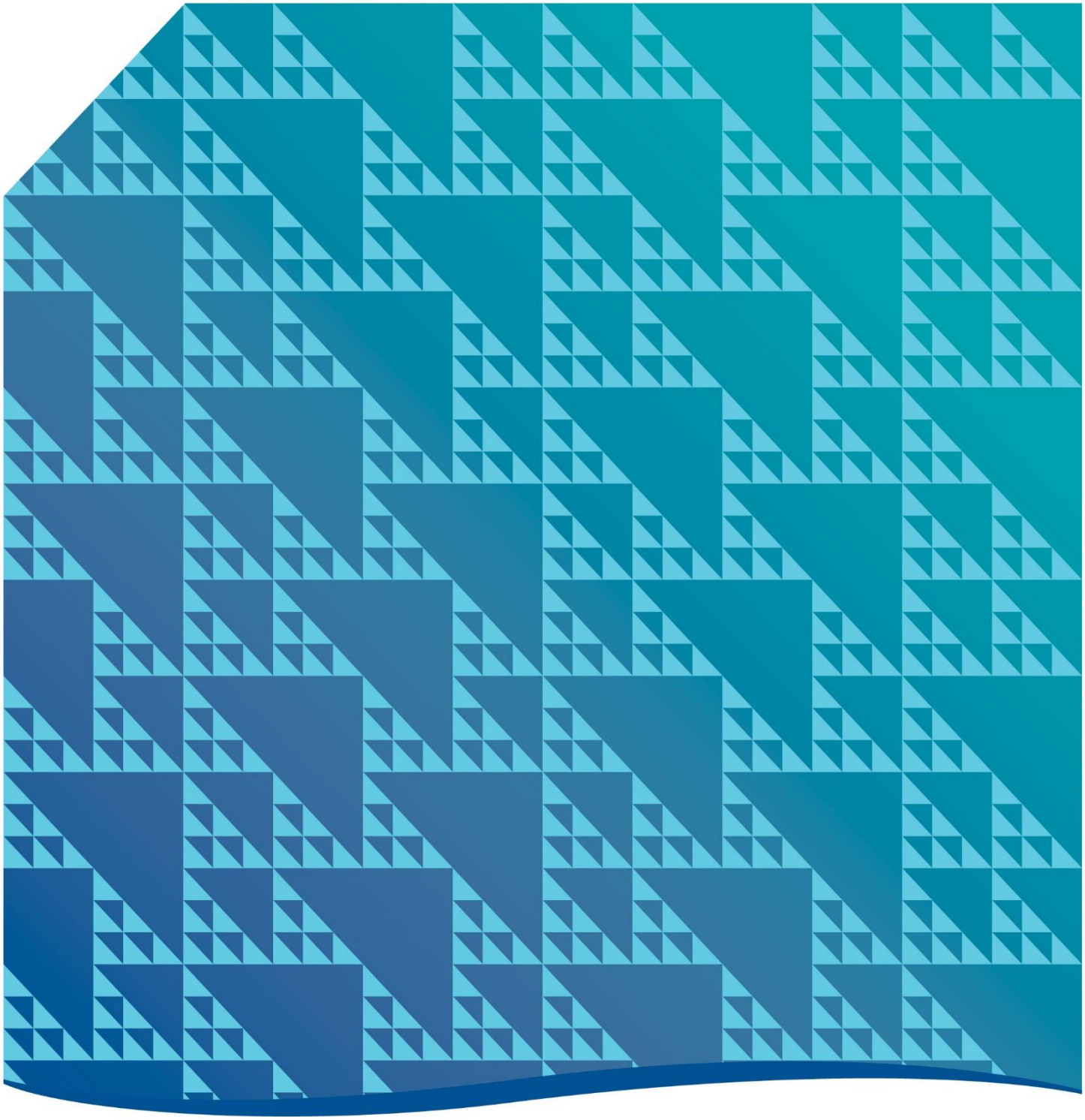
Professional Services
Specifications (PSS)

Last updated:
November 2021

T6 – Geotechnical Investigations



Department of State Growth

Tasmanian Government

Contents

Revision History

Version No.	Date	Description of changes
2.0	November 2021	Full revision with specification updated to adopt the Austroads Guide to Road Design as the preferred methodology, with referencing to VicRoads Technical Notes added. Areas impacted by updates to other Professional Services Specifications are highlighted, with a minor revision to be issued once finalised.
1.1	17 August 2020	Template updated and old references to superseded documents/entities updated Minor updates to content
1.0	7 July 2014	*'Department of State Growth'* replaces *'DIER'* T6.1 reworded New Clauses (T6.2-T6.5) added, previous Clauses T6.3 & T6.4 removed T6.6 replaces previous Clause T6.2, Clause reworded New Clauses (T6.7-T6.10) added T6.11 replaces previous Clause T6.5, Clause reworded T6.12 replaces previous Clause T6.6 and previous Appendix T6.A, Clause reworded New Appendix (T6.A) added

T6.1 Introduction

The Department of State Growth uses the Austroads Guides as primary references for the planning and design of road and bridge projects to promote national consistency and standardisation its work.

The Department of State Growth Professional Services Specifications identify practices, policies, standards, and guidelines that differ from, or supplement, the Austroads Guides.

The Professional Services Specifications are intended to take precedence over the Austroads Guides for Department of State Growth projects. Specific requirements included within a Project Brief normally take precedence over both the Austroads Guides and the Professional Services Specifications.

This Professional Services Specification relates to Geotechnical Investigations.

The principal stages of geotechnical investigations are:

- Determination of the Geotechnical Site Investigation Level
- Preparation and approval of an Investigation Plan
- Undertake investigations
- Analysis and reporting

For larger or more complex projects, the investigation may be undertaken in several phases, particularly for projects in the planning stage or where preliminary investigations are required to ascertain the scope of more detailed investigations.

T6.1.1 Reference Documentation

Geotechnical Investigations shall generally be undertaken in accordance with:

- Austroads Guide to Road Design Part 1: Objectives of Road Design – Appendix B Geotechnical Investigations and Design, and
- The supplement included within this Professional Services Specification

Geotechnical Investigations, particularly those relating to bridge structures need to consider requirements of Australian Standards, particularly:

- AS 1726-2017 Geotechnical site investigations
- AS 5100.3-2017 Bridge design – Foundation and soil supporting structures

This Specification refers to several VicRoads Technical Notes for guidance on specific investigation types. These include:

- TN 022: Acid Sulfate Soils
- TN 024: Interpretation of Piezo-Cone Penetration Tests
- TN 078: Guide to Planning Geotechnical Site Investigations
- TN 092: Groundwater in Cut Excavations
- TN 093: Groundwater Sampling and Analysis
- TN 095: Investigation of Contaminated Sites
- TN 107: Use of Recycled Materials in Road Pavements
- TN 044: Pile Capacity Using Pile Driving Analyser
- BTN 023: Code of Practice – Foundations

For published information of Acid Sulphate Soils distribution in Tasmania, refer to:

- DPIWE - Tasmanian Acid Sulfate Soil Management Guidelines (2009)
- Mineral Resources Tasmania (MRT) - Distribution of acid sulphate soils in Tasmania (S. Gurung, 2006)

T6.2 Client Supplied Information

The Department of State Growth will provide copies of, or access to, relevant information in its possession. This information (where applicable) may include, but is not limited to:

1. Prior or related geotechnical investigation reports (including for existing structures)
2. Road Information Management System (RIMS) data e.g., road condition, asset inventory
3. Traffic data
4. Environment and Development Approvals (EDA): Desktop Report

Note: The information generally available from Department of State Growth for pavement investigations includes:

- Construction and surfacing history, including previous investigations, reports and test data
- Rutting depth as measured with a multi-laser profilometer
- Cracking as measured with a multi-laser profilometer
- Roughness in terms of IRI Lane (quarter car)
- Skid resistance as measured by SCRIM. It is normally available as a characteristic value for 100m lengths. Differential frictions between wheel paths are also available
- Texture depth in terms of the Sensor Measured Texture Depth (SMTD). The SMTD is not the same as the Sand Patch Texture Depth. The available data includes average values over 100m lengths and also as percentile values within each 100m length; <10mm, 10 to 20mm and >20mm
- Traffic information. This might include AADT, heavy vehicle content and its breakdown into classes. Weigh-In-Motion data may be available. This can provide information on the distribution of axle loads, ESAs.
- Traffic Speed Deflectometer

T6.3 Hold Points

Hold Points for this Specification are listed in Table 6.4.10 – Schedule of Hold Points.

Table 6.4.1– Schedule of Hold Points

Description of Hold Point	**Nominated Work Not to Proceed**	**Evidence of Compliance**
Provision of the Investigation Plan	All investigation work	Approval from Principal's Representative Project Manager

For larger or more complex projects, the Investigation Plan may be undertaken in several parts, or updated, particularly where preliminary investigations are required to ascertain the scope of more detailed investigations. In this instance, the updated Investigation Plan must be submitted and approved prior to undertaking the nominated investigations.

Supplement to Austroads Guide to Road Design Part 1: Objectives of Road Design – Appendix B Geotechnical Investigations and Design

This section is to read in conjunction with Austroads Guide to Road Design Part 1: Objectives of Road Design – Appendix B Geotechnical Investigations and Design and the relevant Australian Standards.

All investigations, design and reporting shall be undertaken in accordance with the Austroads Guide with modification, or guidance, as provided in the following sections.

B.1 Introduction

The Department of State Growth has no additional comments for this section.

B.2 Overview of Geotechnical Investigations

For any projects requiring Geotechnical Investigations, the Consultant shall develop a Geotechnical Investigation Plan.

The Geotechnical Investigation Plan shall detail the scope of works and reasons for it, the amount of sampling and testing envisaged and the expected cost of these works, along with the expected costs for ancillary items such as traffic control, location of utilities etc. The Geotechnical Investigation Plan must consider an appropriate level of risk to both the Consultant and State Growth based on the type of works intended, to ensure investigations are targeted and provide value.

The extent of sampling and testing shall be determined after the analysis of Department of State Growth's network data / supplied information and any previous investigations.

The Geotechnical Investigation Plan shall be based on:

- Considerations of factors that are likely to control future performance of the project, ensuring that these factors are appropriately covered in the plan.
- An examination of available and relevant background material, including past reports, maps, aerial photos etc.
- Access and safety considerations.
- Time frames, including the need or otherwise of monitoring.

Departures from standard practice or terminology shall be clearly documented.

When preparing a Geotechnical Investigation plan, reference to VicRoads Technical Note TN 078 – Guide to Planning Geotechnical Site Investigations is recommended to determine the most suitable investigation technique. Table 3.1 provides a guide to an appropriate Geotechnical Site Investigation Level for various design phases of a project. However, depending on the type, complexity and timeframe of a project, activities from a higher investigation level may be proposed earlier in the project to avoid multiple site investigations.

Note that the Design Phase terminology is in the process of being confirmed in all specifications for consistency across all Technical / Professional Specifications and Project Briefs.

Table B1 - Minimum Level of Geotechnical Investigation

Design Phase	Geotechnical Site Investigation Level
Identification / Scoping	Level 1 (initial)
Concept	Level 2 (preliminary)
Preliminary	Level 3 (general)
Detailed	Level 4 (detailed)

Explanation of the Detail of Investigation is within TN 078 – Guide to Planning Geotechnical Site Investigations: Table 3: Level of Geotechnical Investigations.

An outline of the Investigation Plan including estimated costs, time frames and potential risks and issues is to be provided to the Principal's Project Manager for acceptance prior to undertaking any investigations.

Prior to the commencement of field work / operations / sampling, Consultants shall ensure all permits / permissions have been obtained in accordance with Section B2.2.

B.2.1 Preliminary Investigation

Desktop Assessment

The information obtained during the desktop assessment is used to obtain an understanding of the geotechnical conditions and hazards likely to be encountered, as well as assisting with the preparation of future stages of the geotechnical investigation pan.

The following additional sources of data should be reviewed during a desktop assessment:

- Geological maps - Most geological maps can be obtained online from Mineral Resources Tasmania's online database (www.mrt.tas.gov.au).
- Existing bore log data – Existing bore log data can be obtained online from Mineral Resources Tasmania's online database (www.mrt.tas.gov.au).
- Topographic and Geological Maps including Soil mapping. These maps can be obtained through the Land Information System Tasmania online database (www.thelist.tas.gov.au).
- Landslide hazard bands and information on known active landslides can be obtained through the Land Information System Tasmania online database (www.thelist.tas.gov.au) or Mineral Resources Tasmania (www.mrt.tas.gov.au).
- Information on existing groundwater monitoring wells can be obtained from The Department of Primary Industries, Parks, Water and Environment's (DPIPWE) online groundwater information access portal (Groundwater Information Access Portal | Department of Primary Industries, Parks, Water and Environment, Tasmania (dpipwe.tas.gov.au)).
- Identifying previous land ownership and land use. Previous land uses may impact on suitability of in situ materials for re-use and removal requirements.
- An initial review for previously identified contaminated land can be undertaken using LISTMap, however a Property Information Request shall be submitted to the Environment Protection Authority (EPA) to request any record of contaminated sites within the project area. The Property Information request can be found here: Property Information Request (PIR) - EPA Tasmania.

- Information on local erosion management and landslide information can be obtained from the Land Information System Tasmania online database (www.thelist.tas.gov.au).
- Any information or reports available through local councils including records of roadworks and road maintenance.

B.2.1.1 Field Reconnaissance

The following additional features should be observed and recorded during field reconnaissance:

- presence and condition of any earth retaining structures
- potential acid sulfate soils and saline soils
- presence of any above or below ground utilities
- drainage systems -natural and artificial

B.2.2 Approvals for Site Investigations

This section is still under review, with the aim of all technical specifications and procedures needing approval to conduct site investigations referring to a single document. Currently noted within the Community & Stakeholder Engagement Plan and Professional Services Specification D1 (Road Design) and T5 (Environmental and Heritage Investigations).

Subject to the agreement of the Principal's Project Manager, and prior to undertaking any investigations the consultant shall:

- *Provide notifications and obtain all the necessary permits and approvals to undertake the investigations*
    - *Permits and Approvals required may be additional to those recommended in the EDA Desktop Assessment.*
- *Establish the location of any utilities prior to undertaking destructive testing and notify the appropriate Utility Owner*

A "Dial Before You Dig" request should be processed to obtain information on potential above and below ground utilities prior to any intrusive investigations. This request can be completed online at https://www.1100.com.au. Should any utilities be identified, a suitably qualified locator should be engaged to assist in confirming the location of any utilities.

As part of the DYBD request, an initial Aboriginal Heritage record search is automatically generated, but only for properties with titles through the Department of Primary Industries, Parks, Water and Environment (DPIPWE).

Where the geotechnical investigation is to be undertaken on land without a title reference, an Aboriginal Heritage Desktop Review should be submitted to Aboriginal Heritage Tasmania. If registered Aboriginal relics or apparent risk of impacting Aboriginal relics is identified, then Aboriginal Heritage Tasmania should be contacted for further advice prior to any site investigation works.

Should any unexpected Aboriginal relics be discovered, then the management of unanticipated discoveries of Aboriginal relics shall be in accordance with the Aboriginal Heritage Act 1975 and the Coroner's Act 1995 as per Aboriginal Heritage Tasmania's "Unanticipated Discovery Plan" 2018. All works shall stop immediately, and the Principal's Project Manager shall be informed.

Trimming and removal of vegetation should be avoided during geotechnical investigations. If vegetation trimming or removal is required, the relevant Council should be contacted for advice before proceeding with work and permits obtained if required.

If access to private property is required, relevant notification and permits shall be obtained prior to any entry onto private property.

B.2.3 Detailed Geotechnical Investigation

The Department of State Growth has no additional comments for this section.

B.2.4 Design of Special Systems

The Department of State Growth has no additional comments for this section.

B.2.5 Production of Geotechnical Reports

Available information should be referenced in the Geotechnical Reports if it is not included within them. Where information is not included, the reasons for exclusion should be stated. In preparing a Report it should be recognised that it has uses beyond the design and project specification functions. It may be used by the Principal to assess priorities and risks, by the Contractor to determine methodology and costs, and by the Superintendent to make decisions throughout construction.

The report, in addition to full disclosure, should include:

- A description of the proposed project or site
- The objectives of the investigation
- Description of the site or materials under investigation
- Assessment of the potential for use of in situ materials from any proposed cuttings as subgrade or fill and/ or pavement materials
- A description of the methods of investigation used
- All factual information collected or used
- Recommendations
- Statements concerning reliability of the data and interpretations and opinions where expressed, deficiencies or inconsistencies in the data, residual uncertainties and risks to the Principal
- Descriptions of nomenclature and standards used

The Report shall include definitive locations of test locations by co-ordinates; and, either in terms of design chainage with offset, or in terms of the Department of State Growth's TRIPS's reference (Link / Chainage) with offset. The elevation, to the nearest 0.1m, of the ground surface shall be provided for drill holes.

Data presentation shall be clear and unambiguous. Where data is voluminous it should be summarised by utilising pictorial, graphical and tabulation techniques.

As per AS1726: "Geotechnical Site Investigations", Geotechnical Reports shall present the information from site investigations in the form of factual information and observations, interpretations and/or opinions.

Reporting may be required in separate volumes to distinguish between factual and interpretive reports, depending on the project objectives and investigation level.

All reports shall clearly distinguish between fact, interpretation, and opinion. Opinion should be avoided unless it is necessary to fulfil the objectives of the investigation and only be given by those that have the skills, knowledge, and experience to provide such advice.

B.2.6 Emerging Technologies

The Department of State Growth has no additional comments for this section.

B.3 Methods of Geotechnical Investigation

Where materials testing is required, the relevant Australian Standards shall be used.

Where geotechnical fieldwork requires intrusive investigation techniques such as borehole drilling and test pitting, the disturbed ground shall be reinstated to match existing conditions. Reinstatement shall be in accordance with the Department's Standard Specifications. This includes returning the road surface, drains, and disturbed ground to their original levels and to a serviceable condition. This includes returning the road profile, drains, road cutting and embankment batters, sight benching and other transport infrastructure assets or facilities to original or improved condition.

Should a site within the project area be identified as being contaminated through site investigations, the EPA Notification of a Contaminated Site process must be undertaken. The Notification of a Contaminated Site process can be found on the EPA Tasmania website at: https://epa.tas.gov.au/environment/land/regulation-of-contaminated-sites/notification-of-a-contaminated-site

B.3.1 Seismic Surveys

The Department of State Growth has no additional comments for this section.

B.3.2 Auger and Bore Holes

The Consultant shall seek advice from the Principal's Project Manager regarding the need for an inspection of any drill cores / samples collected during the tendering process.

If an inspection of drill cores or samples is required, the drill cores / samples shall be securely stored. When there is no further need to hold the drill cores, they shall be delivered to the State Government drill core depository.

Samples shall not be disposed of until approved by the Principal's Project Manager.

B.3.3 Penetrometer Testing

For assistance in interpretation of penetrometer test results, further reference to can be made to:

- VicRoads Technical Note *"TN 024 – Interpretation of Piezo-Cone Penetration Tests"*
- *AS1289.6.3.2 Methods of testing soils for engineering purposes – "Soil strength and consolidation tests - Determination of the penetration resistance of a soil - 9 kg dynamic cone penetrometer test"*

B.3.4 Standpipe Piezometers

For further guidance, refer to:

- VicRoads Technical Note *"TN 093 – Groundwater Sampling and Analysis"*

B.3.5 Trenching

Care should be taken in choosing an appropriately sized machine for trenching investigations. Selection of a machine should factor in the following:

- Access conditions, including height restrictions
- Target investigation depths
- Machine and bucket size appropriate for expected ground conditions
- Distance between test locations

B.3.6 Sampling and Testing of Materials

For further guidance on sampling and testing for groundwater and contaminated sites, refer to:

- VicRoads Technical Note *"TN 093 – Groundwater Sampling and Analysis"*
- VicRoads Technical Note *"TN 095 – Investigation of Contaminated Sites"*

B.4 Design Elements

B.4.1 General

The Department of State Growth has no additional comments for this section.

B.4.2 Horizontal Alignment

The Department of State Growth has no additional comments for this section.

B.4.3 Vertical Alignment

The Department of State Growth has no additional comments for this section.

B.4.4 Cuttings

For further guidance refer to:

- VicRoads Technical Note *"TN 092 – Groundwater in Cut Excavations"*

B.4.5 Embankments

For further guidance on spacing of test sites refer to:

- VicRoads Technical Note *"TN 078 – Guide to Planning Geotechnical Site Investigations (2006)"*

B.4.6 Pavements

For further guidance on spacing of test sites refer to:

- VicRoads Technical Note *"TN 078 – Guide to Planning Geotechnical Site Investigations (2006)"*

B.4.7 Subsurface Drainage Systems

The Department of State Growth has no additional comments for this section.

B.4.8 Footings for Structures

For further guidance refer to:

- VicRoads Code of Practice *"BTN023 AS5100 Part 3 Code of Practice – Foundations (2018)"* on minimum requirements for bridge site investigations and pile design.
- VicRoads Technical Note *"TN 044 – Pile Capacity Using the Pile Driving Analyser"* on confirming driven pile capacity estimated from geotechnical investigation results.

B.4.9 Observational Method

The Department of State Growth has no additional comments for this section.

B.5 Sustainable Design Practices

In addition to the requirements of this section, refer to the Department of State Growth – *Site Stabilisation and Landscaping Guideline*.

B.5.1 General

The Department of State Growth has no additional comments for this section.

B.5.2 Materials Stewardship

The Department of State Growth has no additional comments for this section.

B.5.3 Minimisation of Erosion

The Department of State Growth has no additional comments for this section.

B.5.4 Water for Construction and Landscaping Purposes

The Department of State Growth has no additional comments for this section.

B.5.5 Preservation of Topsoil

The Department of State Growth has no additional comments for this section.

B.5.6 Use of Non-standard or Recycled Materials

For further guidance refer to:

- VicRoads Technical Note *"TN 107 Use of Recycled Materials in Road Pavements 2019"*on the use of recycled materials in pavements.

B.6 Laboratory Tests

The Department of State Growth has no additional comments for this section.

B.7 Special Geotechnical Design Systems

B.7.1 General

Additional public resources related to special geotechnical design systems can be obtained online from the Australian Geomechanics Society (australiangeomechanics.org).

B.7.2 Slope Stability Treatments

For additional guidance on slope stability mechanisms and treatments refer to:

- The Australian geoguides for slope management and maintenance (2007)

B.7.3 Treatments for Soft or Swampy Ground beneath Embankments

The Department of State Growth has no additional comments for this section.

B.7.4 Monitoring of Movement in Embankments

The Department of State Growth has no additional comments for this section.

B.7.5 Erosion Protection

The Department of State Growth has no additional comments for this section.

B.7.6 Contamination

For further guidance relating to Acid Sulfate Soils refer to *DPIPWE - Tasmanian Acid Sulfate Soil Management Guidelines (2009)* located at: https://dpipwe.tas.gov.au/Documents/ASS-Guidelines-FINAL.pdf

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