

PART B – AEIS

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6. GEOLOGY AND SOILS

Strategic cropping land (as it was under the now repealed *Strategic Cropping Land Act 2011*) is addressed in **Section 1.5** and **Section 7.1.2** of the AEIS.

6.1. Soil management strategies

In response to issues raised regarding the management of soils along the pipeline route, SunWater engaged Land Resource Assessment and Management Pty Ltd (LRAM) to develop Soil Management Protocols (the protocols). The protocols are designed to assist SunWater and its contractors with:

- identification of distinct soil management groups along the pipeline corridor;
- mapping the distribution of these soil management groups within the corridor;
- determining the environmental risk for each soil management group due to particular construction and operation activities associated with the pipeline; and
- identifying appropriate management strategies to implement so that environmental impact is minimised.

The complete protocols are provided as **Appendix B6** and will be included within the Construction Environmental Management Plan (updated in **Appendix B29**).

Section 2 of the protocols provides a soil reference for the range of soil management groups that may be encountered along the pipeline corridor.

Section 3 describes the soil mapping protocol.

Section 4 describes the process for identifying these soil management groups via the mapping protocol.

Section 5 is a Risk Assessment and Management Protocol that matches soil management groups to be disturbed against each planned activity and then describes the range of management strategies to be implemented (via a series of Implementation Schedules).

Schedules A - D detail the Implementation Schedules. The schedules list the soil management practices that need to be implemented to minimise environmental impact. Within the schedules, the management practices are organised to address the identified soil management risk with respect to:

- erosion and sediment control;
- topsoil management;
- subsoil salinity management;
- subsoil acidity management; and
- management and disturbance to Good Quality Agricultural Land (GQAL) crop land.

Some management practices refer to recommended topsoil stripping depth and soil amelioration with lime, dolomite or gypsum. The recommended topsoil stripping depth for each soil management group is provided in Appendix D (to the protocols) and specifications for lime, dolomite and gypsum soil ameliorants are given in Appendix E.

The Risk Assessment and Management Protocol will be applied to each sequential stage of pipeline works:

1. clearing and grubbing;

2. stripping and stockpiling topsoil;
3. excavating and stockpiling subsoil;
4. excavating building foundation;
5. excavating trench / inserting pipeline;
6. backfilling and stabilising the trench;
7. forming a maintenance track; and
8. rehabilitating disturbed areas.

6.2. Management of excess trench spoil

Options for disposal of the surplus excavated trench material were discussed in Sections 2.4.3.2, 4.3.2 and to an extent in 6.2.2.2 of the EIS. The risks associated with sodic and dispersive subsoils were recognised, as was the risk of redirection of surface flows as a result of mounding over the pipeline. The significant reduction in pipeline length (**Part C**) simplifies the issue as less material will be available, increasing the likelihood that it can be utilised productively on or near site. An agency submission noted that several strategic gullies could be rehabilitated in Area 3 with proper attention to the design of the rehabilitation, and to appropriate treatment of the imported soil material. This is addressed in the protocols.

The protocols determine that the priorities outlined in the EIS remain valid, that is, following appropriate treatment as determined by the protocols, excess spoil will be:

- used in construction of the 600 ML balancing storage or other associated infrastructure;
- formed into a shallow mound over the easement, treated if necessary, topsoiled, and re-planted;
- used to rehabilitate strategic gullies, or
- used as landfill daily cover or capping.

The protocols also provide management options for disposal of surplus material such as producing a permanent mound with appropriate treatment, topsoiling and revegetation. This would be orientated so as to not interfere with overland flow and would only proceed following agreement with the landowner. Use of any option depends on the site of potential use being near to the point of generation of the excess. The purpose of these various options is to promote efficiencies in the disposal of excess material and minimise traffic and transport related impacts.

6.2.1. Disposal of sodic soils

The Soil Identification Protocol and Soil Management Protocol provide the technical basis for identifying the presence and extent of unsuitable soil material within the pipeline corridor including dispersive, saline or acidic subsoil.

Soil with elevated levels of sodicity and salinity, or that are strongly acidic, are referred to as unsuitable soil material throughout the protocol. Unsuitable soil material is defined in Appendix D and is any soil layer that either:

- is strongly dispersive ($ESP \geq 15$ or $Ca:Mg \leq 0.01$) in shrink-swell soils (*Shallow medium-heavy clays, Deep cracking clays and Melonhole clays*); or
- is dispersive ($ESP \geq 6$ or $Ca:Mg \leq 0.01$) in all other (rigid) soil management groups; or
- has medium or higher salinity ($EC_{1:5} \geq 0.24$ dS/m, or $CL \geq 350$ mg/kg where gypsum is present); or
- has very strong to extreme acidity ($pH \leq 5$) in GQAL crop land.

The Risk Assessment and Management Protocol enables specific measures to be implemented to:

- prevent leaving unsuitable soil material that has not been ameliorated exposed at the ground surface; and
- provide sufficient topsoil to enhance regeneration of ground cover; or
- amend unsuitable soil material at appropriate amelioration rates, if there is insufficient topsoil available to provide adequate cover.

In particular, the Implementation Schedules include specific management practices for:

- stripping topsoil to avoid unsuitable soil material;
- stockpiling unsuitable soil material;
- backfilling voids and gullies with unsuitable soil material;
- treating unsuitable soil material when rehabilitating disturbed areas of GQAL crop land; and
- treating unsuitable soil material when rehabilitating other land.

6.2.2. Backfilling voids and gullies

The Risk Assessment and Management Protocol enables specific measures to be implemented to ensure backfilling operations produce a stable soil.

In particular, the Implementation Schedules include specific management practices for rehabilitating backfill areas:

- to ensure sufficient suitable topsoil is used to cap any unsuitable soil material;
- to treat unsuitable soil material when rehabilitating disturbed areas of GQAL crop land; and
- to treat unsuitable soil material when rehabilitating other land.

In addition, several management practices are aimed at producing a stable land surface with low risk of soil erosion for all disturbed areas.

Management practices in Schedule C and Appendix E provide thresholds and specifications for ameliorating unsuitable soil material that is either dispersive or strongly to extremely acidic.

Unsuitable soil material should only be used to backfill erosion gullies where unsuitable soil material is already present. This is stipulated as part of Implementation Schedule C. Any such rehabilitation would require agreement of the landholder.

6.3. Interference with overland flow and erosion along the pipeline or maintenance track

Chapter 6 of the EIS identified the types of soils, and their characteristics, that will be affected during construction of the pipeline. Mitigation measures specific to managing runoff and erosion along the pipeline alignment were provided in Section 6.2.2.2 of the EIS. Mitigation measures to manage the impacts associated with runoff were also provided in Section 14.2.1.2 of the EIS. Section 29.9.4, the construction EMP particularly focussed on sediment and erosion control as related to Geology and Soils.

The Implementation Schedules of the Soil Management Protocols include specific management practices for control of surface runoff via the following criteria:

- access is restricted to essential areas only;
- rehabilitation commences as soon as works are completed;
- the rehabilitated land surface is re-formed appropriately to minimise erosion on sloping land;
- adequate run-off and sedimentation control measures are implemented at all infrastructure sites;
- slope length is reduced to an appropriate distance on sloping land;
- disturbance of overland flow patterns is avoided on GQAL crop land; and
- protection of any open borrow pits during the construction and operational phases.

In particular, management practices in Schedule C stipulate the implementation of runoff control devices to reduce slope length on access tracks and the pipeline but do not specify actual distance to be used between devices. The distance between devices is governed by soil type, slope gradient, presence of local drainage lines, and degree of disturbance and should be determined initially during the development of the management plan and revised at the commencement of field work. These issues are also addressed in the latest versions of erosion control manuals such as the IECA Best Practice Erosion and Sediment Control (2008). This manual was nominated as the preferred manual in Section 29.9.4 (Geology and Soils sub-plan) of the Construction EMP (EIS).

The management practices also describe the construction of berms (banks) as one method for runoff control. Other management practices will work in collaboration so that no unsuitable soil material is exposed at the surface following construction of such berms by stipulating that such material must be capped with sufficient suitable topsoil.

6.4. Soil compaction

Section 29.9.4 noted that compacted work areas such as access tracks would be ripped to loosen the subsoil prior to rehabilitation. The Soil Management Protocol notes and defines the process of lightly compacting the subsoil and topsoil in these areas during rehabilitation.

6.5. Pipeline easement rehabilitation and availability of topsoil

Section 29.9.9 of the EIS noted a specific revegetation/rehabilitation plan would be prepared prior to construction and further detail on this plan is provided in **Appendix B29**. The Soil Management Protocols (**Appendix B6**) describe methods to strip and stockpile topsoil appropriately, the depth of topsoil cover required in various circumstances, and means to ameliorate soil such that it is suitable for use as topsoil. While it is not anticipated

that additional topsoil would need to be imported, should it be required SunWater's preference is to source the material from commercial suppliers with implementation of the Weed Management protocols outlined in Section 29.9.13 of the EIS and reiterated in this document.