REPORT

Shire of Yarra Ranges Erosion Management Overlay

Basis for Schedule Amendment

Submitted to:

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Distribution List

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List of Abbreviations

AGS	Australian Geomechanics Society
BoM	Australian Government Bureau of Meteorology
ASMG	A.S. Miner Geotechnical
DELWP	Department of Environment, Land, Water and Planning
DEM	Digital Elevation Model
EMO	Erosion Management Overlay
IPCC	Climate Council and Intergovernmental Panel on Climate Change
GIS	Geospatial Information System
GSV	Geological Survey of Victoria
LiDAR	Laser imaging, detection, and ranging
LGA	Local Government Area
MMBW	Melbourne Metropolitan Board of Works
NGOs	Non-Government Organisations (NGOs)
SIA	Secondary Impact Assessment
UYVDRA	Upper Yarra Ranges and Dandenong Ranges Authority UYVDRA
YRC	Yarra Ranges Council

Geological Units

Qa1	Alluvium	Dvm	Mt Evelyn Rhyodacite
Qc1	Colluvium	Dvc	Coldstream Rhyolite
Tvo	Tertiary Volcanics	Dlwn	Norton Gully Sandstone
Dug	Devonian Granite/Granodiorite	Dlh	Humevale Siltstone
Dcd	Donna Buang Rhyodacite	Sud	Dargile Formation
Dvf	Ferny Creek Rhyodacite	Sla	Anderson Creek Formation
Dvk	Kalorama Rhyodacite		

Executive Summary

Based on a review of the provisions of the Yarra Ranges Council Erosion Management Overlay (EMO) a strategy for revising and improving the schedule to the EMO within the Shire of Yarra Ranges has been put forward. Key elements of the strategy to revise the schedule to the EMO include:

- Additional exemptions, for example where works are specifically intended to reduce a landslide risk.
- Clarifying existing exemptions in relation to development in proximity to existing earthworks.
- Providing discretionary exemption to Council where community benefit outweighs landslide risk.
- Taking structure importance into consideration in risk tolerance thresholds for property. This results in tolerance of a higher risk to residential property than under the current EMO.

- Providing an incorporated document which sets out technical information required to be provided by a suitably qualified geotechnical engineer in support of a planning application, which includes:
  - An additional tier of assessment to allow a geotechnical professional to advise Council there are no significant hazards that could affect the proposed development and to remove the requirement to provide a full geotechnical assessment.
  - Specialised requirements for geotechnical reports provided in support of subdivision applications, distinct from the requirements for applications relating to buildings and works.

This report sets out the basis for modification recommended to the EMO schedule. An example EMO schedule and incorporated document are appended to this report (Appendix A and B), which include the strategic recommendations set out above.

Note that this document discusses changes to the existing schedule only, and does not address updates to the mapped extent of the EMO. We understand that amendments to mapping may be considered as part of a future planning scheme amendment.

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1.0 INTRODUCTION

Yarra Ranges Council (Council) has engaged WSP Australia Pty Ltd (WSP Golder), assisted by AS Miner Geotechnical Pty Ltd (ASMG), to undertake a review of the schedule to the Erosion Management Overlay, (C189yran, dated 8 July 2021) (EMO) within the Shire of Yarra Ranges Local Government Area (LGA). A review of the justification for an amendment has been undertaken by WSP Golder, the results of which are set out in our report of 28 April 2023 (ref: PS134170-002-R-Rev0). A summary of the suggested schedule amendments and the strategic benefits arising from that review is set out in Table 1.

This report provides recommendations for a planning scheme amendment intended to implement the schedule amendments set out in Table 1. We note there is also potential to update the mapped extent of the EMO, however the recommendations in this report address updates to the schedule only. We understand that amendments to mapping may be implemented through future planning scheme amendments.

Table 1: Summary of suggested amendments to Yarra Ranges EMO Schedule

Suggested Amendment Provisions (Schedule)	Basis	Strategic Benefit
Develop incorporated document containing technical geotechnical information.	Has been suggested at state level as a means of simplifying EMO schedules and improving consistency between geotechnical practitioners. Has recently been adopted for the Colac Otway amendment.	Simplify the EMO by removing technical jargon. Allow update of geotechnical reporting requirements without amending EMO schedule. Improve quality and consistency of geotechnical reports. Inform planners of what a geotechnical report should contain.
Review and amend list of exemptions for minor buildings, works and vegetation removal. Clarify confusing exemptions such as 20% within 20 m requirement.	There have been some applications triggered under the EMO which should be exempt from EMO requirements on a technical basis.	Revise exemptions for minor or essential development for which landslide risks are typically low or where society benefit clearly outweighs landslide risk, for example minor service upgrade and repair. Remove current requirement for all building and works to trigger a permit requirement.
Provide discretionary exemption where societal benefit outweighs the landslide risk or where delayed action could be detrimental.	There are cases where delaying works could be detrimental to slope stability. For example, excavation and vegetation removal to repair a leaking water service. It may not be possible to nominate every circumstance whereby such discretion could be exercised, requiring a general exemption at Council's discretion.	Avoid delaying essential, beneficial work.
Include additional tier in approach to landslide risk assessment with provision to waive the requirement for a geotechnical assessment.	Avoid requirement for applicants to provide a full geotechnical assessment or landslide risk assessment where there are no landslide hazards and full assessment is not justified.	Achieve level of assessment and impost on applicants consistent with the level of risk associated with the application. Lower reporting requirements and cost for lower risk.
Reconsider risk to property tolerance criteria to make consistent with guidance	Has been adopted by other regulatory authorities, including Colac-Otway Shire and is	Provides a clear decision basis. Allows risk threshold requirements to be consistent with importance of structure.

Suggested Amendment Provisions (Schedule)	Basis	Strategic Benefit
provided in AGS 2007. Consider different tolerable risk threshold for structures of different importance.	consistent with advice in AGS 2007.	
Develop separate requirements for applications related to subdivision.	The information on landslide hazards required to assess the risk to subdivision differs from that required to assess the risk to building and works.	Allows appropriate information to be provided and better informs assessment of applications within the EMO.

[1] Assessment of land subject to erosion is beyond this scope of this document. Note that state policy uses the term 'slope instability'. However, the term 'landslide' is used here for consistency with national guidelines, e.g. Australian Geomechanics Society Landslide Risk Management Guidelines, 2007 (AGS 2007).

2.0 RECOMMENDED AMENDMENTS TO PROVISIONS

The recommended amendments to the provisions as set out in Table 1 have been incorporated into an example EMO schedule included at APPENDIX A and example incorporated document included at APPENDIX B). The following sets out the basis and reasoning behind the recommended amendments to the schedule and incorporated document.

2.1 Exemptions for Landslide

The exemptions included in the example schedule in APPENDIX A are based on the below commentary.

Impervious water holding structures

Impervious water holding structures of relatively small capacity such as tanks, pools and spas present a landslide risk because they could leak, leading to a concentration of water in the subsurface which could lead to instability. Tanks can also impose a significant surcharge load to the slope. Notwithstanding this, engineered, impervious water holding structures such as water tanks can be expected to have a low likelihood of leakage. If the tanks are fitted with underdrainage, typically granular aggregate under the tank provided to allow water leakage from the tank to drain out on to the slope surface rather than seep into the slope, there is a low likelihood of the water tank reducing the stability of a slope. Note that the earthworks required to level an area for a tank or water holding structure could introduce a landslide risk and may not be exempt.

Large or pervious water holding structures such as dams from which a leak could result in a greater volume of water infiltration into the ground are not exempt.

Earthworks

Earthworks present a risk because they can potentially be unstable causing soil or rock to collapse on to buildings or people. Furthermore, earthworks can trigger landslides on natural slopes by changing the distribution of stresses in the ground. However, it is not practical to require a planning permit for any form of ground disturbance no matter how minor.

It is recommended that minor earthworks, which could change the natural ground surface by less than 1 m be exempt. It is important to note that the 1 m is measured relative to the natural ground surface. If for example existing earthworks which exceed a depth of 1 m are deepened by 0.5 m, this would not be exempt because the overall depth of excavation relative to the natural ground surface would be 1.5 m. The existing schedule seeks to identify the potential for existing earthworks by including a clause that where the slope within 20 m of the proposed development is steeper than 20%, the development is not exempt. This basis of this clause was that if the site is steeper than 20% and previously developed, it is very unlikely that development would have occurred without earthworks having been carried out. Based on our experience, this clause has created some confusion and has been difficult to interpret. It is recommended it be replaced with a clause that triggers an assessment if there are existing earthworks greater than 1 m within 5 m of a proposed development.

Note that the current EMO schedule includes exemption for earthworks less than 600 mm in height. Adopting a height of 1 m increases the allowable exemptions. The consequences of 1 m of soil collapsing on a person, as might occur in a scenario of somebody standing at the base of or below a 1 m high cut, are not typically fatal. For example, Work Safe Victoria guidelines restrict persons from entering an excavation deeper than 1.5 m (Worksafe Victoria 2019 [1]), unless appropriate safety controls are in place. The Work Safe Victoria

[1] WorkSafe Victoria Compliance Code, Excavation, Edition 2, December 2019.

guidelines refer to construction sites and generally temporary excavation. In a residential setting, where persons may be more vulnerable to impact from soil compared to on a construction site, and for permanent excavation, a more onerous criteria of 1 m is recommended as a trigger for a planning permit.

Fences

Fences generally do not change landslide risk unless:

- They are impermeable at ground surface and could cause disruption or redirection and concentration of surface water flow.
- They are heavy, for example masonry that could present a risk to life if they constructed on unstable ground and were to topple.

There is a basis to exempt permeable, lightweight fences. Freestanding masonry walls higher than 1 m and fences impermeable at ground level should not be exempt.

Minor Extensions

Minor extensions may not significantly alter landslide risk if they do not require earthworks, are not heavily loaded, nor alter surface drainage or the volume of on-site wastewater disposal. It is too onerous to require a planning permit for very minor extensions if they do not significantly alter the landslide risk. A nominal extension area of 20 m^2 is proposed, below which works are exempt. This area has been selected for consistency with other planning schemes. Note that if earthworks requiring excavation or filling greater than 1 m are required as part of the extension, it would not be exempt.

Non-Habitable Structures

Non habitable structures including sheds and agricultural buildings would generally not be associated with a significant risk to life due to the much lower proportion of time a person is in the structure compared to a dwelling. This risk is also reduced if the structure is formed from lightweight materials unlikely to cause a fatality if they were to collapse on to someone. The consequences of the risk to property depend on the value of the non-habitable asset. There is a basis to exempt non-habitable structures from the requirement of a planning permit if they are light weight, flexible structures of low value which require no significant earthworks or changes to on site surface water discharge. It is difficult to assign a value threshold, however taking precedent from other planning schemes and maintaining the threshold adopted in the existing schedule, the size of the structure can be used as a proxy for value. A nominal size of 40 m^2 is recommended below which an exemption could apply for non-habitable structures. For agricultural buildings, involved in primary production, and for which stormwater and drainage alterations caused by the building are not expected to have a significant impact, no size limit is applied. Note that an agricultural building of reasonable size within the sloping ground of the EMO is likely to require significant earthworks and would otherwise trigger a permit on that basis.

Vegetation

A loss of vegetation can cause slope instability because it facilitates change in the soil moisture conditions and the soil may be mechanically strengthened by living vegetation root systems. Bushfires for example, followed by heavy rainfall in the following months can lead to debris flows. Good landslide and slope stability management would usually involve the retention of vegetation as far as is practical.

Where removal or modification of vegetation does not substantially change the capacity of the vegetation to remove moisture from the soil, there is a basis for an exemption. This includes the removal of dead vegetation, pruning works that do not involve the removal of a significant proportion of vegetation and the removal of shallow rooted vegetation such as grasses.

Water bearing services are a potential landslide trigger, noting that the 1997 Thredbo landslide was triggered by a leaking underground service. The potential for a leaking service to trigger a landslide is likely to be far greater than the removal of isolated vegetation. To this end, if vegetation removal is required to access and repair services, the landslide risk is likely to be lower if delay in accessing the services and effecting the repairs is minimised. There is a basis to exempt vegetation removal if it is required to access, repair and maintain underground services. The construction and installation of new services, if poorly sited and constructed could increase landslide risk and should not be exempt.

2.2 Risk Acceptance

Under the current EMO provisions, it is necessary for a suitably qualified geotechnical professional to estimate a risk level and to evaluate the estimated risk against a criteria. This is done in accordance with the methods described in the Australian Geomechanics Society Guidelines for Landslide Risk Management[2] (AGS 2007). As set out in AGS 2007, the risk tolerance threshold is to be set by the relevant regulatory authority. The existing EMO provisions provide a qualitative tolerable risk threshold (Low) for risk to property or structure damage and do not allow for variation of risk tolerance based on the importance level of the structure. For risk to life, the current schedule requires a quantitative assessment of risk to life to indicate an annual probability of loss of life for the individual most at risk to be less than 10^{-5} (1 in 100,000).

2.2.1 Method of Qualitative Risk Assessment for Property

The qualitative risk assessment to property set out in AGS 2007 requires two key inputs – the *Likelihood* and the *Consequence*. The *Likelihood* describes the annual probability of the development being impacted by a landslide. The *Consequence* describes the severity of the impact that the landslide has on the property. These two inputs are combined in a matrix (Figure 1) to indicate a risk level, reported on a five level scale: Very High, High, Moderate, Low, Very Low. The inputs to the risk assessment are further discussed subsequently.

[2] Australian Geomechanics Society (2007), Guidelines for Landslide Risk Management, Australian Geomechanics, Vol 42, No 1 March 2007.

QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY

LIKELIHOOD		CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)				
	Indicative Value of Approximate Annual Probability	1: CATASTROPHIC 200%	2: MAJOR 60%	3: MEDIUM 20%	4: MINOR 5%	5: INSIGNIFICANT 0.5%
A – ALMOST CERTAIN	10^{-1}	VH	VH	VH	H	M or L (5)
B - LIKELY	10^{-2}	VH	VH	H	M	L
C - POSSIBLE	10^{-3}	VH	H	M	M	VL
D - UNLIKELY	10^{-4}	H	M	L	L	VL
E - RARE	10^{-5}	M	L	L	VL	VL
F - BARELY CREDIBLE	10^{-6}	L	VL	VL	VL	VL

Notes: (5) For Cell A5, may be subdivided such that a consequence of less than 0.1% is Low Risk.
(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time.

RISK LEVEL IMPLICATIONS

Risk Level		Example Implications (7)
VH	VERY HIGH RISK	Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low; may be too expensive and not practical. Work likely to cost more than value of the property.
H	HIGH RISK	Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to Low. Work would cost a substantial sum in relation to the value of the property.
M	MODERATE RISK	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as practicable.
L	LOW RISK	Usually acceptable to regulators. Where treatment has been required to reduce the risk to this level, ongoing maintenance is required.
VL	VERY LOW RISK	Acceptable. Manage by normal slope maintenance procedures.

Note: (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.

Figure 1: Extract from AGS2007 showing the matrix for qualitative risk assessment for property.

'Tolerable' risk which sets the threshold in the EMO schedule is taken as one order of magnitude greater than 'acceptable' risk. Acceptable risk is a risk that requires no assessment or specific management. Tolerable risk is a risk that can be tolerated, subject to appropriate management – i.e. it remains a consideration into the future.

Under the current EMO provisions, Low or Very Low risk is designated as tolerable, Moderate is not tolerable. For example, if a landslide were considered to result in the complete destruction of a dwelling (Catastrophic, which means the cost of stabilisation, repair and rebuild is estimated to be greater than the present value of the property), then the likelihood of this happening would need to Rare (less than 10^{-5} or 1 in 100,000 annual probability) to meet the tolerable criteria set out in the schedule.

The risk level implications set out in Figure 1 indicate that Moderate Risk may be tolerated in some circumstances but that investigation and treatment options should be implemented to reduce the risk to Low. However, there is guidance within AGS2007 which discusses adjustment to the tolerable risk criteria based on the societal value or 'importance' level of the structure, as distinct from the dollar value. The importance level, is rated from 1 through 4 as indicated in Figure 2 with 1 being less important structures and 4 being more important structures. Notably, low rise residential construction is nominated as an importance level 2 structure.

Importance Level of Structure	Explanation	Examples (Regulatory authorities may designate any structure to any classification type when local conditions make such desirable)
1	Buildings or structures generally presenting a low risk to life and property (including other property).	Farm buildings. Isolated minor storage facilities. Minor temporary facilities. Towers in rural situations.
2	Buildings and structures not covered by Importance Levels 1, 3 or 4.	Low-rise residential construction. Buildings and facilities below the limits set for Importance Level 3.
3	Buildings or structures that as a whole may contain people in crowds, or contents of high value to the community, or that pose hazards to people in crowds.	Buildings and facilities where more than 300 people can congregate in one area. Buildings and facilities with primary school, secondary school or day-care facilities with capacity greater than 250. Buildings and facilities for colleges or adult education facilities with a capacity greater than 500. Health care facilities with a capacity of 50 or more residents but no having surgery or emergency treatment facilities. Jails and detention facilities. Any occupancy with an occupant load greater than 5,000. Power generating facilities, water treatment and waste water treatment facilities, any other public utilities not included in Importance Level 4. Buildings and facilities not included in Importance Level 4 containing hazardous materials capable of causing hazardous conditions that do not extend beyond property boundaries.
4	Buildings or structures that are essential to post-disaster recovery, or with significant post-disaster functions, or that contain hazardous materials.	Buildings and facilities designated as essential facilities. Buildings and facilities with special post-disaster functions. Medical emergency or surgery facilities. Emergency service facilities: fire, rescue, police station and emergency vehicle garages. Utilities required as back-up for buildings and facilities of Importance Level 4. Designated emergency shelters. Designated emergency centres and ancillary facilities. Buildings and facilities containing hazardous (toxic or explosive) materials in sufficient quantities capable of causing hazardous conditions that extend beyond property boundaries.

Figure 2: Extract from AGS2007 indicating importance level of structure.

Figure 3 indicates the suggested 'Acceptable' level of qualitative risk set out in AGS 2007. For development within the EMO, risk mitigation measures will usually be recommended through the geotechnical assessment process, so tolerable risk is the appropriate threshold to apply.

For clarity, the table in Figure 3 has been amended in

Table 2 to indicate the AGS 2007 suggested tolerable risk for structures of different importance levels.

Table C10: AGS suggested Acceptable qualitative risk to property criteria.

Importance Level of Structure (1)	Suggested Upper Limit of Acceptable Qualitative Risk Property (2)	
	Existing Slope (3) / Existing Development (4)	New Constructed Slope (5) / New Development (6) / Existing Landslide (7)
1	Moderate	Moderate
2	Low	Low
3	Low	Low
4	Very Low	Very Low

Figure 3: Extract from AGS 2007 providing the suggested upper limit of Acceptable level of risk.

Table 2: Upper limit of Tolerable risk level, taken as one probability order of magnitude higher than the AGS 2007 suggested upper limit of Acceptable risk as indicated in Figure 3.

Importance Level of Structure	AGS 2007 Suggested Upper Limit of Tolerable Qualitative Risk to Property	
	Existing Development	New Development
1	High	High
2	Moderate	Moderate
3	Moderate	Moderate
4	Low	Low

Table 2 suggests Moderate risk as the upper limit of tolerable risk to inhabited property. For low rise housing, this level of risk is greater than the upper limit set out in the existing schedule to the Yarra Ranges EMO. AGS 2007 provides some context to the nomination of Moderate risk as the upper limit of tolerable risk for low rise, importance level 2 structures:

The recommendation to the regulator that MODERATE risk is tolerable and that LOW (and Very Low) Risk is acceptable for Importance Level 2 and 3 structures is based on the assessment of implied cost impact of damage on most home owners and the fact that most home owners will be risk averse in the light of lack of insurance availability. If insurance was available then an annualised dollar value equivalent to an insurance policy cost would be a reasonable benchmark for acceptability.

This statement is effectively saying that the nomination of Moderate risk assumes the property is not insured against landslide. The tolerable risk to property could feasibly be increased further if insurance were available because the cost of the damage would be equal to the cost of the insurance policy rather than the actual cost of stabilisation and rebuild. However, we note that most home insurance policies do not cover landslide or subsidence unless it is caused by another event such as a storm or earthquake and occurs within 72 hours of the storm or earthquake. Many of the landslides that occur within Yarra Ranges are triggered by rainfall accumulation and changes in groundwater conditions over time, not storms or earthquake meaning insurance would not be available for many of the landslides that occur within Yarra Ranges.

Whilst AGS2007 clearly recommends Moderate risk as an appropriate threshold for the evaluation of risk to property, there is some ambiguity with respect to the statement against Moderate risk set out in the Risk Evaluation Table in Figure 1. Whilst it indicates Moderate risk to property can be tolerated, it recommends measures are implemented to reduce risk to Low. This raises the question as to whether a situation in which there are no practical measures available to reduce the risk from Moderate to Low can be tolerated and in the context of the EMO, whether a development can be approved.

Other planning schemes, for example Colac Otway Shire and the Victorian Alpine Resorts have interpreted Moderate risk as tolerable, including in cases where the risk cannot practically be reduced from Moderate to Low. We agree with this interpretation. Notwithstanding this, where Moderate risk has been assessed, a principle of ‘As Low as Reasonably Practical’ (ALARP) should apply. That is, if there are practical measures that can be implemented to reduce risk, they should be. In line with ALARP principles, a geotechnical assessment or landslide risk assessment undertaken by a geotechnical practitioner should provide recommendations to reduce risk to as low as reasonably practical. This is in line with the tolerable risk threshold to which their risk assessment is compared and the guidance in AGS 2007 that where tolerable risk has been assessed, measures to reduce the risk should be implemented. Implementation of the recommended measures would then become a condition of the planning permit.

It is recommended that consideration be given to adopting tolerable levels to assess risk to property in line with building importance as set out in Table 2. Under these levels, the risk to property for residential development would have a tolerable threshold of Moderate.

2.2.2 Method of Quantitative Risk Assessment for Risk to Life

The AGS 2007 guidelines recommend that risk to property be assessed qualitatively and risk to life quantitatively. The current EMO schedule provides a threshold for the quantitative assessment of risk to life of 10^{-5} (1 in 100,000) per annum for loss of life of the individual most at risk. This is consistent with criteria provided in other EMO schedules within Victoria and is consistent with the AGS 2007 guidelines for new development. It is recommended that this threshold be retained.

2.3 Geotechnical Reporting Requirements

The requirements for a geotechnical report prepared to assess landslide risk in support of a planning application are technical and unlikely to be readily comprehended by a lay person. It is recommended that the technical requirements be removed from the EMO schedule and included in an incorporated document, referenced by the schedule. An example document is provided in Appendix B. The incorporated document can then be updated separately from the schedule. The schedule should set out the qualifications that are required by a person to prepare a geotechnical report in support of a planning application. The Victorian Government passed the Professional Engineers Registration Bill in 2019, which describes the required competence of engineers practicing within Victoria and the maintenance of a register of persons assessed as competent. In addition to the chartership requirements previously included in the current EMO, registration as an RPEng, registered professional engineer has also been added.

The existing EMO incorporates a tiered approach to geotechnical assessment, which recognizes potential uncertainty in the EMO mapping and seeks to prevent unnecessary more onerous assessment if it is not warranted. The tiered approach allows for an initial basic level geotechnical assessment to be undertaken for all development, with a more onerous landslide risk assessment only undertaken on sites where there are clearly landslide hazards present. This is intended to avoid unnecessary impost on applicants. Notwithstanding this, there are cases that could arise where a particular development does not alter landslide risk and is not otherwise exempt from a permit application. Recognising that the list of exemptions cannot cover every conceivable development that could warrant an exemption, a third initial tier for geotechnical assessment is suggested. This initial assessment provides an opportunity for an applicant's geotechnical engineer to identify cases where there are no landslide or slope stability hazards applicable and a geotechnical assessment is not warranted. Subject to the additional appropriate evidence, this can be communicated in writing without the impost of a full geotechnical assessment. We note that this would apply only in exceptional cases and that for almost all applications within the EMO a geotechnical assessment is expected to be required.

A more onerous landslide risk assessment is required only on sites that have previously been affected by landslide or are exceptionally steep. This is unchanged from the existing requirements.

A clause is also included allowing Council to waive requirements for a geotechnical assessment at their discretion. This is intended to be rarely implemented and would only apply in cases where a development is not specifically exempted by the schedule but is clearly minor and will not alter landslide risk on the site, or where the objective of the works is to address an existing landslide hazard and timely implementation is important.

1. Landslide Hazard Assessment (Subdivision)

The requirements for the assessment of landslide risk for subdivisions are different to those for buildings and works. This is because the consequences of landslide to life or property are not known at subdivision stage and cannot be assessed. Rather, at subdivision stage, landslide hazard assessment (rather than a landslide risk assessment) should be undertaken which seeks to identify hazards that could affect future development within the subdivision and which recommends constraints on development, for example, identifies areas that might not be suitable for a building envelope or provides restrictions on allotment sizes based on capacity for onsite wastewater disposal. The incorporated document sets out the requirements of a landslide hazard assessment in accordance with the requirements set out AGS 2007.

Future buildings and works within the subdivision would be subject to the requirements of the EMO schedule and require a geotechnical assessment or landslide risk assessment which specifically addresses the building and works proposed. These requirements are set out in the following sections.

2. Geotechnical Assessment (New Buildings and Works)

In almost all cases, a geotechnical assessment will be required. The overarching objective of the geotechnical assessment is to assess whether the proposed development could be subject to any significant landslide hazards. The assessment also documents the geotechnical conditions on the site and indicates the landslide hazards the proposed development could be subject to.

In an effort to achieve consistency between geotechnical assessments provided by different practitioners, the incorporated document sets out the minimum information that a report of a geotechnical assessment must contain. These requirements are consistent with guidance provided in AGS 2007. Being set out in an incorporated document, any changes to AGS 2007, or any required changes to the contents of a geotechnical interpretive report can be updated within the incorporated document without the need to alter the schedule to the EMO.

In line with current requirements, the practitioner who prepares the geotechnical assessment must provide a geotechnical declaration form, which is a requirement recommended in AGS 2007. This requires the geotechnical practitioner who assessed the risks to confirm they have viewed the proposed development plans, have assessed the risk to life and property and to confirm (or otherwise) that the requirements to meet tolerable risk in the schedule to the EMO have been satisfied.

Where required, the geotechnical assessment must be accompanied by a landslide risk assessment, which could be included in the same report or appended.

3. Landslide Risk Assessment

The landslide risk assessment includes an assessment of the risk to life and property and an evaluation of the assessed risk to the criteria set out in the schedule. A landslide risk assessment is mandatory on sites where landslide has previously occurred (either mapped in the landslide inventory, or identified by the geotechnical practitioner), or on very steep slopes. It is recommended that the threshold requiring a landslide risk assessment on very steep slopes be altered from what is set out in the current EMO schedule. The current schedule states that with the exception of slopes on Tertiary Volcanics, all sites with a slope angle steeper than 17° (30%) require a landslide risk assessment. We recommend this be increased to 22° (40%) for all geologies except Quaternary Colluvium and Tertiary Volcanics. Comparison between slope angles and

landslides identified and mapped in the Yarra Ranges landslide inventory (Figure 4) indicates that most landslides in the spatially extensive Devonian Volcanics (e.g. Dvf) occur on slope angles in excess of 22°.

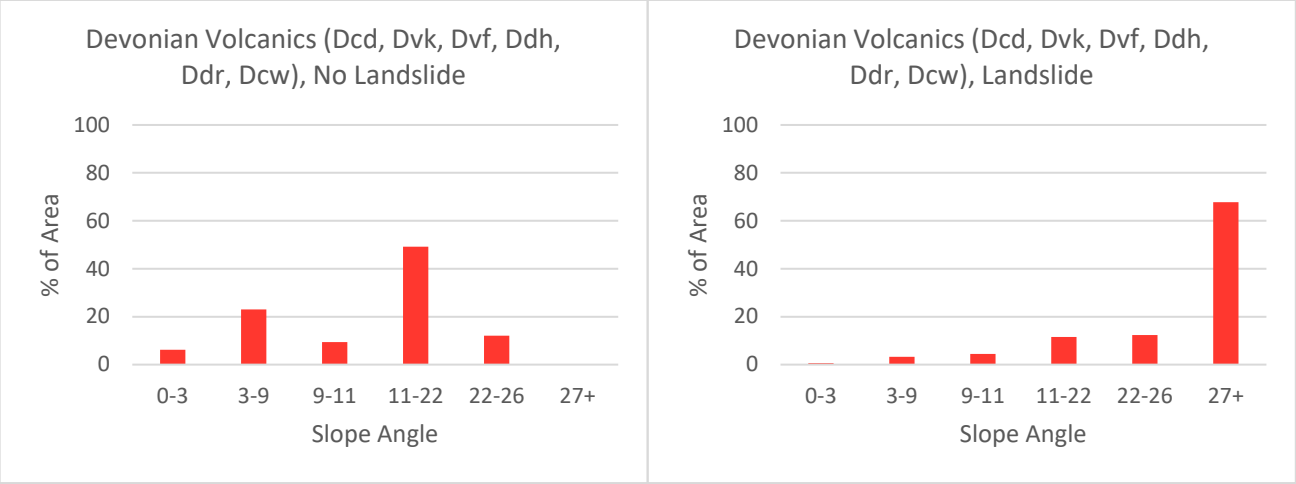

Figure 4: Slope angle distribution in Devonian Volcanics (Dcd, Dvk, Dvf, Ddh, Ddr, Dcw), outside and within mapped landslides

The report of the landslide risk assessment will be required to recommend measures to mitigate identified landslide risks with the aim of reducing the landslide risk to as low as reasonably practical and to at least a tolerable level. Where warranted, the landslide risk assessment could also conclude that the risk associated with the proposed development cannot be practically mitigated to the extent that the proposed development can proceed.

With the objective of achieving consistency between different geotechnical practitioners, the technical requirements for a landslide risk assessment are set out in the incorporated document. The landslide risk assessment must be undertaken in accordance with AGS 2007. Where AGS2007 is updated or superseded, the incorporated document can be amended without the need to update the schedule to the EMO. A geotechnical declaration must accompany the landslide risk assessment in line with current requirements.

3.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled “Important Information Relating to this Report” which is included in Appendix C of this report. The statements presented in that document are intended to advise you of what your realistic expectations of this report should be. This document is not intended to reduce the level of responsibility accepted by Golder, but rather to ensure all parties who rely on this report are aware of the responsibilities each assumes in so doing. We would be pleased to answer any questions the reader may have regarding this document.

Signature Page

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DRP/GEM/drp

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APPENDIX A

Example EMO Schedule

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SCHEDULE 1 TO CLAUSE 44.01 EROSION MANAGEMENT OVERLAY

Shown on the planning scheme map as **EMO1**.

EROSION MANAGEMENT OVERLAY - SCHEDULE 1

1.0 Erosion management objectives to be achieved

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To ensure that development can be undertaken at a tolerable risk to human life and property from landslip.

2.0 Statement of risk

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Areas subject to landslip across the Yarra Ranges include the hillsides along the Yarra River valley, the mountains of the Dandenong Ranges and agricultural areas of Silvan, Monbulk and Seville.

The occurrence of landslips within the Yarra Ranges has historically caused damage to property and the environment and presents an ongoing risk to human life. Geotechnical studies have documented historical landslip occurrences and seek to identify areas susceptible to future landslide occurrence.

The control of environmental factors and development relating to vegetation cover, drainage, rock, earthworks, soil disturbance and effluent and stormwater disposal are all important in managing the risk of landslip.

Risk from landslip needs to achieve a Tolerable Risk level to be considered suitable for new development.

Tolerable Risk is a risk within a range that society can live with so as to secure certain net benefits. It is a range of risk that is regarded as non-negligible and requires ongoing review and reduction if possible. The maximum tolerable risk is defined as:

- For loss of life for the person(s) most at risk, it is taken as having a probability of no greater than 10^{-5} (1 in 100,000) per annum calculated in accordance with the Australian Geomechanics Society Practice Note Guidelines for Landslide Risk Management 2007.
- For property loss it is assessed qualitatively using the Australian Geomechanics Society Practice Note Guidelines for Landslide Risk Management 2007, specifically Appendix C to that document. and the tolerable risk level is selected depending on the new development type in accordance with Table 1.

Table 1 - Maximum tolerable risk to property

New Development Type	Maximum Qualitative Tolerable Risk
Essential facilities, including hospitals, medical and surgery facilities, emergency services facilities, designated emergency shelters and facilities, buildings and facilities containing toxic or explosive materials in sufficient quantity capable of causing hazardous conditions that extend beyond property boundaries.	Low
All other new development, including residential dwellings.	Moderate

3.0 Permit requirement

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A permit is not required to:

- Construct or carry out works associated with:
  - A pond or open, impervious water holding structure with a capacity of less than 5,000 litres.

- Landscaping water features provided it does not entail ponding of more than 500 litres.
- A domestic rainwater tank with capacity of not more than 4500 litres provided it is constructed at ground level or above.
- A masonry fence, if the height of the fence does not exceed one metre and the fence does not alter surface water drainage.
- A fence of lightweight timber or wire construction, where the fence is permeable or the base of the fence is at least 50 mm above the ground surface and does not obstruct surface water flow.
- A spa and associated mechanical and safety equipment if the spa has a capacity not exceeding 5000 litres and is constructed at or above ground level.

- Construct or carry out earthworks that result in a modified ground surface that is less than 1 metre above or below the natural ground level and does not allow water ponding.
- Extend a building or carry out works, provided:
  - The gross ground floor area is not increased by more than 20 square metres, and
  - Stormwater from the building is drained to a legal point of discharge, and
  - There are no existing earthworks (cut or fill) higher than 1 metre within 5 metres of the proposed extension.
- Construct a building associated with productive agricultural activities provided:
  - The building is constructed of lightweight, flexible materials (not bricks, concrete blocks or similar).
  - The development would result in not more than two such structures existing on the subject property.
  - There are no existing earthworks (cut or fill) higher than 1 m within 5 m of the proposed building.
  - Stormwater from the roof is drained to the legal point of discharge.
- Construct a temporary building used for the storage of building materials and equipment, provided:
  - The building does not exceed 20 square metres in floor area.
  - The building is temporarily located on the subject property for the duration of building construction works allowed or approved under this scheme.
- Construct a retaining wall that:
  - Does not exceed 1 m in height.
  - Is not associated with other building construction works.
  - Does not provide landslip protection for any adjoining land.
  - Is constructed to provide support to existing unsafe earthworks.
- Construct a non-habitable structure ancillary to a dwelling, including carports and garden sheds, provided:
  - The structure is constructed of lightweight, flexible materials (not bricks, concrete blocks or similar).
  - The ground surface area occupied by all such structures on the property does not exceed 40 square metres.

- There are no existing earthworks (cut or fill) higher than 1 m within 5 m of the proposed structure.
- Stormwater from the roof is drained to the legal point of discharge.

- Construct or carry out repair or maintenance works undertaken by or on behalf of a public authority relating to watercourse management, environmental improvements or infrastructure services.
- Remove, destroy or lop vegetation, either separately or as part of building works if any of the following apply:
  - The trunk circumference measured at a height of 1.3 metres above ground level at less than 0.16 metres (Equivalent to a circumference of less than 0.5 metres at breast height) and the natural ground surface is reinstated.
  - The vegetation is within 2 m of a building.
  - The vegetation is dead and the natural ground surface is reinstated.
  - The lopping is for pruning to improve a tree's health or structural stability in accordance with normal horticultural practice for the species involved.

4.0 Application requirements

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The following application requirements apply to an application for a permit under Clause 44.01, in addition to those specified elsewhere in Clause 44.01 and elsewhere in the scheme, and must accompany an application, as appropriate, to the satisfaction of the responsible authority:

- For an application to construct a building or construct or carry out works, plans drawn to scale and dimensioned, showing as appropriate:

  – The proposed new development, including as appropriate a site plan, land contours, building elevations, access, cut and fill, retaining walls and effluent disposal system.

  – Any existing development, including buildings, water tanks and pools or dams on both the subject lot(s) and adjacent land.

  – Any existing earthworks and water infrastructure on the subject lot(s), including cut and fill, stormwater drainage, subsurface drainage, water supply pipelines, sewerage pipelines or effluent disposal installations and pipelines and any otherwise identified geotechnical hazard.

  – Details and location of existing vegetation, including any vegetation to be removed.
- For an application to subdivide land, plans drawn to scale and dimensioned, showing as appropriate:

  – The proposed subdivision layout and land contours.

  – Any existing development, including buildings, water tanks and pools or dams on both the subject lot(s) and adjacent land.

  – Any existing earthworks or water infrastructure on the subject lot(s), including cut and fill, stormwater drainage, subsurface drainage, water supply pipelines, sewerage pipelines or effluent disposal installations and pipelines and any otherwise identified geotechnical hazard.

  – Details and location of existing vegetation, including any vegetation to be removed.
- A geotechnical assessment, landslide hazard assessment or landslide risk assessment as required by and prepared in accordance with the Incorporated Document titled ‘Requirements for a Geotechnical Assessment, Landslide Risk Assessment or Landslide Hazard Assessment prepared

in support of a planning permit application under the Erosion Management Overlay (EMO), March 2023' and to the satisfaction of the responsible authority.

- Where, in the opinion of the responsible authority, the application for a subdivision or development will not adversely increase the landslip risk to life or property affecting the subject lot(s) or adjoining or nearby land, a written geotechnical assessment, landslip hazard assessment or landslip risk assessment (as appropriate) is not required.

5.0 Decision guidelines

C217yran

The following decision guidelines apply to an application for a permit under Clause 44.01, in addition to those specified elsewhere in Clause 44.01 and elsewhere in the scheme must be considered, as appropriate, by the responsible authority:

- The risk to human life and property is tolerable.
- The recommendations of the Geotechnical Assessment, Geotechnical Hazard assessment or any Landslide Risk Assessment.
- The need for any ongoing monitoring and maintenance for mitigation measures.

System Note: The following ordinance will be modified in Sub-Clause:72.04 INCORPORATED DOCUMENTS, Schedule:SCHEDULE TO CLAUSE 72.04 DOCUMENTS INCORPORATED IN THIS PLANNING SCHEME

1.0 Incorporated documents

C217yran

Name of Document	Introduced by
13 Green Street, Healesville Incorporated Document, December 2020	c187yran
261 Mount Dandenong Tourist Road, Ferny Creek, Development and Use of Land for a Restaurant and a Caretaker's House, November 2013	C129
30-32 Melba Highway, Yering, July 2016	C160
Amendment L145 to the former Lillydale Planning Scheme (Heritage Golf Course, Hughes Road, Chirnside Park)	NPS1
Amendment L3 to the former Healesville Planning Scheme (15 Healesville-Kooweerup Rd and 16 Airley Rd, Healesville)	NPS1
Amendment L33 to the former Upper Yarra Planning Scheme (Warburton Mountain Resort, Martyr Road, Warburton)	NPS1
Amendment L4 to the former Upper Yarra Planning Scheme (Warburton Chalet, Scotchmans Creek Road, Warburton)	NPS1
Billanook College Master Plan October 2011	C123
Cement Creek Plantation, Cement Creek Road, East Warburton - Statement of Significance, October 2022	C197yranPt2
Chirnside Park Major Activity Centre, Development Contributions Plan, February 2013	C103(Part 2)
Concept Plan – Healesville Mandarin by G Burgess & K Taylor dated February 1989 (Pt CAs 163 & 163A, Maroondah Hwy and Mt Riddell Rd, Healesville)	NPS1
Concept Plan Nos CP-3-5 by Mark Burns, dated June 1996 (140 Yarra Glen Road, Healesville)	NPS1
Document Incorporated under the Schedule to Clause 52.03 (Specific Sites and Exclusions) of the Yarra Ranges Planning Scheme, March 2017	C162
Eastern Golf Club Yering, February 2013	C130
Former Lilydale Quarry Comprehensive Development Plan, October 2021 (Amended August 2022)	C213yran

Name of Document	Introduced by
Healesville Commercial Precinct – February 2015	C131
Kaufland Supermarket and complementary uses, 266-268 Maroondah Highway, Chirnside Park, Incorporated Document, March 2019	GC123
Lilydale Cemetery Incorporated Management Plan (August 2006)	C16(Part 2)
Lilydale Street Trees Incorporated Management Plan (August 2007)	C63
Little Yarra Steiner School Special Use Zone 8 Master Plan Mar 2009	C82
Manchester Road, Mooroolbark Level Crossing Removal Project Incorporated Document, February 2020	GC152
Maroondah Highway, Lilydale Level Crossing Removal Project Incorportated Document, February 2020	GC152
Montrose Intersection Upgrade Project Incorporated Document, February 2022	C200yran
Overall Development Plan by Fulcrum Town Planners dated October 1996 (“The Country Place”, 180 Olinda Creek Road, Kalorama)	NPS1
Permit PS/5416 dated 30 January 1979 and Plan 865AP dated 13 September 1978 by Paul Millar & Associates, modified by Permit PS/8024 and PS/8209 Coldstream Airfield)	NPS1
Plan No C6007 by Plan Printing & Drafting, dated September 1985 (Lilydale Airfield)	NPS1
Powerline Bushfire Safety Program - Native Vegetation Removal Code of Practice, August 2016	GC57
Proposed 10 Year Development Plan 1991-2001, prepared by Michol Design and dated 25 July 1990 (Life Ministry Centre, Old Melbourne Road, Chirnside Park)	NPS1
Requirements for a Geotechnical Assessment, Landslide Risk Assessment or Landslide Hazard Assessment prepared in support of a planning permit application under the Erosion Management Overlay (Yarra Ranges Shire Council, March 2023)	C217yran
Restructure Plan for Old and Inappropriate Subdivisions in the Yarra Ranges Council, April 2021	C177yran
Section 1A of Schedule 2 – Restricted Uses in Chapter 5 (Upper Yarra District) of the former Yarra Ranges Planning Scheme (Little Yarra Road, Gilderoy)	NPS1
St Hubert’s Stables and Wine Cellar (Ruins) Incorporated Plan June 2007	C60
Small Lot Housing Code (Victorian Planning Authority, November 2019)	C203yran
Symons Street Healesville Residential Precinct – February 2015	C131
Yarra Glen Cemetery Incorporated Management Plan (April 2005)	C51
Yarra Ranges Council – List of Environmental Weeds 2019	C148yran

System Note: The following ordinance will be modified in Sub-Clause:72.08 BACKGROUND DOCUMENTS, Schedule:SCHEDULE TO CLAUSE 72.08 BACKGROUND DOCUMENTS

1.0 Background documents

C217yran

Name of background document	Amendment number - clause reference
Belgrave Commercial Precinct (Lovell Chen, 2009)	
Brocklesby House Ladies Rest Home (Trevor Westmore, 2009)	
Cave Hill Quarry Conservation Management Plan (Lovell Chen, 2015)	
Cement Creek Plantation, Cement Creek Road, East Warburton Heritage Citation (Extent Heritage Pty Ltd, October 2022)	C197yranPt2 - Clause 43.01
Chirnside Park Urban Design Master Plan (Woods Bagot, September 2010)	
Coldstream Structure Plan (Yarra Ranges Council 2016)	
Conservation of Historic Sites and Structure of Historical and Architectural Significance in the Upper Yarra Valley and Dandenong Ranges Region October (Upper Yarra and Dandenong Ranges Regional Authority, 1978)	
Erosion Management Overlay – Basis for Schedule Amendment (Yarra Ranges Shire Council, May 2023)	
Former Lilydale Quarry Heritage Interpretation Strategy (Lovell Chen & Biosis, 2020)	
Former Lilydale Quarry Integrated Transport Plan (Cardno, 2020)	
Former Lilydale Quarry Integrated Water Management Strategy (Incitus, 2020)	
Former Lilydale Quarry Stormwater Strategy (Incitus, 2020)	
Former Lilydale Quarry Sustainability Framework (WSP, 2020)	
Healesville Structure Plan (Yarra Ranges Council, 2016)	
Lilydale Historic Houses Precinct Methodology and Heritage Precinct Report (Lovell Chen, 2011)	
Lilydale Major Activity Centre Structure Plan (Yarra Ranges Council, 2006)	
Lilydale Urban Improvement Project (Planisphere, 2008)	
Mooroolbark Activity Centre Structure Plan (Yarra Ranges Council, 2011)	
The Bend Heritage Precinct Citation (Lovell Chen, 2011)	
Vision 2020 by Design – A Built Environment Framework for Yarra Ranges (Yarra Ranges Council, 2008)	
Yarra Ranges Shire Council Gambling Planning Policy Framework - Options Paper (Symplan Consulting, 2007)	
Yarra Ranges Shire Council Gambling Planning Policy Framework - Discussion Paper (Symplan Consulting, 2007)	
Yarra Ranges Green Wedge Management Plan (Yarra Ranges Council, 2010)	
Yarra Ranges Housing Strategy (Yarra Ranges Council, 2009)	
Yarra Ranges Activity Centre Network Strategy (Essential Economics, 2012)	

System Note: The following ordinance will be deleted from Clause:44 LAND MANAGEMENT OVERLAYS, Sub-Clause:44.01 EROSION MANAGEMENT OVERLAY

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SCHEDULE TO CLAUSE 44.01 EROSION MANAGEMENT OVERLAY

This schedule and schedule sections will be deleted.

APPENDIX B

Example Incorporated Document

Requirements for a Geotechnical Assessment, Landslide Risk Assessment or Landslide Hazard Assessment prepared in support of a planning permit application under the Erosion Management Overlay

Yarra Ranges Shire Council, March 2023

YARRA RANGES PLANNING SCHEME

Incorporated Document

This document is an incorporated document in the Yarra Ranges Planning Scheme pursuant to section 6(2)(j) of the Planning and Environment Act 1987

[OPTIONAL - Insert Author Logo]

1.0 INTRODUCTION

This document is an Incorporated Document to the Schedule to Clause 44.0 and Clause 72.04 of the Yarra Ranges Planning Scheme (the Scheme), pursuant to section 6(2)(j) of the Planning and Environment Act 1987 (the Act).

This document sets out the requirements for geotechnical assessments and reporting in support of planning applications required under the provisions of the Yarra Ranges Erosion Management Overlay – Schedule 1.

The documentation described herein is to be prepared by a Geotechnical Practitioner, being an Engineer or Engineering Geologist who has experience in the management of slope stability problems and landslide risk management as a core competence, is degree qualified, and who has current professional status as a:

- Chartered Professional Engineer (CPEng); or
- Registered Professional Engineer (RPEng); or
- Chartered Professional Geologist (CPGeo); or
- Registered Professional Geologist (RPGeo).

There are different assessment and reporting requirements for Subdivision and Buildings and Works, where:

- Subdivision – is a subdivision as specified in the *Subdivision Act 1988*;
- Buildings and works – is Buildings or Works as specified in the *Planning and Environment Act 1987.*

The geotechnical documentation required to inform the assessment of landslide risk for subdivision or buildings and works is set out below. If there is any inconsistency between the specific controls in this document and the general provisions of the Scheme, the specific controls will apply.

2.0 LAND DESCRIPTION

This Incorporated Document applies to all land covered by the Erosion Management Overlay in the Yarra Ranges Planning Scheme.

3.0 APPLICATION OF PLANNING SCHEME PROVISIONS

In the event of any inconsistency between the specific controls contained in this document and the general provisions of the scheme, the specific controls contained in this document will prevail.

4.0 EXPIRY OF THIS SPECIFIC CONTROL

No expiry provisions apply.

5.0 PURPOSE

The purpose of this document is to provide additional detail on Application Requirements to the requirements of Clause 44.01-6 of the Erosion Management Overlay and Clause 4.0 of the Erosion Management Overlay Schedule 1.

6.0 CONTROLS:

6.1 Buildings and works

6.1.1 Assessment Requirements

If the geotechnical practitioner assesses that the site has:

- A slope angle of less than 9 degrees at and within 20 m of the proposed new development; and
- Has not previously been affected by landslide, and;
- There are no credible landslide or debris flow hazards that could affect the proposed development, including debris flow;

a Geotechnical Assessment (as described at 6.1.2) may not be required. However, the Geotechnical Practitioner should provide written advice stating that these requirements have been met. Written evidence should include a site description and evidence to support the advice. Where these requirements have not been met, a Geotechnical Assessment prepared in accordance with the requirements set out in Section 6.1.2 is required.

A written Landslide Risk Assessment prepared in accordance with the requirements of Section 6.1.3 is required in addition to a Geotechnical Assessment if any of the following apply:

- the Geotechnical Assessment or other landform data (a detailed site survey) indicates natural slopes on or immediately adjacent to the subject lot which:
    - are steeper than 11 degrees (20%) in areas underlain by Tertiary Older Volcanics or Quaternary Colluvium; or
    - are steeper than 22 degrees (40%) in all other geologies including the spatially extensive Devonian Volcanics; or
    - exhibit evidence of possible or past landsliding on or immediately adjacent to the site; or
    - the Geotechnical Assessment concludes there are landslide or debris flow hazards affecting the new development that require a Landslide Risk Assessment; or
    - in the opinion of the Responsible Authority, the Geotechnical Assessment is not sufficient to determine that the development can be carried out in a manner which will not adversely increase the landslide risk to life or property affecting the subject lot or adjoining or nearby land.

6.1.2 Geotechnical Assessment

Where a Geotechnical Assessment is required, it must be prepared in accordance with the methodology described below and with reference to the Australian

Geomechanics Society Practice Note Guidelines for Landslide Risk Management 2007. The Geotechnical Assessment must be for the development proposed in the application, and include:

- Details of the Geotechnical Practitioner and their qualifications and experience including but not limited to experience in the management of slope instability problems and landslide risk management.

- A statement that the assessment is based on field survey measurements undertaken not more than 12 months prior to the relevant application for development.

- A detailed site description.

- Site assessment plans and cross-sections of the subject lot and relevant surrounds for the area potentially subject to landslide or debris flow hazards. Plans and cross sections are to be based on field measurements, with measured ground slopes shown and drawn to scale and dimensioned. Where applicable, plans should show the areas of the site subject to landslide or debris flow hazards.

- A detailed assessment of subsurface conditions, including the underlying geology.

- A statement indicating whether there are natural slopes on or immediately adjacent to the subject lot which exhibit evidence of landslide potential, or past landslide.

- Relevant entries in the Yarra Ranges landslide inventory.

- Details of all site investigations and any other information used in preparation of the Geotechnical Assessment.

- A statement indicating whether subsurface investigation involving boreholes and/or test pit excavations or other methods is necessary to assess the geotechnical/geological model for the subject lot and details of all such investigations, boreholes, test pits or other methods.

- A statement indicating that in the opinion of the Geotechnical Practitioner, the proposed new development is not subject to significant landslide or debris flow hazards and is not expected to be subject to significant landslide or debris flow hazards over the design life of the development such that a Landslide Risk Assessment (as described in the following section) is not required. Where significant landslide hazards are identified and this statement cannot be made, a Landslide Risk Assessment undertaken in accordance with the requirements of Section 6.1.3 is required and a statement should be made in the Geotechnical Assessment that a Landslide Risk Assessment is required.

- A statement indicating whether or not new development should only be approved subject to conditions, and if so recommend what conditions are required that may be related but not limited to:

- The positioning of buildings and works on site to avoid landslide and debris flow hazards.

- The provision of appropriate footing types and base levels and foundation materials in any structural works, including all retaining walls.

- The location/s of and depth/s of soil and rock cut and fill.

- The construction of any excavations and fill and the method of retention of such works.

- Any details of surface and sub-surface drainage.

- The selection and design of a building structure system.

- Retention, replanting and new planting of vegetation.

- Any effluent drainage and discharge.

- Any necessary ongoing mitigation and maintenance measures and any recommended periodic inspections, including performance measures and thresholds.

- The time within which works must be completed after commencement and the location/s and maximum time period that materials associated with the development can be stockpiled.

- Any requirements for geotechnical inspections and approvals to be incorporated into a construction work plan for building approval.

- Be accompanied by a Geotechnical Declaration and Verification Form (Form A).

6.1.3 Landslide Risk Assessment

A written Landslide Risk Assessment is to be prepared by a suitably qualified and experienced Geotechnical Practitioner in accordance with the methodology set out in the Australian Geomechanics Society Practice Note Guidelines for Landslide Risk Management 2007. The Landslide Risk Assessment must be for the new development proposed in the application and include:

- A copy of the Geotechnical Assessment prepared for the subject land and proposal and, if not prepared by the Geotechnical Practitioner preparing the Landslide Risk Assessment, contain a response by the Geotechnical Practitioner preparing the Landslide Risk Assessment, agreeing with the findings and conclusions of the Geotechnical Assessment.

- If reported in conjunction with a Geotechnical Assessment, include all the requirements of a Geotechnical Assessment as set out in Section 6.1.2 in addition to those of a Landslide Risk Assessment.

- If the Geotechnical Practitioner preparing the Landslide Risk Assessment does

not support the findings and conclusions of the Geotechnical Assessment for new development, the Geotechnical Practitioner must prepare an additional Geotechnical Assessment.

- An assessment supported by field observations and measurements that have been undertaken not more than 12 months prior to the lodgment of the application for a planning permit.

- A full assessment of the risk posed by all reasonably identified landslide, debris flow and slope degradation hazards which could impact or be caused by the new development and which have the potential to either individually or cumulatively impact upon people or property, in accordance with the AGS 2007 Guidelines.

- An assessment of the risk posed by potential future vegetation removal, including by bushfire or for bushfire protection if it were to be undertaken to the maximum extent permissible under the conditions of any planning permit and under permit exemptions in the Planning Scheme.

- A statement indicating that in the opinion of the Geotechnical Practitioner, the proposed new development can be undertaken such that the risk to life and property does not exceed a tolerable level and will not exceed a tolerable level over the life of the proposed development.

- Be accompanied by a Geotechnical Declaration and Verification Form (Form A)

6.2 Subdivision

Where subdivision is proposed, a Landslide Hazard Assessment should be prepared by a Geotechnical Practitioner in accordance with the methodology set out in the Australian Geomechanics Society Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning 2007. The objective of the Landslide Hazard Assessment is to identify hazards affecting future development within a proposed subdivision and to recommend constraints on subdivision and future development. The Landslide Hazard Assessment should include as a minimum:

- A definition of scope establishing the purpose and scope of the hazard assessment.

- A data gathering / desktop phase assembling relevant data and recording the sources of the data. The Yarra Ranges landslide inventory should be consulted as part of the desktop study.

- Completion of investigations sufficient to establish a geotechnical model, identify geomorphic processes and associated process rates.

- Inspection of the site and surrounds including field mapping of the geomorphic features.

- A landslide inventory map covering the proposed subdivision and relevant surrounding areas and associated information on landslides in the inventory (if available) such as classification, location, time of sliding (if known), volume and a description of validation and limitations of the inventory.

- Landslide susceptibility zoning maps prepared in accordance with the AGS 2007 Guidelines including related information on how susceptibility was determined and a description of validation and limitations of the zoning.

- General commentary regarding the nature of the landslide or debris flow hazards, frequency and potential impacts or consequences and their implications for levels of associated risk.

- Recommendations as to whether the proposed subdivision is viable in its current format and an indication of areas that in the opinion of the geotechnical practitioner:

    - are not suitable for development;

    - are suitable for development subject to constraints or risk mitigation and an indication of those constraints;

    - are suitable for development without constraints;

- Discussion of potential impacts to adjacent land.

- Be accompanied by a Geotechnical Declaration and Verification Form (Form A).

7.0 References

- Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning, Journal of Australian Geomechanics Society, Vol. 42: No 1, March 2007.

- Commentary on Guidelines for Landslide Susceptibility, Hazard and Risk Zoning for Land Use Planning, Journal of Australian Geomechanics Society, Vol. 42: No 1, March 2007.

- Practice Note Guidelines for Landslide Risk Management 2007, Journal of Australian Geomechanics Society, Vol. 42: No 1, March 2007.

- Commentary on Practice Note Guidelines for Landslide Risk Management 2007, Journal of Australian Geomechanics Society, Vol. 42: No 1, March 2007.

END OF DOCUMENT

APPENDIX C

Important Information

IMPORTANT INFORMATION RELATING OF THIS REPORT

The document ("Report") to which this page is attached and which this page forms a part of, has been issued by Golder Associates Pty Ltd ("Golder") subject to the important limitations and other qualifications set out below.

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The scope of Golder's Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it.

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Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

Where permitted by the Contract, Golder may have trained subconsultants affiliated with Golder to provide some or all of the Services. However, it is Golder which remains solely responsible for the Services and there is no legal recourse against any of Golder's affiliated companies or the employees, officers or directors of any of them.

By date, or revision, the Report supersedes any prior report or other document issued by Golder dealing with any matter that is addressed in the Report.

Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification.

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