE CONFIRMED BY GEOTECHNICAL ENGINEER DURING WORKS.
7. LANDSCAPING PAVERS TO BE REMOVED.
8. EXISTING RAINWATER TANK TO BE LOCATED. GEOTECHNICAL ENGINEER TO CONFIRM DURING WORKS IF IT IS TO BE REMOVED OR RETAINED. REPLUMB ALL CONNECTIONS TO LEGAL POINT OF DISCHARGE
9. STAR PICKET AND TIMBER LANDSCAPING TREATMENTS TO BE REMOVED.
10. RELOCATE OR DECOMMISSION MONITORING EQUIPMENT WITHIN EXCAVATION AREAS.
11. ALL EXCAVATED SPOIL TO BE REMOVED OR SPREAD THINLY AS DIRECTED BY GEOTECHNICAL ENGINEER. SOIL SHALL BE SPREAD TO NOT ALLOW DAMMING OR PONDING OF WATER.

MORNINGTON PENNINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
TEMPORARY WORKS

STAGE 1 - LANDSLIDE HEAD INITIAL WORKS LAYOUT PLAN

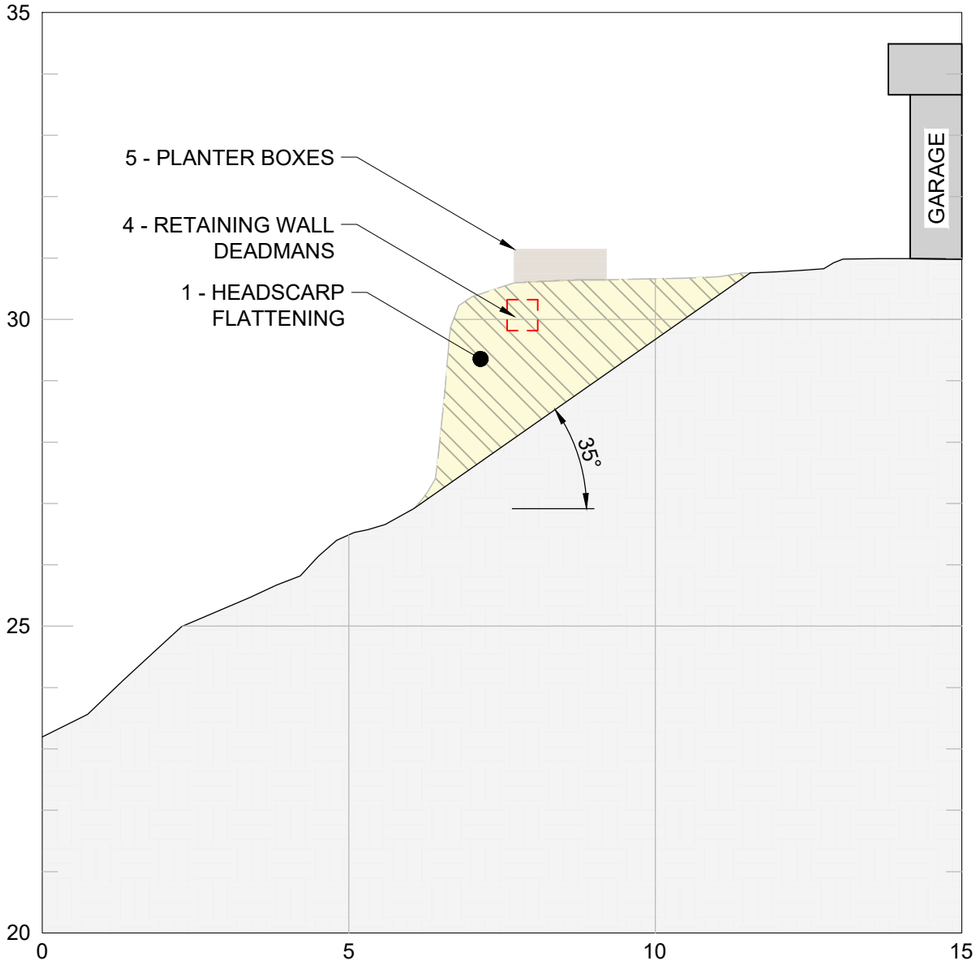
PSM5665-085L REV1 | FIGURE 1



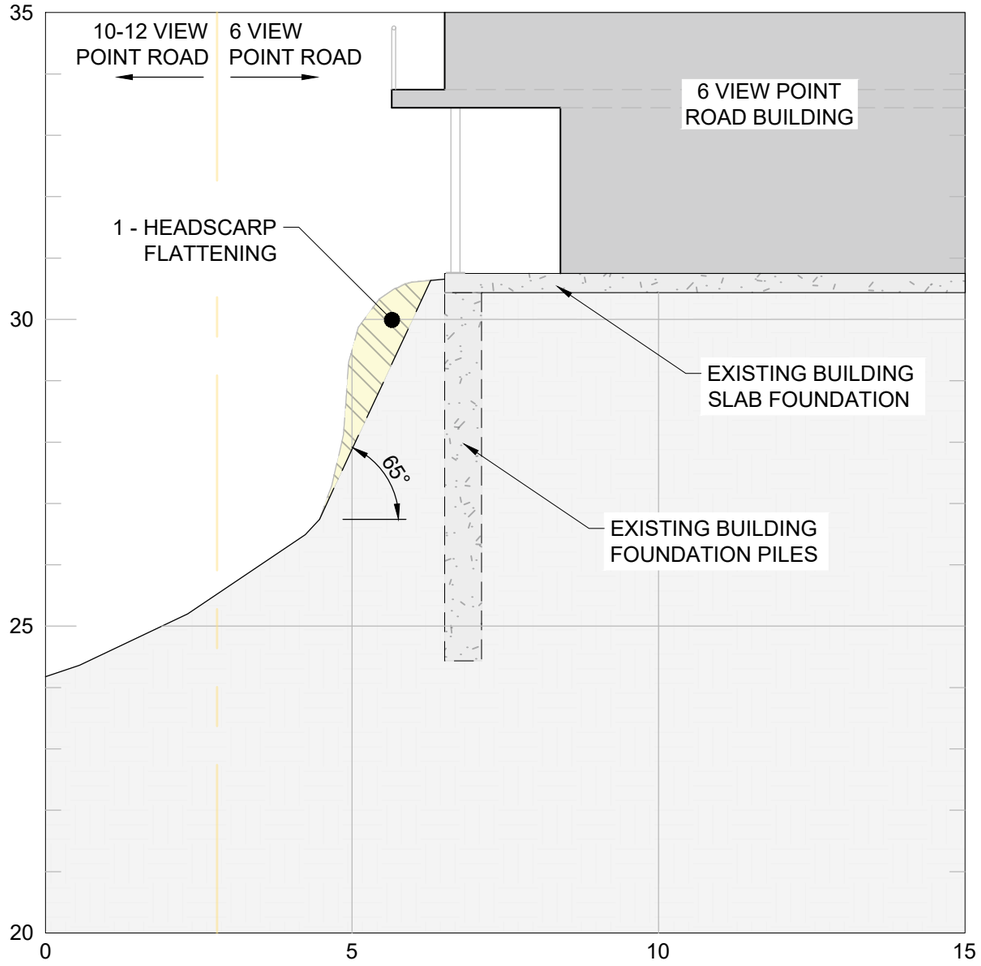
MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
TEMPORARY WORKS

STAGE 1 - LANDSLIDE HEAD INITIAL WORKS
OBLIQUE VIEW

PSM5665-085L REV1	FIGURE 2



SECTION 1
SCALE 1:100
FIG. 1



SECTION 2
SCALE 1:100
FIG. 1

MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
TEMPORARY WORKS

STAGE 1 - LANDSLIDE HEAD INITIAL WORKS
TYPICAL SECTIONS

PSM5665-085L REV1 | FIGURE 3

Appendix F
PSM5665-087R Rev0

McCrae Landslide

Remedial Works

PSM5665-087R 11 August 2025

PRIVILIGED AND CONFIDENTIAL

Table of Contents

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1. Introduction

PSM has been requested by the Mornington Peninsula Shire Council (**MPSC**) to prepare high level long term remedial works advice for the landslide hazards presented by the 2022 Landslides and the 2025 Landslides, referred to collectively as the "***Landslides***", Figure 1. With regards to Figure 1, the red hatched zones are referred to as the "***Site***". This report has been prepared in response to a Brief provided by Weir Legal (WL) on 8 August 2025 (**the Brief)**. The Brief is included in an attachment to PSM5665-090L (11 August 2025).

Although the advice in this report is conceptual, based on PSM experience in implementing similar projects, it is our opinion that it has been developed sufficiently to promote meaningful discussions with other experts.

1.1 Objective

The objective of this report is to respond to the Brief.

Hazards that are not included in the areas defined as the Landslides are excluded from the scope of services. Further advice should be sought where treatments in other areas are required.

1.2 Scope of Work

This report includes:

- Discussion of set of assumed performance objectives
- Brief discussion of remediation options proposed in the **WSP Causation Report** (document ref. PS224394-WSP-MEL-GEO-REP-001 Rev 0 dated 21 July 2025)
- PSM's preferred remediation options for the Landslides.

1.3 Properties Impacted by the 2022 and 2025 Landslides

This report is prepared with the view of remediating landslide hazards specifically from the Landslides. Properties that are "**Directly Impacted**" by the Landslides include those properties that are subject to ground loss or debris runout associated with the Landslides or immediately downslope of the Landslides, Table 1 and Figure 1. This report only includes discussions for properties Directly Impacted by the Landslides.

Table 1 – Properties Directly Impacted by 2022 and 2025 Landslides

Property	Description of Landslide Impact
6 View Point Road	2025 Landslide head scarp impact to land and dwelling
10-12 View Point Road	2022 and 2025 Landslide head scarps impact to land
2 Penny Lane	2022 Landslide debris impact to land and dwelling
3 Penny Lane	2025 Landslide impact to land and dwelling
605 Point Nepean Road	Immediately downslope of 2025 Landslide impact to land and dwelling
607-609 Point Nepean Road	2025 Landslide impact to land and dwelling
Unit 3/613 Point Nepean Road	2022 Landslide debris impact to land and dwelling
Unit 4/613 Point Nepean Road	Immediately downslope of 2022 Landslide, impact to land and dwelling

2. PSM Reports

PSM has prepared relevant reports listed in Table 2. Note that the 2025 Landslide area Temporary Works (**TW**) advice is currently under peer review and is subject to revision.

Table 2 – PSM reports

Report Title	File Name	Abbreviation	Revision	Date
McCrae Landslide – Causation	PSM5665-075R	PSM Causation Report	Rev0	21 July 2025
GFR	PSM5665-GFR	PSM GFR	Rev0	9 April 2025
LRA	PSM5665-LRA	PSM LRA	Rev1	28 May 2025
McCrae Landslide – Stormwater and Sewer Investigation Geotechnical Factual Report	PSM5665-070R		DRAFT RevA	13 June 2025
Expert Opinion Report – Rectification 10-12 View Point Road, McCrae	PSM5226-005R	PSM 2022 Rectification Report	Rev0	11 June 2024
Expert Opinion Report – Landslide Assessment 10-12 View Point Road, McCrae	PSM5226-006R	PSM 2022 Causation Report	Rev0	11 June 2024
McCrae Landslide Incident – Temporary Works Advice	PSM5665-085L	2025 TW	Rev1	18 July 2025
McCrae Landslide – 2022 Landslide Temporary Works Advice	PSM5665-088L	2022 TW	Rev1	8 August 2025

3. Performance Objectives

3.1 General

The remedial works should be selected and designed to satisfy a set of defined performance objectives. The performance objectives need to be developed and agreed to by the various stakeholders prior to preparing detailed designs for the works. It is not the role of a consulting design engineer (**the Designer**) to nominate the performance objectives. It is the role of the Designer to prepare a design that satisfies the requirements.

Typically, performance objectives in a residential setting on a hillside (referred to herein as the "**Residential Development Objectives**" are based on:

1. The National Construction Code (NCC).
2. Relevant Australian Standards (AS).
3. Australian Geomechanics Society Practice Note Guidelines for Landslide Risk Management (AGS (2007)c) and Commentary (AGS (2007)d) and associated technical references.
4. The Building Act (1993).
5. Building Regulations (2018).
6. The design objectives of the Local Government Authority (MPSC).
7. A design life of 50 years (**the "Design Life"**).

Often in landslide engineering works, the design requirements, and particularly the required outcomes are not well defined and can be excluded from some AS. For Example, AS4678 (2002) *Earth-Retaining Structures* excludes landslides (Clause 1.2.1 of AS4678). Although there are still relevant sections to design in such standards, landslide remediation must be grounded in good first principles engineering and supported by a robust engineering geological model. Importantly, the design must respond to the mechanisms of failure.

It is possible that the performance objectives may initially result in designs that are uneconomical for the parties commissioning the works. A revised set of performance objectives may need to be developed and agreed upon by all stakeholders. This may require an iterative process.

In Section 3.2 PSM has assumed a set of performance objectives that in our opinion are reasonable starting point for the purpose of developing initial concept design options and can be adjusted as agreed to by the relevant stakeholders.

3.2 Design Assumptions

PSM has assumed that the performance objectives are those consistent with the "**Residential Development Objectives**", Section 3.1. In the preparation of this report the following **key assumptions (Design Assumptions)** have been adopted:

1. Rebuilding and return of people to 3 Penny Lane will be on the basis satisfactory future planning and building approvals/works that must include a Landslide Risk Assessment (LRA) in accordance with AGS(2007c). Consistent with current MPSC practice this will include independent peer review of the LRA. PSM note that it may not be economically feasible to reconstruct 3 Penny Lane to satisfy modern standards. This is not only due to the existing Landslides but also other landslide hazards on the property.
2. The landform geometry pre-failure is not required to be reinstated.
3. Remedial works are to achieve a minimum FOS of 1.5 for global stability (under static conditions) for the Design Life (MPSC requirement). An FOS of 1.5 is based on our understanding of MPSC's minimum requirements (refer to Mr Pope's Brief in the PSM 2022 Causation Report).
4. The most onerous design requirements in the Residential Development Objectives will govern design. For example, where AS5100 Bridge Design (2017) is adopted for design of bonds for soil nails, rock dowels and anchors it is likely that reduction factors adopted in accordance with AS5100 (2017) will result in a FOS for global stability much greater than 1.5.
5. Designs are to be undertaken in accordance with Australian Standards (where relevant) and good first principles engineering.
6. Completed remedial works will be owned and maintained by the property owners of the land on which the works have been constructed.

4. WSP Remediation Options

Section 9 of the WSP Causation report includes the following remediation options for the 2025 Landslide:

1. Soil nails and shotcrete facing to support the headscarp (Paragraph 204(a) of the WSP Causation report).
   a. WSP notes that constructability issues may make this option infeasible.
2. Reinstatement of detached material using rockfill (Paragraph 204(b) of the WSP Causation report).
   a. Additional details are provided in Appendix F of the WSP Causation report.
3. Reinstate the slope using a gabion wall or crib wall (Paragraph 204(c) of the WSP Causation report).
4. Installation of groundwater extraction wells (Paragraph 215 of the WSP Causation report).
   a. Additional details are provided in Appendix F of the WSP Causation report.

4.1 WSP Remediation Option: Reinstatement of Detached Material Using Rockfill

WSP proposes to reinstate material that detached as a result of the 2025 Landslide with an engineered rockfill comprising high strength interlocking boulders reinforced with geogrid. The rockfill is proposed to be constructed from the mid-slope to the crest, and constructed at an angle no steeper than 1H:1V Inset 1 and Inset 2. The proposed design includes a bench cut into the existing slope, Inset 2. I note that this bench does not appear to be back tilted.

Appendix F of the WSP Causation Report includes drawings (pdf pages 268 and 269 of the WSP Causation report) showing this remediation option and include:

- A 17 m long bored pile wall at the toe of the rockfill (mid slope), Inset 3
- Piles 600 mm diameter and approximately 3 m depth, Inset 4
- A capping beam, inferred from Inset 4 and not explicitly stated.

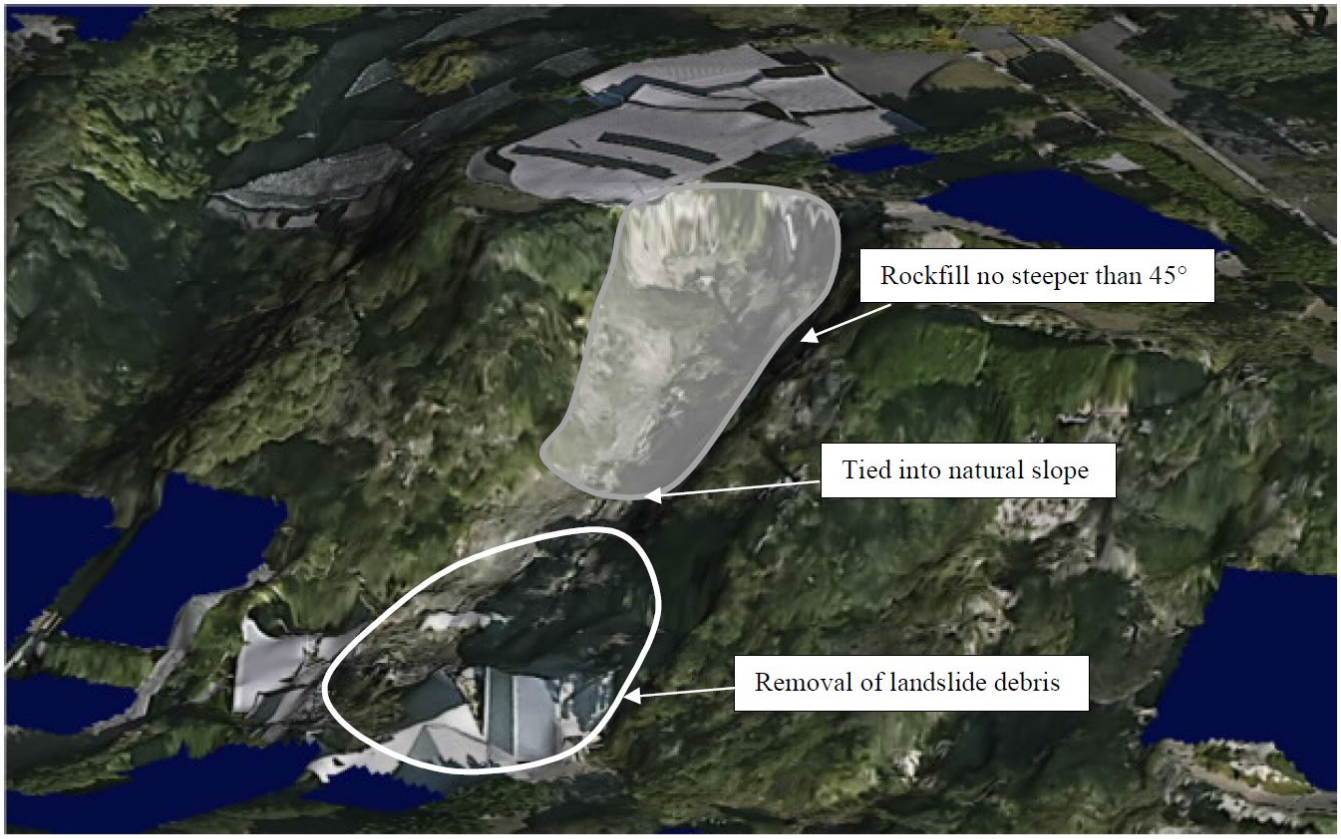


Figure 9.2 3D image showing possible extent of rockfill required to reinstate zone of depletion arising from the 2025 landslide.

Inset 1: Figure 9.2 of the WSP Causation Report

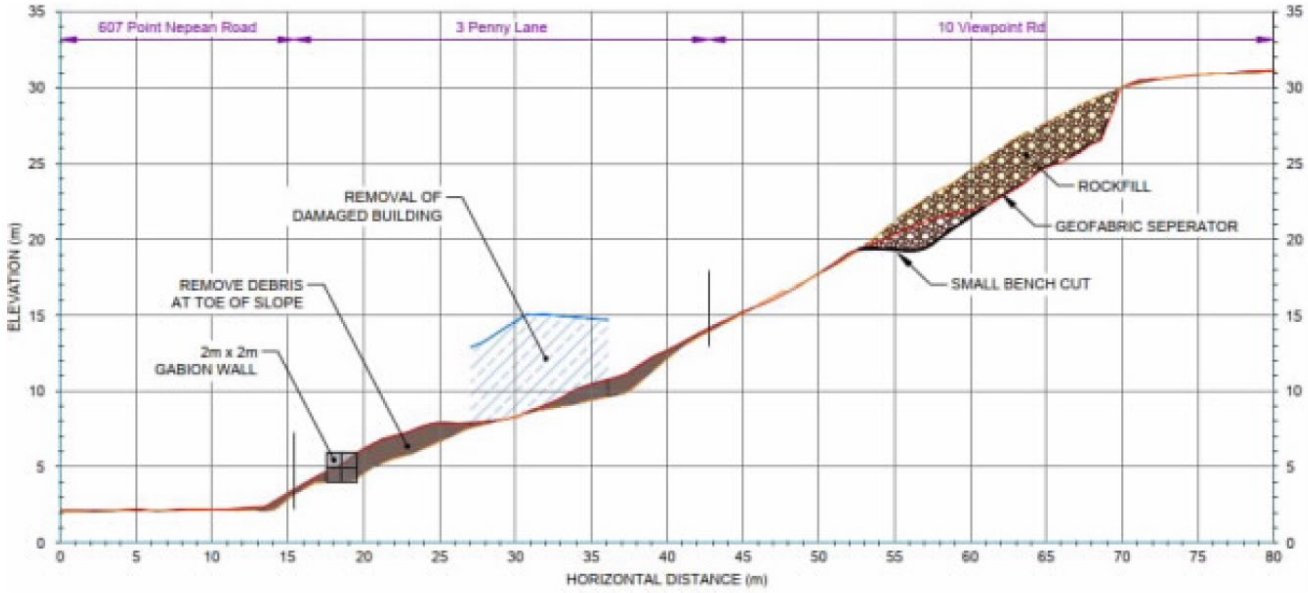
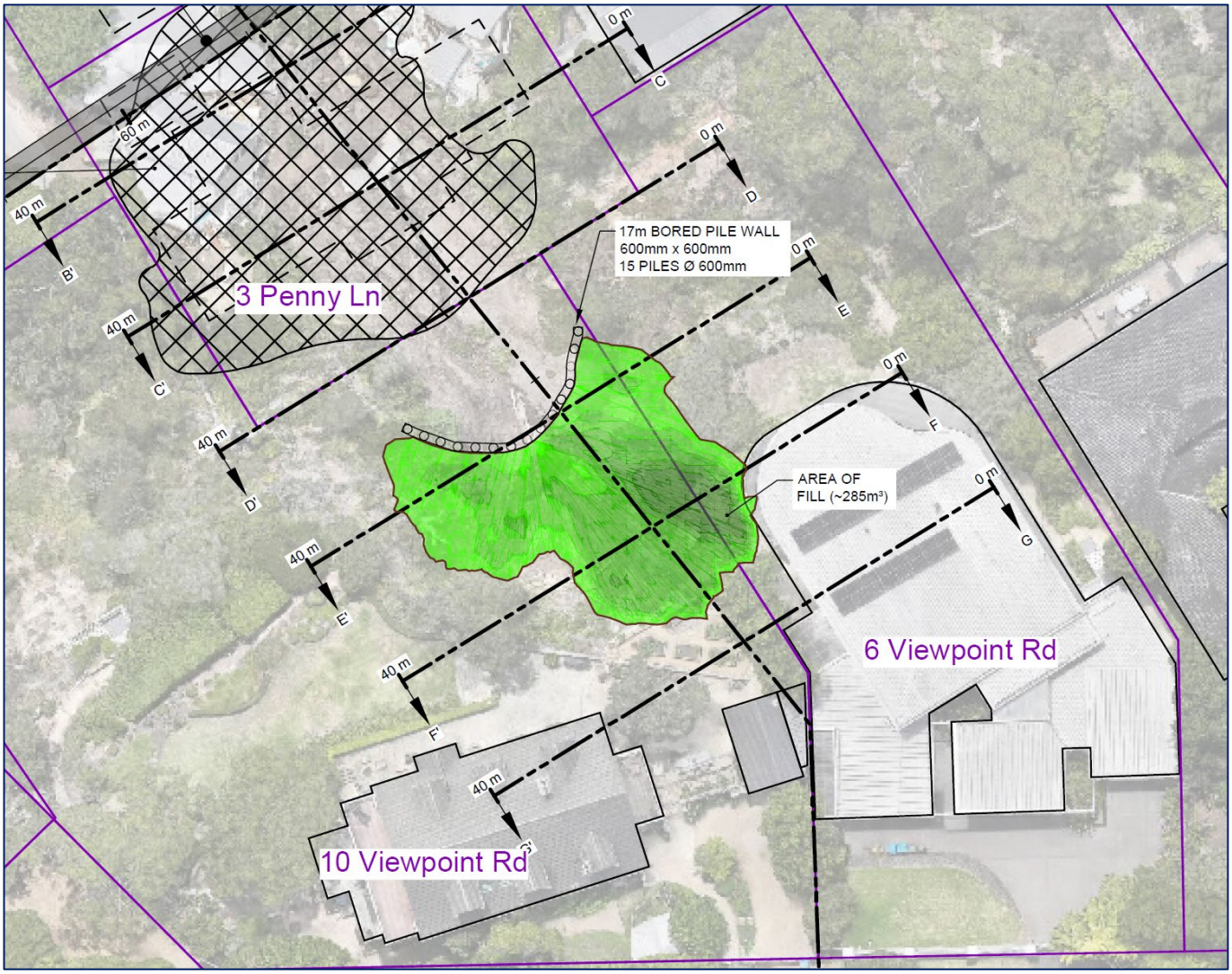
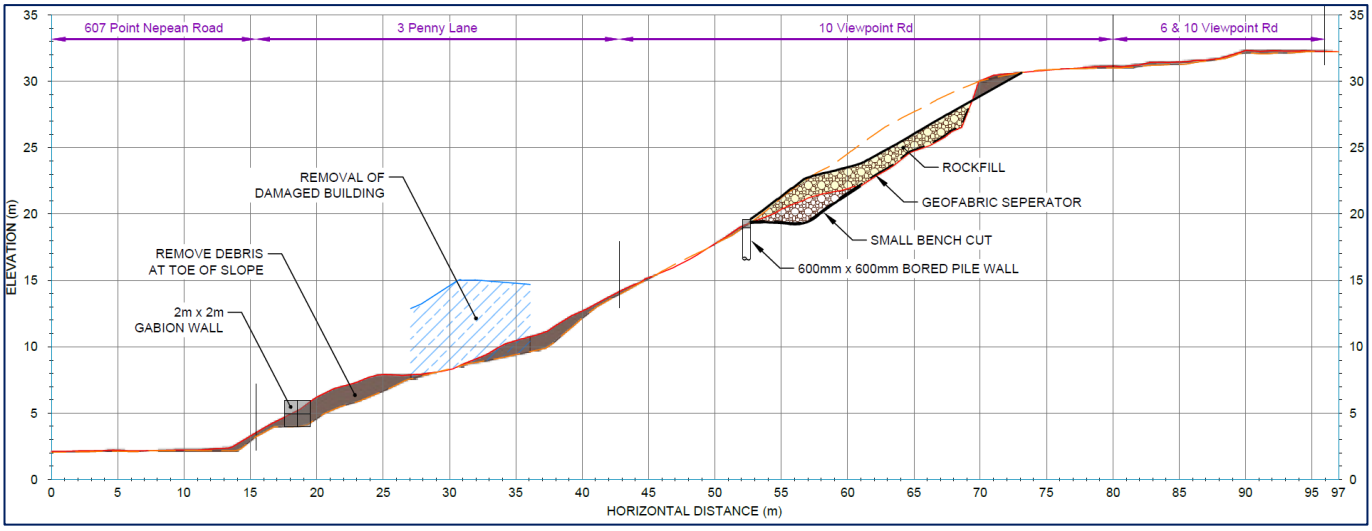


Figure 9.4 Indicative cross section through remediation using rockfill (see Appendix F for further detail)

Inset 2: Figure 9.4 of the WSP Causation Report



Inset 3: Extract from WSP Causation Report Appendix F Figure 3a



Inset 4: Extract from WSP Causation Report Appendix F Figure 3b

4.2 WSP Remediation Option - Gravity Retaining Wall

The WSP Causation Report notes that reinstatement of the slope using a gabion or crib wall style retaining wall (**RW**) would comprise a similar approach to rockfill but could form a steeper slope.

4.3 WSP Remediation Option – Groundwater Extraction Monitoring Wells

The WSP Causation Report proposes construction of 34 “groundwater extraction monitoring wells” along the full length of View Point Road. This option includes installation of approximately 6 m deep boreholes each fitted with a pump that activates when water is detected and discharges water to a suitable location.

5. PSM Preferred Remedial Works Options

PSM has prepared high level concept design options for both the 2022 and 2025 Landslides. The design options have been selected giving consideration to **the Residential Development Objectives,** Section 3.1, and the Design Assumptions in Section 3.2. Before commencement of construction of any remedial works we recommend:

1. Safety in Design (SID) workshops are completed with consideration of both Temporary and Permanent Works.
2. Appropriate Protection Works are completed including dilapidation surveys for properties that may be affected by the works, including works by others on adjacent properties.

5.1 Design Options: 2022 Landslide

PSM’s preferred rectification option for the 2022 Landslide is presented in the PSM 2022 Rectification Report. Other options are discussed in the PSM 2022 Rectification Report and are not repeated here. In summary, the concept level design presented in the PSM 2022 Rectification Report comprised:

- Glass fibre reinforced soil nails, 25 mm diameter installed in 115 mm diameter holes
- Soil nails 3 to 5 m lengths
- Soil nails at 2.5 m centres (horizontal spacing along slope and vertical spacing along slope (as opposed to vertical)) spacing
- Stainless steel Geobrugg Tecco mesh G45/2 with P33 spike plates
- Minor trimming of loose and/or undercut material

We recommend, in addition to the PSM 2022 Rectification design:

- Removal of recently dumped sand fill from the area, Inset 5. Based on PSM inspections this material is assumed to have been dumped sometime between November 2023 and January 2025.
- The extent of treatment should include ravelling and undercut flanks and the headscarp immediately to the east as identified as part of the PSM LRA (Section 6.3.3.2 of the PSM LRA).
- The design should include placement of a nominal 100 mm thick layer of topsoil prior to installation of the soil nails and mesh to promote revegetation.
- The design should consider if temporary erosion protection e.g. coir matting is required for erosion protections while vegetation establishes.

The anticipated extent of the remedial works is presented on Figure 2A and 2B.

Inset 5: Recently dumped sand fill

5.2 Design Options 2025 Landslides

5.2.1 Design Option 1

Design Option 1 assumes that removal of debris and trimming back of the head scarp on 10-12 View Point Road and undercut of ravelling flanks is undertaken as part of temporary works (refer to the 2025 TW, Table 2).

Design Option 1 comprises three treatments which are schematically presented on Figure 3A and 3B:

1. Micro piled wall and capping beam at the boundary of 6 View Point Road and 10-12 View Point Road
2. Installation of soil nails and mesh
3. Installation of sub horizontal drains in the COLLUVIUM layer
4. Landscaping.

Design Option 1 is presented schematically on Figure 3A and 3B. An example of this design applied to a relatively recent landslide in Geelong with comparable geometry and geology constraints is presented in Appendix A.

5.2.1.1 Micro Piled Wall

PSM notes that due to the proximity of the over steep slope to the structure at 6 View Point Road, meaningful flattening of the slope is unlikely to be possible. Both structural support for stability purposes and surface protection to reduce the risk of erosion and progressive ravelling of the slope is required. Underpinning of 6 View Point Road may be required in proximity to the headscarp and works.

A micro piled and anchored RW is likely to be a feasible and effective solution. Similar works have been adopted by DTP South West on Deviation Road (refer to the CV of Mr Dane Pope, Appendix B of PSM5665-090L, 11 August 2025). We envisage that the construction of this solution would include:

- Construction of a temporary working pad within the footprint of the landslide to facilitate piling
- Trenching at either end of the wall to allow the wall to tie into the existing ground
- Installation of micro piles
- Construction of a capping beam to provide structural connection between the micro piles
- Structural connection of steel columns to the capping beam
- Installation of precast concrete sleepers between columns
- Backfill behind wall with a free draining material (e.g. single size aggregate). Note that the use of light weight fill may be required to reduce wall loads
- Installation of appropriate drainage to pipe water from behind the wall to the toe of the slope and a legal point of discharge (LPOD) on Penny Lane. This may need MPSC to develop a new LPOD.

Consideration will need to be given to:

- Interaction with underground tanks
- Interaction with building footings
- Temporary works stability
- Drainage details
- Detailing to facilitate integration with soil nail and netting solution (refer to Section 5.2.1.2).

5.2.1.2 Soil Nail and Netting

Following removal of debris and trimming of slopes (refer to 2025 TW, Table 2) it is expected slopes, particularly the gully flanks will remain too steep to achieve an acceptable level of stability and/or promote reliable revegetation. Structural support will be required.

A soil nail and mesh/netting solution is a feasible and effective solution. Flexible facing is preferred to shotcrete as it will promote drainage of the slope, mitigating risks of pore pressure build up and have reduced impacts to visual amenity. We envisage that the construction of this solution would include:

- Reshaping of slopes to reduce risks of erosion and promote establishment of vegetation as far as practical
- Nominally 2 m x 2 m to 3 m x 3 m soil nail spacing and 4 m to 6 m length
- Flexible facing (mesh/netting)
- Integrate with the micro piled wall at 6 View Point Road.

The design should also include placement of a nominal 100 mm thick layer of topsoil prior to installation of the soil nails and mesh to promote revegetation. Temporary erosion protection e.g. coir matting may also be required for erosion protections while vegetation establishes.

Consideration will need to be given to:

- Tie in details with the existing adjacent slopes
- Opportunities to replace the soil nail and mesh with an engineered landscaping solution where slopes are sufficiently moderate to gentle (potentially within the central gully line).

5.2.1.3 Drainage

Groundwater and pore pressures are a potential landslide trigger and should be controlled. Sub horizontal drains are proposed in the COLLUVIUM layer.

The design and construction of sub-horizontal drains should include:

- Starting drains at the base or just below the COLLUVIUM layer encountered in the Landslide
- Inclined at an angle of 5 to 10 degrees
- Intersect the base of the COLLUVIUM
- 1 row of drains at nominal 0.5 m spacing
- Be in the order of 6 m in length
- Be detailed to collect and pipe water to the toe of the slope and the agreed LPOD.

Consideration will need to be given to:

- Design and construction supervision to ensure drains effectively intersect the COLLUVIUM layer
- Detailing to reduce the risk of blocking and/or fouling
- Maintenance and flushing of the drains
- Interaction with 6 View Point Road building footings and micro piled retaining wall.

5.2.1.4 Landscaping

The soil nail and netting solution will be designed to contain small inter nail slumps (which could be triggered by erosion) however, may not prevent the initiation of erosion itself.

An engineered landscaping plan is proposed to reduce the risk of surface erosion. We envisage that this would comprise:

- Provision of minimum 100 mm of topsoil below the soil nails and mesh
- Planting of hardy and deep rooting grasses as recommended by a suitably qualified professional experienced in vegetation of steep slopes
- Requirement that trees are not planted or allowed to establish as large roots and trunk growth may adversely affect the structure.

5.2.2 Design Option 2

Option 2 is very similar to Option 1 however the micro pile wall is proposed to be replaced with a soil nail and shotcrete wall. This is likely to include:

- Nominally 1.5 m x 1.5 m soil nail spacing and 6 m length
- Minimum 150 mm shotcrete
- Drainage (e.g. strip drains and weep holes may be sufficient however some inclined drains may be required).

Design Option 2 is presented schematically on Figure 4A and 4B.

5.3 Preferred Option

Option 2 is PSM's preferred option as in our opinion:

1. It is likely to be more constructable and economical compared to Option 1.
2. It can be readily designed to achieve the Residential Development Objectives in Section 3.1, and Design Assumptions in Section 3.2.
3. At least two contractors are available in the market with direct experience in these projects and familiarity with the Site.
4. SID and temporary works hazards can be mitigated with the top-down construction method. That is, the nail and mesh systems can be progressively rolled out and protect work crews and mitigate potential run out of debris as the system is installed. This is based on Mr Pope's direct experience in the management of:
    a. Rockfall risk for a 150 m high zone of highwall at Burton Coal Mine (refer to Mr Popes CV, Appendix B of PSM5665-090L).
    b. Rockfall risk at Cumberland River (refer to Mr Popes CV, Appendix B of PSM5665-090L).
    c. Great Ocean Road cutting remediation (refer to Mr Popes CV, Appendix B of PSM5665-090L).

6. PSM Commentary on WSP Design Options

6.1 Soil Nail Wall and Shotcrete

PSM is of the opinion that soil nails can be installed by rope technicians using handheld drills or light weight drills. The use of a drill mounted to a telehandler may also be possible. Similarly, shotcrete can be installed by rope technicians particularly given the relatively small area for which shotcrete facing is proposed (i.e. adjacent to 6 View Point Road).

6.2 Rock Fill

PSM is of the opinion that the rockfill is technically feasible to be designed and constructed to achieve the Residential Development Objectives, Section 3.1, and assumptions, Section 3.2. We assume that the rock fill will be built with the RW. Challenges with this option include:

- The works are proposed to be constructed from mid slope to the crest of the escarpment. Construction of rockfill will load the existing slope and may destabilise down slope material. The proposed RW design must consider this loading.
- SID matters including retreat of workers from a confined gully in the event of instability. PSM accepts that monitoring systems can be used to mitigate much of this risk however this method is at risk of delay as workers are potentially exposed to hazards from the escarpment for a significant timeframe.
- Temporary cut at the toe of the proposed works increases risk of instability of upslope materials during construction.
- The base of the proposed rockfill formation is flat (i.e. not back tilted). Risk of failure due to sliding along basal plane. The RW may not effectively mitigate sliding failure where the capping beam is installed at ground surface. If the RW is designed and constructed to extend above the ground to resist sliding of the rockfill, the proposed RW must consider this loading.
- Construction of a fill creates a large potential landslide source. The influence of the basal contact of the cut slope above the RW must be considered.
- Construction of a bored pile and capping beam system that ties in with the relatively steep gully flanks may be difficult and may require significant temporary works to construct. WSP should consider the history of failures of cuttings in McCrae, including during construction of RW.
- Mitigation of internal erosion of the XW Granite due to placement of large diameter rock fill on the slope. The use of geotextiles alone may not mitigate this risk.

6.3 Gabion or Crib Wall Style Gravity Wall

PSM's opinion regarding a gabion crib wall style gravity retaining wall option is as per the rock fill option. In addition, we note that if a steeper slope is formed compared to the 1H:1V maximum slope proposed for rockfill the risk of destabilising slopes below the constructed gravity wall increases.

Note that disagreement with gravity walls was clearly outlined by Mr Pope in Joint Conclave Report and in the BOI Hearing on 4 to 5 August 2025.

6.4 Groundwater Extraction Monitoring Wells

PSM is of the opinion that it will be technically challenging to implement and maintain an active dewatering system that will meaningfully improve stability of the Landslides. Reasons for this include:

- The variability in location of groundwater (refer to the PSM GFR for details). In more than one instance boreholes drilled within 1 to 2 m of each other had vastly different near surface groundwater. For example, one borehole would be dry and the other would have saturated soils near surface.
- The channelised nature of the granitic landform (refer to Section 5.2.3 of the PSM LRA).
- Ownership: it is not clear to PSM which Authority would be responsible for maintaining the asset and how risks associated with unmitigated water main failures would be allowed for in design. This is further complicated when considering:
  - That groundwater (from existing aquifers) is not managed by MPSC where it is not intercepted by MPSC stormwater assets (for example, springs on private property that do not discharge to an LPOD and natural recharge of aquifers).
  - Stormwater is managed by MPSC.
  - Public water main failures are typically the responsibility of SEW (with exceptions including where a third party causes the failure).
  - Private irrigation and private water main failures are most likely the responsibility of private property owners.

- An active pumping system relies on a constant power source which has higher probability of outage during storm events.
- Observations of flows out of the landslide in June 2025 (and presented in the PSM Causation Report) are relatively low indicating the shallow aquifer may not transmit high volumes of water under base flow conditions.
- Requires ongoing maintenance, monitoring and replacement.
- Installation of wells in vicinity of existing services and including crossovers into private property may be challenging.
- The sewer trench is adjacent to proposed dewatering wells which introduces possible environmental concerns if contaminated water is pumped and discharged direct to stormwater and therefore Port Phillip Bay.

7. Closure

Should there be any queries do not hesitate to contact the undersigned.

Yours Sincerely

I & S

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PRINCIPAL

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Perth

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West Perth WA 6005
+61 8 9462 8400

Legend

- Cadastral Boundaries
- Building Outlines
- Properties Impacted by 2022 & 2025 Landslides
- 2022 & 2025 Landslide Footprint

Scale 1:500

N

0 10 20 m

Map Projection:
GDA2020 / MGA zone 55
EPSG:7855

P S M	Created By: JN	Revision: A	
	Date: 07 Aug 2025	Paper Size: A3	

Mornington Peninsula Shire Council
McCrae Landslide - Remedial Works

SITE LOCALITY PLAN

PSM5665-087R | FIGURE 1

C:\Users\Jesse.Niu\Pells Sullivan Meynink\GIS - PSM5665\04_Working\NM\PSM5665-075R Figure 2.qgz Layout: PSM5665-087R - Figure 1

MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
REMEDIAL WORKS

2022 LANDSLIDE DESIGN OPTION
OBLIQUE VIEW

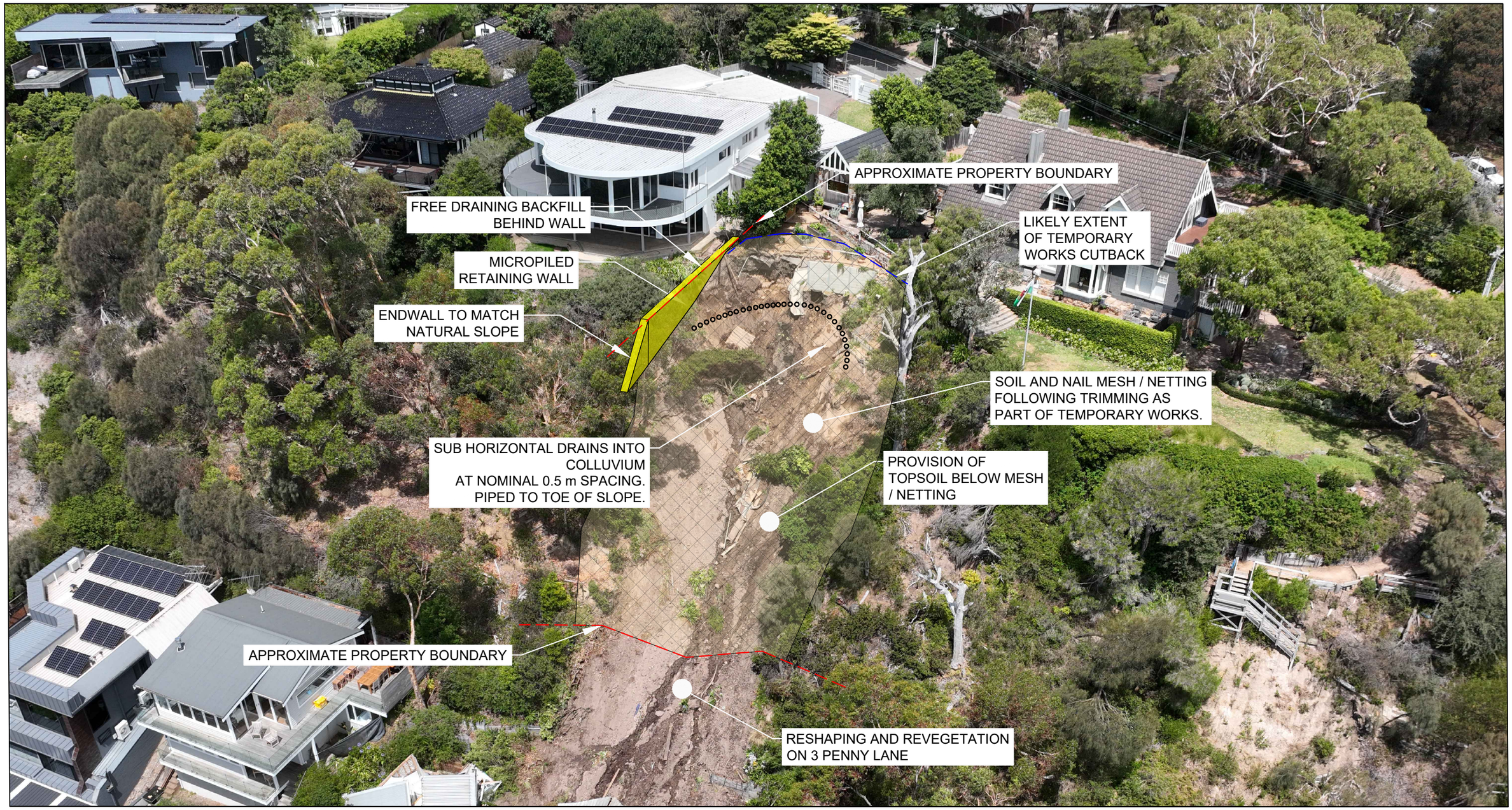
PSM5665-087R	FIGURE 2A

NORTH

MORNINGTON PENNINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
REMEDIAL WORKS

2022 LANDSLIDE DESIGN OPTION
PLAN VIEW

PSM5665-087R	FIGURE 2B

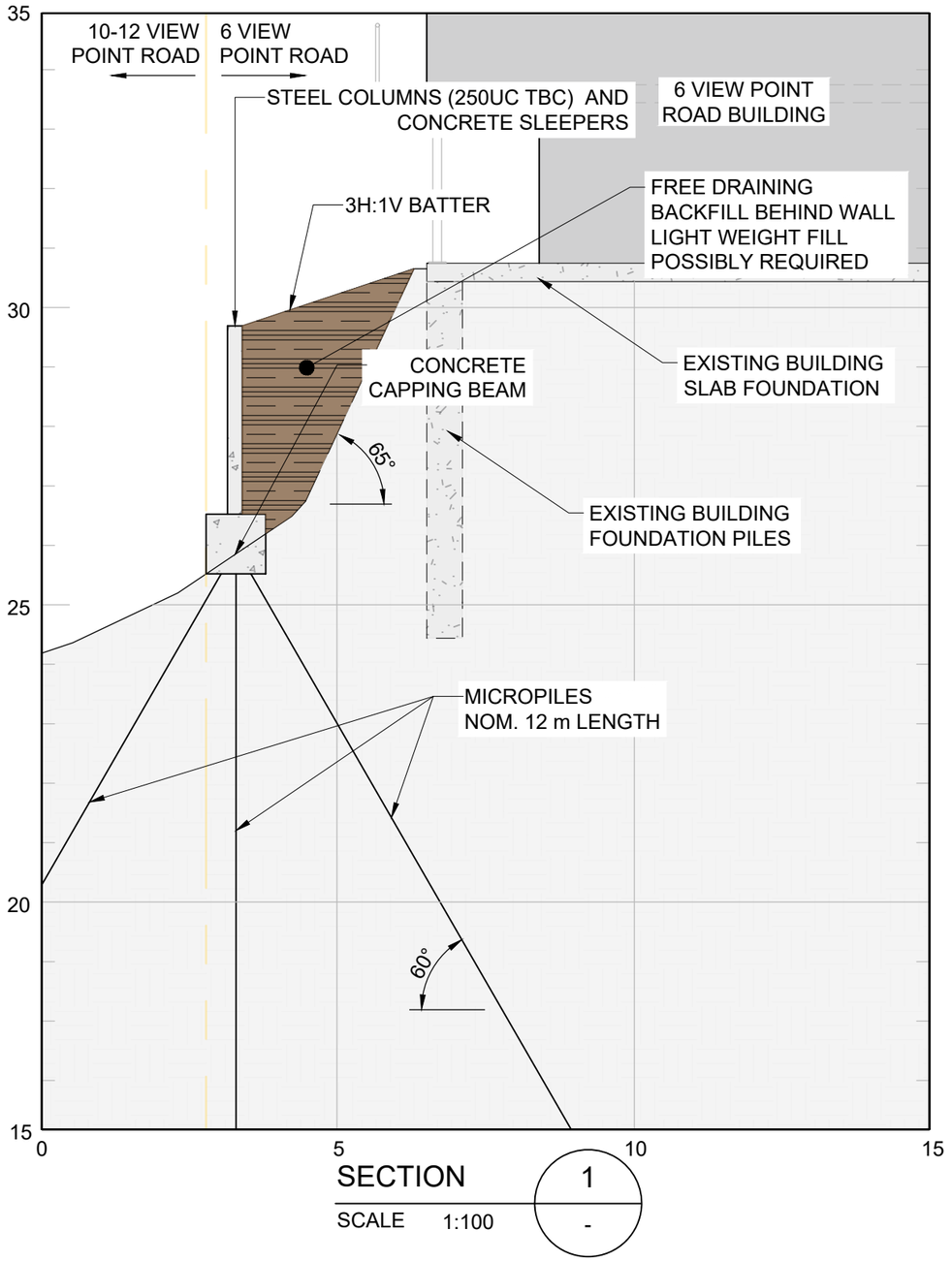


MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
REMEDIAL WORKS

2025 LANDSLIDE DESIGN OPTION 1
OBLIQUE VIEW

PSM5665-087R	FIGURE 3A

PLAN VIEW
NOT TO SCALE

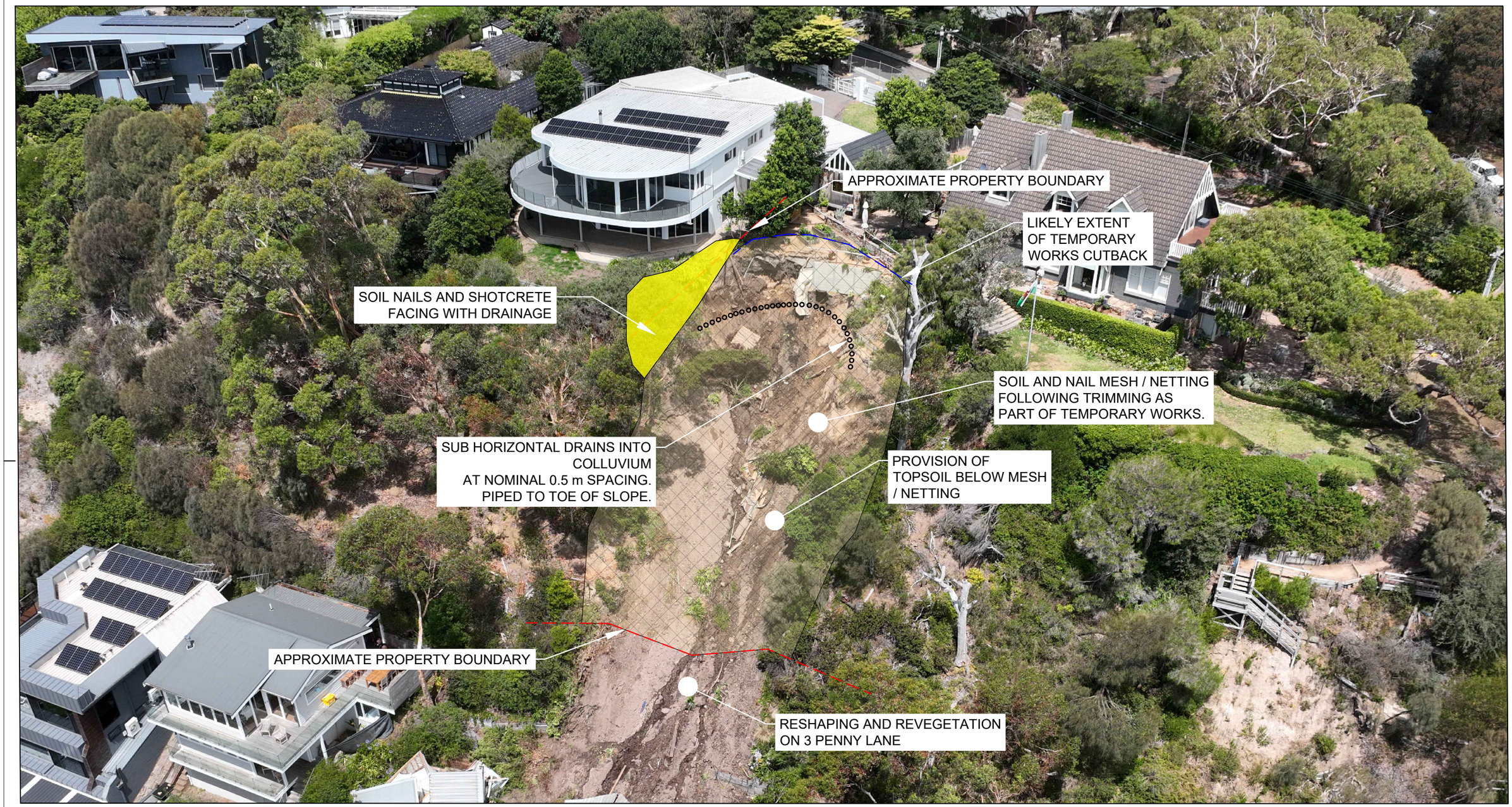


SECTION 1
SCALE 1:100 -

MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
REMEDIAL WORKS

2025 LANDSLIDE DESIGN OPTION 1
PLAN VIEW AND SECTION

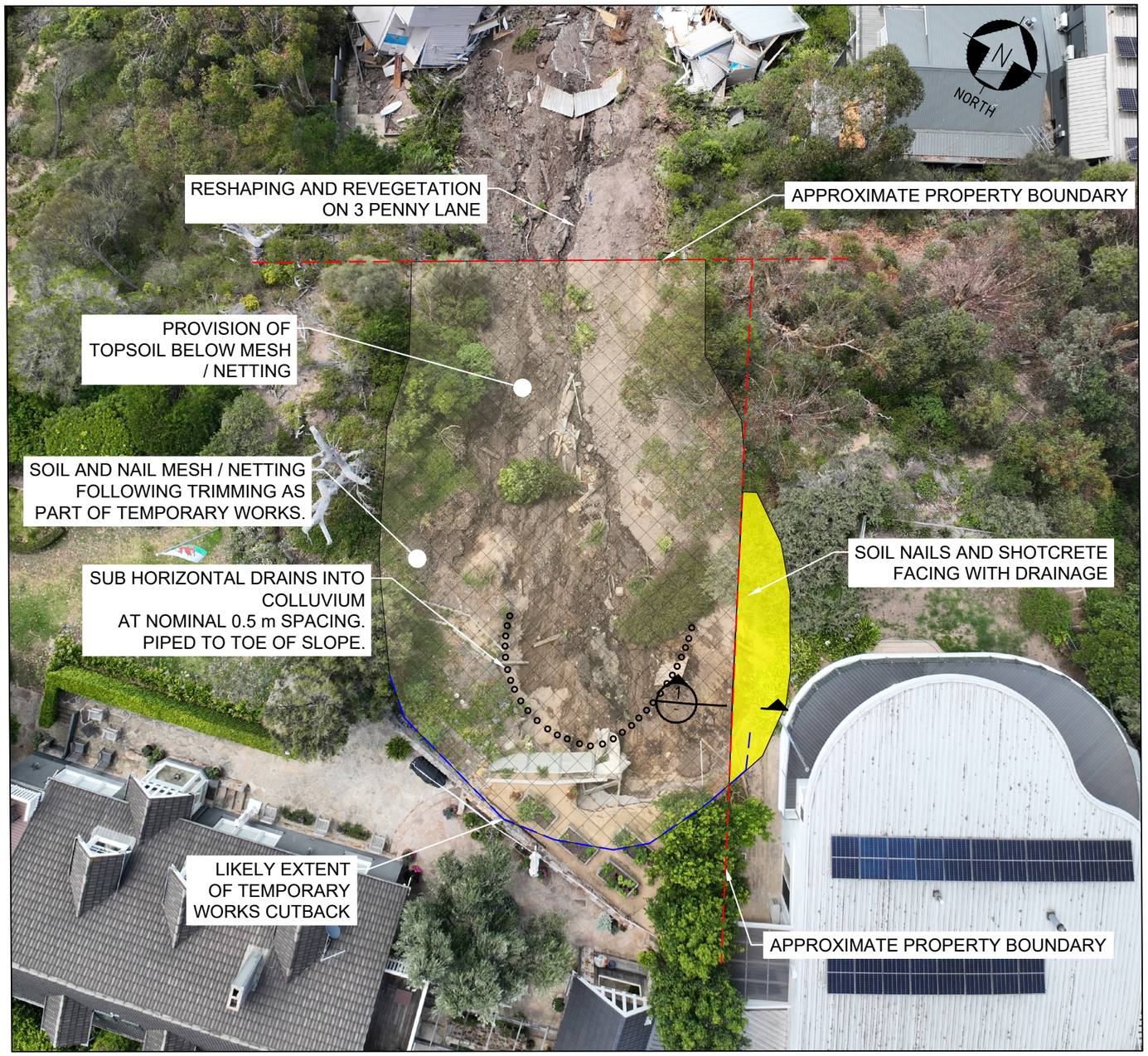
PSM5665-087R | FIGURE 3B



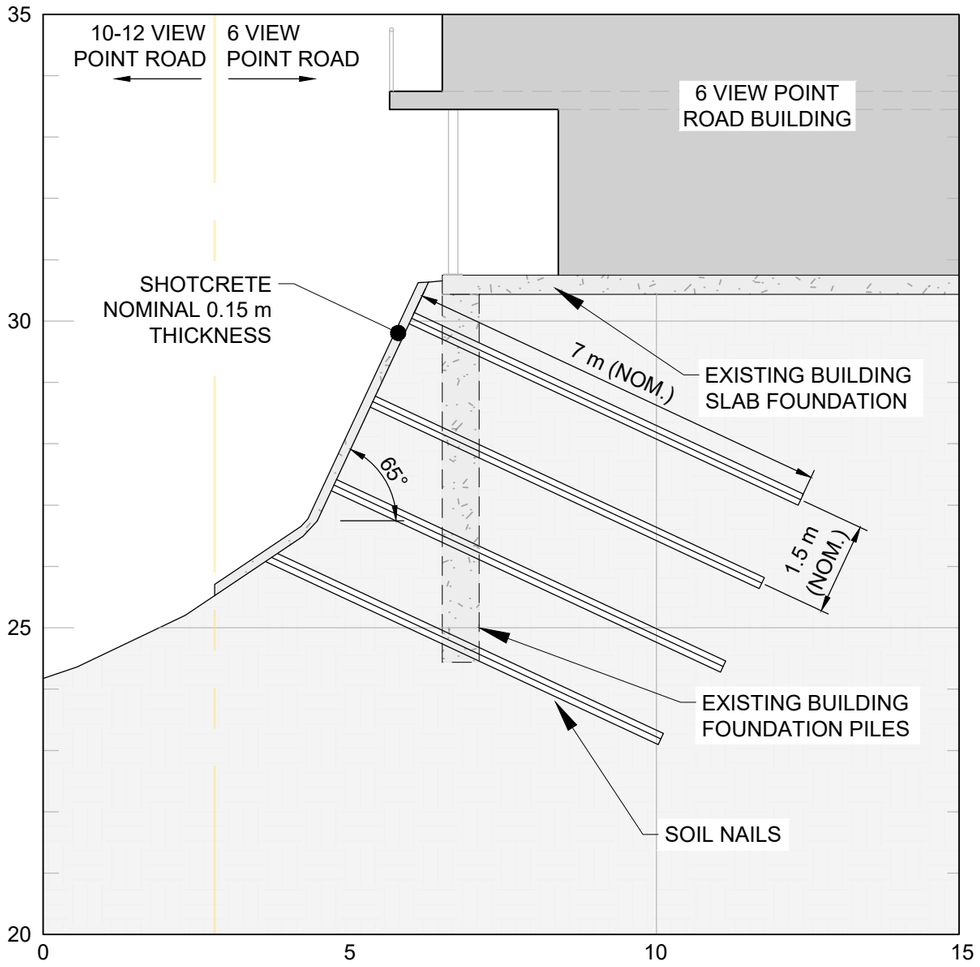
MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
REMEDIAL WORKS

2025 LANDSLIDE DESIGN OPTION 2
OBLIQUE VIEW

PSM5665-087R	FIGURE 4A



PLAN VIEW
NOT TO SCALE



SECTION 1
SCALE 1:100 -

MORNINGTON PENINSULA SHIRE COUNCIL
MCCRAE LANDSLIDE
REMEDIAL WORKS

2025 LANDSLIDE DESIGN OPTION 2
PLAN VIEW AND SECTION

PSM5665-087R | FIGURE 4B

Appendix A
Hamilton Highway example

ISCHEBECK TITAN

Hamilton Highway
Slope Stabilisation
Geelong VIC

July 21

Project Details:

Client:	VicRoads
Design Consultant:	Soilsrock Engineering Pty Ltd
Contractor:	Geovert
Soil Nails:	375 No. 6m to 10m 40/20 Duplex bars with Ø115mm carbide drill bit
Vertical Micropiles:	34 No. 10.5m to 16.5m 52/26 Duplex bars with Ø115mm carbide drill bit
30^0 Raked Micropiles:	17 No. 12m & 8m 52/26 Duplex bars with Ø115mm carbide drill bit

Figure 1 Soil nailed slope stabilised with Titan 40/20 Duplex hollow bar anchors

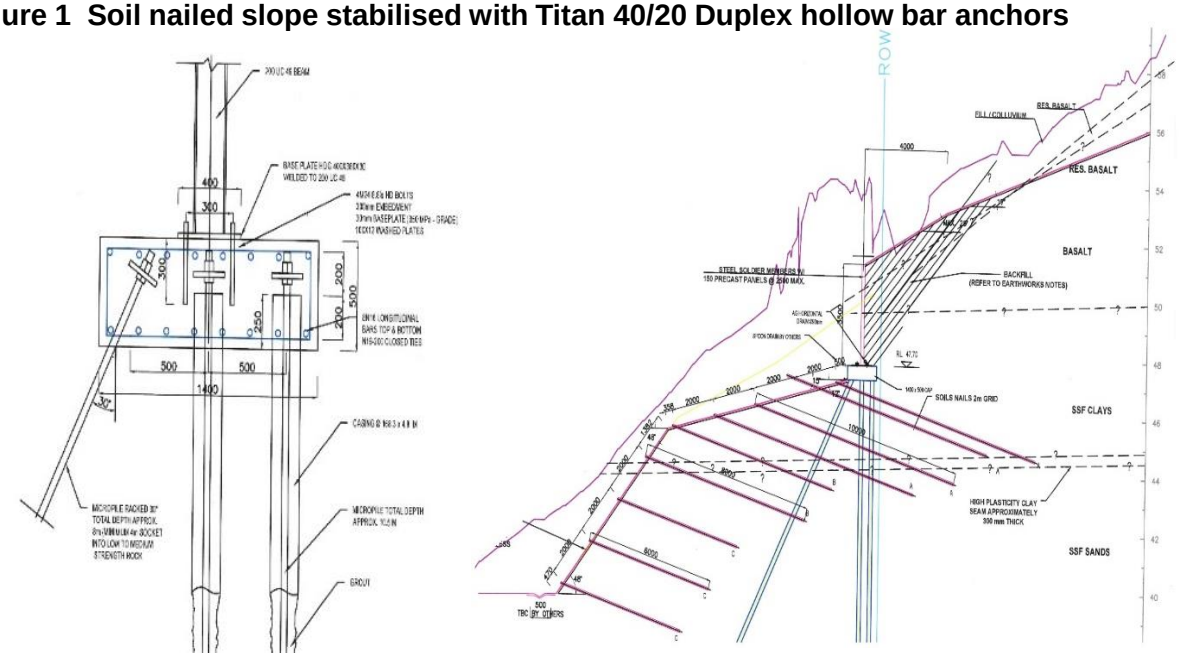


Figure 2 Design by Soilsrock Engineering Pty Ltd

TITAN Self-Drilling Hollow Anchor bars

Independently Certified 100$^+$ years Design Life

Soil Nails
Rock Bolts
Stressed Ground Anchors
Tension and Compression Micropiles

PERMANENT German DIBt Approval Z-34.14-209 100+ Years

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Web: www..ischebeck-titan.com.au

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Hamilton Highway
Slope Stabilisation
Geelong VIC

July 21

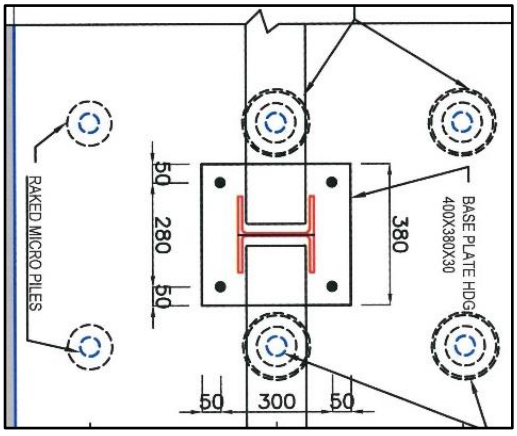

Figure 3 Titan 52/26 A Frame Micropiles for Retaining Wall Footing

Figure 4 Collapsed Slope Prior to Stabilisation

Figure 5 Completed Slope

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