

Southern Sydney Freight Line Soil and Water Management Sub-Plan

January, 2009



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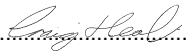
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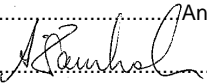
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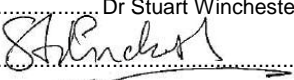
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1. Introduction

1.1 Purpose and objectives

This Soil & Water Management Sub Plan forms part of the Construction Environmental Management Plan (CEMP) for the Southern Sydney Freight Line.

The conditions of approval for Southern Sydney Freight Line (CoA 61) require the proponent to “prepare a Soils and Water Management Sub Plan (SWMSP) in consultation with Relevant Government Departments, and Councils and the CLG(s) and in accordance with the SoC as part of the CEMP. The SWMSP must be prepared in accordance with The Blue Book and must include:

- a) *an Erosion and Sedimentation Control Sub Plan that is fully integrated with the Spoil and Fill Management Sub Plan;*
- b) *an Acid Sulphate Soils Management Sub Plan;*
- c) *a Groundwater Management Sub Plan (CoA (e)); and*
- d) *a Surface and Ground Water Monitoring Program that is fully integrated with plans (a) to (c) above and the Hazard and Risk Management Sub Plan referred to in CoA 69.*
- e) *The Groundwater Management Sub Plan (GMSP) will include groundwater investigations and assessment in order to establish water levels, evaluate water quality and to assess the likely impacts of the Project on potential groundwater dependent ecosystems, and existing or project related structures and infrastructure within and adjoining the rail corridor.”*

1.2 Relationship with other plans

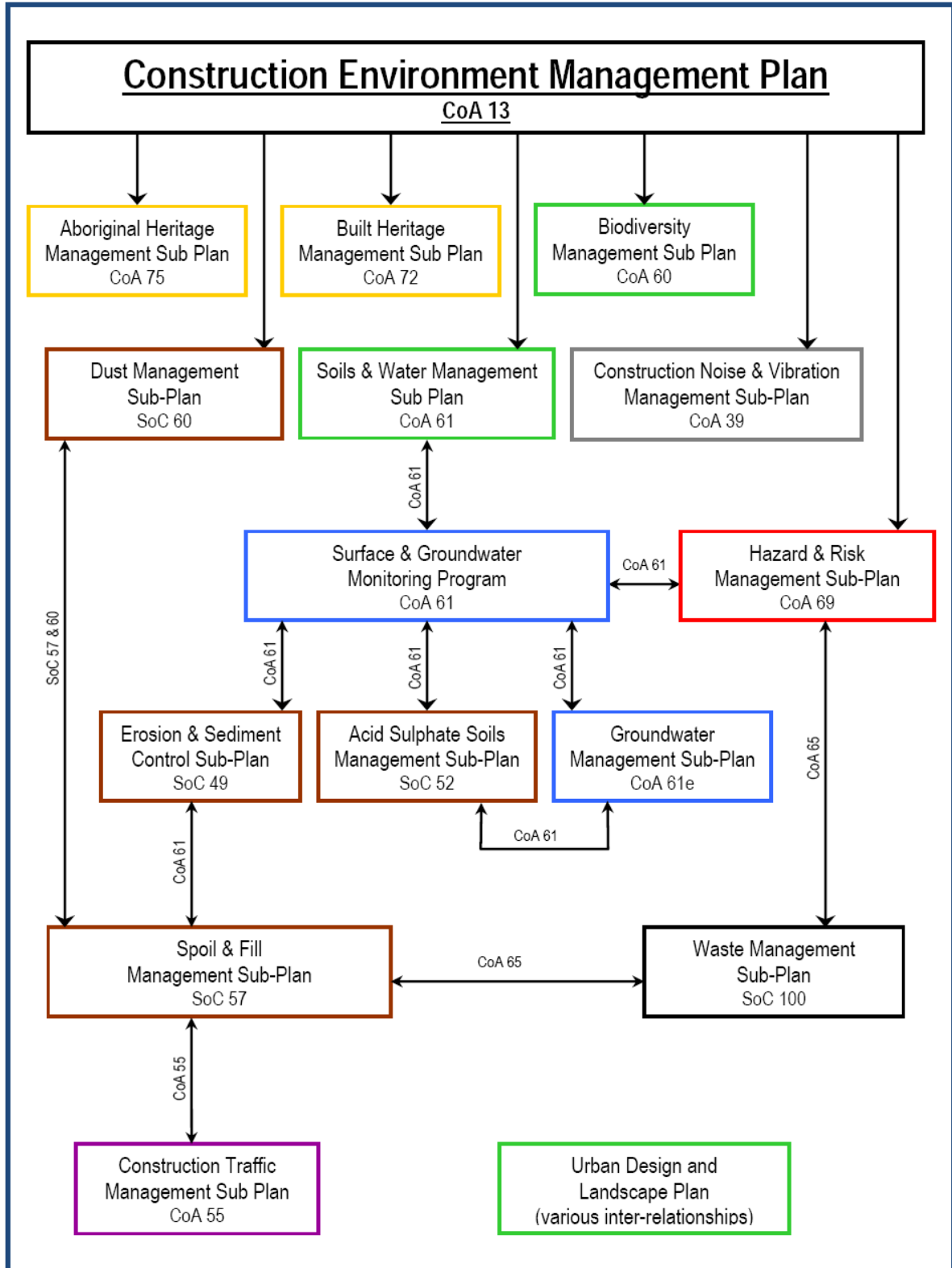
This Soil & Water Management Sub Plan forms part of the Master CEMP for the SSFL Project.

The relationship between the Master CEMP sub-plans is shown on Figure 1-1.

1.3 Work description

Details of construction activities and work packages are included in the Master CEMP.

Figure 1-1: Construction Environmental Management Plan Structure



1.4 Existing environment and site specific issues

The following general description of the existing biophysical environment that the SSFL passes through has been taken from the PB Environmental Assessment (2006).

The proposed SSFL passes through a gently undulating landscape from Macarthur to Glenfield with Bow Bowing and Bunbury Curran Creeks and other drainage lines crossing the rail corridor. The rail corridor forms part of the Georges River catchment. The hills are located on the Wianamatta Group Shales and Hawkesbury Sandstone with a gradual rise south-west of Macarthur to approximately 100 metres above sea level. Many creeks, recreational grounds and open grassed areas follow the drainage lines between Macarthur and Glenfield.

Along the southern section of the proposed route open grassed areas are mainly associated with the creeks and their crossings. Although there are remnant areas of listed endangered ecological communities, comprising Sydney Coastal River Flat Forest (e.g. north of Narallen Road at Campbelltown) and Cumberland Plain Woodland (e.g. at Pembroke Park, Minto). Leacock Regional Park, located north of Glenfield, has a significant area of open forest, comprising Cumberland Plain Woodland and Sydney Coastal River Flat Forest. The Sydney Coastal River Flat Forest is also located at Casula and north of Liverpool Railway Station where the SSFL would be close to the Georges River.

Between Casula and Liverpool, Liverpool City Council's riverfront parkland separates the river from the rail corridor. The land between Casula and Carramar Railway Stations is mostly alluvial floodplains with generally flat topography and slopes of less than 10%. Hilly terrain lies beyond the embankment of the river at Casula to the west of the rail corridor.

Between Liverpool and Warwick Farm there is minimal natural vegetation and landscaped areas. However, in this stretch of the alignment, one of the two small clusters of the threatened plant species *Acacia pubescens* is located.

Between Warwick Farm and Carramar Railway Stations the SSFL passes through fairly flat to undulating topography. The main watercourses flowing through this area are the Cabramatta and Prospect Creeks. North of Warwick Farm there are open space areas located on either side of the alignment associated with the floodplain of Cabramatta Creek. The SSFL crosses Prospect Creek just west of Carramar Railway Station. At both of these creek crossings Sydney Coastal River Flat Forest occurs as narrow strips or patches adjacent to the creek.

From Carramar Railway Station until the end of the proposed route of the SSFL at Sefton Park Junction, the area is located on mostly undulating rises on the Wianamatta Group Shales and Hawkesbury Sandstone resulting in high and steep cuttings or embankments on either side of the rail corridor. The second location of the threatened plant species *Acacia pubescens* is located east of Sefton Park Junction near the end of the route.

All construction and operation activities have the potential to cause adverse environmental impacts on soil and water. These activities and specific risks to soil and water resulting from the construction and operation of the SSFL are presented in detail in the relevant sub-plan.

2. Legislative requirements and guidelines

This section details the legislative requirements for the project as it relates to soil and water management. The requirements are prepared against construction activities being undertaken and the site specific issues. Legislative requirements include approvals, licences or permits required to undertake construction works, such as those below.

The legislative requirements are listed alphabetically by the relevant environmental issue they relate to and are sourced from the nested subplans.

Acid Sulfate Soils

Current environmental legislation (including regulations) applicable to the management of Acid Sulfate Soils are outlined below.

Table 2-1 Legislative Requirements (Acid Sulphate Soils)

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<i>Environmental Planning and Assessment Act, 1979</i> (Department of Planning, Campbelltown, Fairfield and Liverpool City Councils)	Planning approval required for any significant changes or additional requirements for the project.	All works must be undertaken in accordance with the conditions of consent and statement of conditions. Notify ARTC Project Director if any significant changes to the project are required. ARTC Project Manager to identify any further environmental assessment required.
<i>Protection of the Environment Operations Act 1997</i> (Department of Environment and Climate Change)	This Act enforces licences and approvals formerly required under separate Acts relating to air, water and noise pollution, and waste management with a single integrated licence.	DECC has issued an Environmental Protection Licence for scheduled activities to occur within the licensed premises. (12971)
<i>Water Management Act 2000</i> Department of Water and Energy	Under the Act, a licence would be required if water was to be extracted from a creek/bore or if any waterways were to be realigned during construction.	Pursuant to section 75U(1) of the Environmental Planning Approvals Act 1979, proposals determined under Part 3A of that Act do not require separate approvals under sections 89, 90 or 91 of this Act.
<i>Acid Sulfate Soil Manual</i> (Acid Sulfate Soil Management Advisory Committee, 1998)	The acid sulfate soil manual outlines the strategies to manage potential impacts of development works that are likely to disturb acid sulfate soils. Applies only if acid sulfate soils are encountered during the project.	It is likely that acid sulfate soils will be encountered during construction, therefore this project will need to follow the manual.

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<p>(Commonwealth) <i>Environment Protection and Biodiversity Conservation Act, 1999</i></p> <p>(Department of Environment, Water, Heritage and Arts)</p>	<p>The Act is triggered by developments that will have a significant impact on Matters of National Environmental Significance including items of outstanding heritage value to Australia.</p> <p>The Act requires approvals to be sought by a commonwealth agency for any act which may have a significant impact on the environment.</p> <p>The SSFL will not affect any national heritage places or Commonwealth heritage listed places or items on the Register of National Estate.</p>	<p>ARTC is a commonwealth agency under this Act.</p> <p>Commonwealth approval is not required in relation to items of outstanding heritage value.</p> <p>Commonwealth approval is being obtained due to the presence of matters of national environmental significance, threatened biodiversity listed under the EPBC Act. (refer biodiversity sub-plan)</p>

Dust Management

The key legislative instruments and guidance documents which are applicable to the project and the management of dust are outlined below.

Table 2-2 Legislative Requirements (Dust Management)

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<p><i>Protection of the Environment Operations Act, 1997</i> (DECC)</p>	<p>This Act provides for the control of polluting activities in NSW in order to prevent pollution of the environment. Offences exist in relation to activities that cause air pollution.</p> <p>Applies to dust and other emissions associated with construction activities which are controlled through the CEMP and other Sub-Plans.</p>	<p>The Environmental Protection Licence details dust monitoring and reporting requirements</p>
<p><i>Environmental Planning and Assessment Act, 1979</i> (Department of Planning, Campbelltown, Fairfield and Liverpool City Councils)</p>	<p>All works must be undertaken in accordance with the Conditions of Approval and Statement of Conditions.</p>	<p>No requirement for additional permit, approval or licence since project is approved under Part 3A <i>Environmental Planning and Assessment Act 1979</i> approval.</p> <p>Notify ARTC Project Director if any significant changes to the project are desired. ARTC Project Manager to identify any further environmental assessment required.</p>
<p><i>Protection of the Environment Operations (Clean Air) Regulation, 2002</i> (DECC)</p>	<p>This regulation provides details and sets maximum limits on air impurities in emissions in relation to motor vehicles, plant, equipment and activities on the construction site.</p> <p>Applies to all plant, equipment and vehicles used on the construction site.</p>	<p>Conditions of Approval and Statement of Conditions address this.</p>

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<i>National Parks and Wildlife Act, 1974</i> (Department of Environment and Climate Change)	Pursuant to section 75U(1) of the <i>Environmental Planning and Approvals Act 1979</i> , proposals determined under Part 3A of that Act do not require separate approvals under sections 87 or 90 of this Act.	No requirement for additional permit, approval or licence since project is approved under Part 3A <i>Environmental Planning and Assessment Act 1979</i> approval.
<i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, January 2007</i> (DECC)	This guideline provides standard approved methods used in monitoring dust deposition and particulates for ambient air quality in NSW, and gives reference to documents containing further details on these methods. Applies to dust monitoring to be conducted for the construction activities.	No requirement for additional permit, approval or licence since project is approved under Part 3A <i>Environmental Planning and Assessment Act 1979</i> approval.
<i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, August 2005</i> (DECC)	This guideline provides impact assessment criteria which reflect the environmental outcomes adopted by the NSW Department of Environment and Climate Change. These criteria were applied to the assessment of air emissions from construction activities.	No requirement for additional permit, approval or licence since project is approved under Part 3A <i>Environmental Planning and Assessment Act 1979</i> approval.
<i>National Environment Protection Measure for Ambient Air Quality, 1998</i> (Environment Protection and Heritage Council)	Provides uniform standards for ambient air quality (not including indoor air). Applies to dust and air emissions from construction.	No requirement for additional permit, approval or licence since project is approved under Part 3A <i>Environmental Planning and Assessment Act 1979</i> approval.

Erosion and Sediment

The key legislative instruments and guidance documents which are applicable to the project and the management of erosion and sediment control are outlined below.

Table 2-3 Legislative Requirements (Erosion & Sediment Control)

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<i>Environmental Planning and Assessment Act, 1979</i> (Department of Planning, Campbelltown, Fairfield and Liverpool City Councils)	Major project approval required for any project modification.	All works must be undertaken in accordance with the conditions of consent and Statement of Conditions. Notify ARTC Project Director if any significant changes to the project are desired. ARTC Project Manager to identify any further environmental assessment required.

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<p><i>Protection of the Environment Operations Act 1997 (POEO Act);</i> (DECC)</p>	<p>Under the Protection of the Environment Operations Act (POEO Act) certain types of waste are subject to special monitoring and reporting requirements by DECC. Tracking can be required for the consignment, transportation and acceptance for storage, treatment or disposal of certain types of waste.</p>	<p>The Environment Protection Licence for this Project will include requirements for waste disposal. In addition, waste receival facilities will need to be appropriately licensed under this Act.</p>
<p><i>National Parks and Wildlife Act, 1974</i> (Department of Environment and Climate Change)</p>	<p>The Act aims to prevent the unnecessary or unwarranted destruction of relics, and the active protection and conservation of relics of high cultural significance. This Act covers relics of both Aboriginal and non-Aboriginal habitation in NSW.</p> <p>It is an offence: to harm any animal which is part of a threatened species, population or ecological community; to pick any plant which is part of a threatened species, population or ecological community.</p> <p>It is also an offence, if a person knows that an area of land is the habitat of a threatened species, population or ecological community, to do something or fail to do something that causes damage to that habitat.</p>	<p>Pursuant to section 75U(1) of the <i>Environmental Planning and Approvals Act 1979</i>, proposals determined under Part 3A of that Act do not require separate approvals under sections 87 or 90 of this Act.</p> <p>The <i>National Parks and Wildlife Act 1974</i> provides for land to be gazetted as part of the State's National Park Estate. Due to the need to acquire approximately 1.3 ha of land from Leacock Regional Park for the Project the acquired land would require de-gazettal.</p>
<p><i>Water Management Act 2000</i> (Department of Water and Energy)</p>	<p>Under the Act, a licence would be required if water was to be extracted from a creek/bore or if any waterways were to be realigned during construction. This Act replaces the <i>repealed Rivers and Foreshores Improvement Act 1948</i>.</p>	<p>Pursuant to Section 75U(1) of the <i>Environmental Planning and Approvals Act 1979</i>, proposals determined under Part 3A of that Act do not require separate approvals under sections 89, 90 or 91 of this Act.</p>
<p><i>Native Vegetation Act 2003</i></p>	<p>The Act protects state-protected land and native vegetation as identified in the Act.</p>	<p>Pursuant to section 75U(1) of the <i>Environmental Planning and Approvals Act 1999</i>, proposals determined under Part 3A of that Act do not require separate approvals under section 12 of this Act for clearing of native vegetation. However any such impacts will be assessed as part of the environmental assessment.</p>

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<p>(Commonwealth) <i>Environment Protection and Biodiversity Conservation Act 1999</i></p> <p>(Department of Environment, Water, Heritage and Arts)</p>	<p>The Act is triggered by developments that will have a significant impact on Matters of National Environmental Significance including endangered ecological communities, threatened species and migratory species.</p> <p>The Act requires approvals to be sought by a commonwealth agency for any act which may have a significant impact on the environment.</p>	<p>ARTC is a commonwealth agency under this Act.</p> <p>Commonwealth approval has been obtained. DEW accredited the NSW Part3A assessment process for the SSFL.</p> <p>Minister's approval is required for SSFL due to presence of matters of national environmental significance, threatened biodiversity listed under the <i>EPBC Act</i>: Cumberland Plain Woodland and <i>Acacia pubescens</i>.</p>
<p><i>Soil Conservation Act 1938 (New South Wales Government) (DNR)</i></p>	<p>Provides for the protection conservation of the soil resources of the State, the mitigation of soil erosion and land degradation and the conservation of water resources.</p>	<p>No requirement for permit, approval or licence identified for construction.</p>
<p><i>Water Management Act 2000 (New South Wales Government)</i></p>	<p>Promotes sustainable and integrated management of the water sources of the state for the benefit of both present and future generations.</p> <p>Provides for all water sources to be protected and wherever possible enhanced.</p>	<p>No requirement for permit, approval or licence identified for construction.</p>
<p>Managing Urban Stormwater – Soils and Construction Volume 1 4th Edition (Blue Book)</p>	<p>Provides guidance for the design, construction and implementation of erosion and sediment controls for construction sites</p>	<p>Design, implementation and decommissioning of erosion and sediment controls must be in accordance with the Blue Book.</p>

Groundwater

The key legislative instruments and guidance documents which are applicable to the project and the management of groundwater are outlined below:

Table 2-2-4 Legislative Requirements (Groundwater)

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<p><i>Environmental Planning and Assessment Act 1979 (New South Wales Government) (DP)</i></p>	<p>Promotes ecologically sustainable development through the proper management, development and conservation of natural and artificial resources, for the purpose of promoting the social and economic welfare of the community and a better environment.</p>	<p>Minister of Planning's approval is required for the construction phase of the project under Part 3A Section 75J.</p>

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<i>Protection of the Environment Operations Act 1997 (DEC/ Campbelltown, Fairfield and Liverpool City Councils)</i>	Environmental protection licences are required for scheduled activities. Provides for the control of polluting activities in NSW to prevent pollution of the environment. Provides a duty to notify DEC of any environmental harm from site activities.	DECC has issued licence no 12971
<i>Water Management Act 2000 (New South Wales Government)</i>	Promotes sustainable and integrated management of the water sources of the state for the benefit of both present and future generations. Provides for all water sources to be protected and wherever possible enhanced.	No requirement for permit, approval or licence identified for construction.

Spoil and Fill

The key legislative instruments and guidance documents which are applicable to the project and the management of spoil and fill are outlined below.

Table 2-5 Legislative Requirements (Spoil and Fill)

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<i>Environmental Planning and Assessment Act, 1979</i> (Department of Planning, Campbelltown, Fairfield and Liverpool City Councils)	Major project approval required for any project modification.	All works must be undertaken in accordance with the conditions of consent and Statement of Conditions. Notify ARTC Project Director if any significant changes to the project are desired. ARTC Project Manager to identify any further environmental assessment required.
<i>Protection of the Environment Operations Act 1997 (POEO Act);</i> (DECC)	Under the Protection of the Environment Operations Act (POEO Act) certain types of waste are subject to special monitoring and reporting requirements by DECC. Tracking can be required for the consignment, transportation and acceptance for storage, treatment or disposal of certain types of waste.	The Environment Protection Licence 12971 details requirements for waste transport and disposal.

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<p><i>National Parks and Wildlife Act, 1974</i></p> <p>(Department of Environment and Climate Change)</p>	<p>The Act aims to prevent the unnecessary or unwarranted destruction of relics, and the active protection and conservation of relics of high cultural significance. This Act covers relics of both Aboriginal and non-Aboriginal habitation in NSW.</p> <p>It is an offence: to harm any animal which is part of a threatened species, population or ecological community; to pick any plant which is part of a threatened species, population or ecological community.</p> <p>It is also an offence, if a person knows that an area of land is the habitat of a threatened species, population or ecological community, to do something or fail to do something that causes damage to that habitat.</p>	<p>Pursuant to section 75U(1) of the <i>Environmental Planning and Approvals Act 1979</i>, proposals determined under Part 3A of that Act do not require separate approvals under sections 87 or 90 of this Act.</p> <p>The <i>National Parks and Wildlife Act 1974</i> provides for land to be gazetted as part of the State's National Park Estate. Due to the need to acquire approximately 1.3 ha of land from Leacock Regional Park for the Project the acquired land would require de-gazetted.</p>
<p><i>Water Management Act 2000</i></p> <p>(Department of Water and Energy)</p>	<p>Under the Act, a licence would be required if water was to be extracted from a creek/bore or if any waterways were to be realigned during construction. This Act replaces the <i>repealed Rivers and Foreshores Improvement Act 1948</i>.</p>	<p>Pursuant to Section 75U(1) of the Environmental Planning and Approvals Act 1979, proposals determined under Part 3A of that Act do not require separate approvals under sections 89, 90 or 91 of this Act.</p>
<p><i>Native Vegetation Act 2003</i></p>	<p>The Act protects state-protected land and native vegetation as identified in the Act.</p>	<p>Pursuant to section 75U(1) of the Environmental Planning and Approvals Act 1999, proposals determined under Part 3A of that Act do not require separate approvals under section 12 of this Act for clearing of native vegetation. However any such impacts will be assessed as part of the environmental assessment.</p>
<p><i>(Commonwealth) Environment Protection and Biodiversity Conservation Act 1999</i></p> <p>(Department of Environment, Water, Heritage and Arts)</p>	<p>The Act is triggered by developments that will have a significant impact on Matters of National Environmental Significance including endangered ecological communities, threatened species and migratory species.</p> <p>The Act requires approvals to be sought by a commonwealth agency for any act which may have a significant impact on the environment.</p>	<p>ARTC is a commonwealth agency under this Act.</p> <p>Commonwealth approval has been obtained. DEW accredited the NSW Part3A assessment process for the SSFL.</p> <p>Minister's approval is required for SSFL due to presence of matters of national environmental significance, threatened biodiversity listed under the <i>EPBC Act: Cumberland Plain Woodland and Acacia pubescens</i>.</p>

Relevant legislation (administering authority)	Summary of legislation requirements	Approvals/Permits or licences required
<i>Soil Conservation Act 1938 (New South Wales Government) (DNR)</i>	Provides for the protection conservation of the soil resources of the State, the mitigation of soil erosion and land degradation and the conservation of water resources.	No requirement for permit, approval or licence identified for construction.
<i>Water Management Act 2000 (New South Wales Government)</i>	Promotes sustainable and integrated management of the water sources of the state for the benefit of both present and future generations. Provides for all water sources to be protected and wherever possible enhanced.	No requirement for permit, approval or licence identified for construction.

3. Performance criteria

This section details specific means to assess the degree to which the objectives detailed in Section 1 have been met. The performance criteria are measurable, either qualitatively or quantitatively, and should be the overall outcomes the particular Sub-Plan seeks to achieve. As such, they may be used to assess the effectiveness of the management measures detailed in Section 5 and to encourage continual improvement.

The performance criteria for the SWSP have been taken from the nested sub-plans which detail performance criteria for specific environmental issues which have the potential to affect soil and water. The performance criteria are listed by the sub-plan (presented in alphabetical order) they have been addressed in:

Acid Sulfate Soils

- Ensure ASS management measures are in place prior to disturbance of soils in locations mapped as being acid sulfate prone soils.

Dust

- receive no complaints from nearby residences or local road users
- ensure air quality meets the air quality goals and DECC's guidelines.

Erosion and Sediment Control

- No release of sediment-laden water to occur from the construction site.
- Ensure erosion and sediment controls are sized to sufficiently protect against uncontrolled release of sediment-laden water to waterways.
- Minimise the risk of detrimental effects to ground water quality beneath the proposed development area.
- Ensure all necessary erosion controls are implemented prior to soil disturbances due to construction or vegetation clearing activities and appropriately maintained for the duration of construction.
- Ensure that erosion controls are maintained until areas of soil disturbance have been stabilised.
- Limit disturbance to areas within the construction site boundary.

Groundwater

- Manage and monitor groundwater quality and levels potentially impacted by construction or operational activities within or outside the immediate area of development.
- No significant change in groundwater levels as a result of construction/operational activities.
- No significant impacts on groundwater resources as a result of construction or operational activities which could affect surrounding bore users.
- No significant deterioration in groundwater quality as a result of construction or operational activities which could have a detrimental impact on groundwater dependant ecosystems or species.

- No significant impacts on groundwater dependant structures and infrastructure within and adjoining the rail corridor.

Spoil and Fill

- Maintain natural surface water drainage lines.
- Ensure that there is no discernable release of sediment into any waterway as a consequence of the works.
- Ensure spoil and fill excavation is in compliance with excavation plans.
- Ensure that dust generation and cross-contamination of soil types in stockpiles does not occur.
- Ensure that stockpile management, and the movement of spoil and fill, minimises impacts on the environment.

Waste

- The following targets have been established to maximise the quantity of materials that are recycled during the construction phase of the project:
 - 100% of waste oil and lubricants to be collected for recycling
 - 100% of cleared vegetation to be reused in revegetation, or other beneficial reuses such as sediment control and habitat recreation
 - no material that is commercially recyclable is to be disposed to landfill
 - all unsuitable spoil is to be reused in landscaped mounds, noise mounds or recontouring, unless contaminated
 - collected runoff water to be used for dust suppression, in preference to drawing water from watercourses or potable supplies
 - 100% of weed free topsoil to be recovered for reuse in landscaping and revegetation; and topsoil from threatened species areas to be salvaged for reuse in translocation program.

Flood Management

A Flood Management Study Report was provided by Connell Wagner in October 2008 in accordance with CoA 63. When works are planned within the flood zone at waterway crossings (particularly bridge works) the Contractor must consider the following:

- Impact of temporary works in reducing waterway area and the impacts in the event of a flood (elevated water levels due to reduced waterway, increased velocities causing scouring)
- Stability of temporary works to withstand potential flood impacts
- Flood evacuation of machinery and materials where works are located below the 1 in 20 year average recurrence interval (ARI) flood level.

4. Potential impacts

This section should list environmental aspects and impacts associated with the construction as identified in the overarching CEMP. As defined in ISO: 14001,2004, an environmental aspect is “an element of an organisation’s activities or products or services that can interact with the environment” (SAI Global, 2004). Environmental aspects within this project are specific actions or items that could cause an impact.

Aspects and impact identified in the CEMP should be revised against construction activities being undertaken (listed in Section 1.2) and the site specific environmental issues listed in Section 2. They are documented in the following table by the environmental issue and sub-plan they refer to.

Table 4-1 Potential environmental impacts

Environmental aspect	Environmental impact
Acid Sulfate Soils	
<ul style="list-style-type: none"> ▪ Exposure of sulphidic soils to air ▪ Excavation and pile drilling in acid sulphate risk areas. ▪ 	<ul style="list-style-type: none"> ▪ Oxidation forms acid soils and leachate which is fatal to aquatic environments. ▪ Contamination of surrounding water bodies from Potential Acid Sulphate Soils (PASS) should they be encountered.
Dust	
<ul style="list-style-type: none"> ▪ Vegetation clearing ▪ Removal, stockpiling and respreading of soil ▪ Access track siting and construction ▪ Access track utilisation ▪ Site compound location and construction ▪ Water-cart operations ▪ Concreting activities 	<ul style="list-style-type: none"> ▪ Air pollution due to wind generated dust. ▪ Water pollution due to dust transported by wind. ▪ Health impacts (i.e. breathing or eye irritation) if elevated PM10 levels persist. ▪ Reduced visibility due to dust in the air. ▪ Negative aesthetic impacts due to reduced visibility. ▪ Poor working conditions due to health implications. ▪ Additional cleaning effort/costs due to dust transported by wind. ▪ Damage to personal property due to dust transported by wind damaging property where it lands. ▪ Loss of soil resources due to dust transported by wind away from original area.

Environmental aspect	Environmental impact
Erosion and Sediment Control	
<ul style="list-style-type: none"> ▪ The extension of existing culverts to continue under the new track, realignment of Bow Bowing Creek, reduction of incline/decline along the alignment, extending maintenance access ways ▪ Fill operations include: levelling of specific areas along the route, reduction of incline/decline, realignment of Bow Bowing Creek, extending of maintenance access ways ▪ Levelling of site ▪ Weed seeds ▪ Soil stockpiles ▪ Extension of existing embankments ▪ Vegetation Clearing ▪ Cutting of embankments ▪ Handling, storage and disposal of hazardous materials 	<ul style="list-style-type: none"> ▪ Disturbance of natural drainage lines, causing erosion of surface cover material. ▪ Exposure of soil surfaces, due to clearing and construction activities. ▪ Uncontrolled sediment runoff, leading to: <ul style="list-style-type: none"> ▶ Siltation of surrounding water bodies. ▶ Changes to the chemical balance of surrounding waterways. ▶ Increase in turbidity. ▶ Increase in Total Suspended Solids (TSS). ▶ Sedimentation in local waterway. ▶ Exposing acid sulfate prone soils. ▶ Weed invasion. ▶ Changes to the natural pH levels of waterbodies. ▶ Contamination of surrounding water bodies by chemicals utilised in the construction process. ▶ Contamination of surrounding water bodies from liquid fuel spills. ▪ sedimentation within the nearby waterways. ▪
Spoil and Fill	
<ul style="list-style-type: none"> ▪ Excavation and blasting (if required) ▪ Transportation ▪ Storage ▪ Reuse (landscaping, mounds, mulching) ▪ Topsoil 	<ul style="list-style-type: none"> ▪ Noise, dust generation, erosion and sedimentation. ▪ Noise, dust, air pollution, disturbance of local amenity. ▪ Dust, weeds, erosion and sedimentation. ▪ Removal of topsoil rich in organic matter and useful for seeding ecosystems. ▪ Dispersal of weeds.
Waste	
<ul style="list-style-type: none"> ▪ General activities producing waste 	<ul style="list-style-type: none"> ▪ Litter reaching local waterways. ▪ Excessive use of resources (energy, water, raw material). ▪ Sedimentation. ▪ Soil erosion. ▪ Contaminated land management. ▪ Loss of vegetation and spread of weeds. ▪ Soil erosion. ▪ Inappropriate disposal of waste items. ▪ Potential for fuel and oil spills.

5. Mitigation measures

Mitigation measures for managing the impacts of construction activities on soil and water are detailed in the relevant sub plans as follows:

Table 5-1: Sub Plan Mitigation Measures Reference

CEMP Sub Plan	Mitigation Measure Table Reference
Acid Sulphate Soils Management	Table 4-1
Dust Management	Table 6
Erosion & Sediment Control	Table 5-1
Spoil & Fill Management	Table 5-1
Waste Management	Table 5

6. Monitoring and reporting

Monitoring and reporting on the management of Soil and Water is detailed in the relevant sub plans as follows.

Table 6-1: Sub-plan monitoring and reporting reference

Sub Plan	Monitoring & Reporting Relevant Section
Acid Sulphate Soils Management	Section 4.5
Dust Management	Section 6
Erosion & Sediment Control	Section 6
Spoil & Fill Management	Section 6
Waste Management	Section 6
Groundwater Management	Section 6

7. Corrective action

Possible non-conformances with this Sub-Plan will include non-compliance with the management measures and mitigation strategies outlined in Section 5 and corresponding Sub-Plans.

All incidents and non-conformances are to be reported using the Non-Conformance Report Form (appended to the CEMP) and investigated and corrected in accordance with Section 7 of the CEMP to ensure effective environmental management practices at all times.

Specific corrective action items are outlined in the sub-plans that address specific environmental issues. The Sub-Plans details specific corrective action items (i.e. spill or release of sediment laden water occurs, an incident report is submitted and remedial action required) that are specific to activities being undertaken as detailed in relevant Sub-Plan.

8. Document control

This document should be reviewed prior to construction commencing, regularly during the construction process and after the construction process has been completed.

Initially the document should be reviewed in the week prior to construction commencing (not including enabling works) to allow any changes in the proposed construction methodology, and hence impacts and mitigation measures required, to be updated.

During the construction process the document should be reviewed on a bimonthly basis. If any of the SWMSP nested sub-plans are not performing as designed or are inappropriate to managing the environmental impacts of the SSFL, a review of the monitoring and mitigation or mitigation measures should be conducted.

Once construction activities have been completed, the document should be reviewed to ensure that the SWMSP and nested sub-plans control procedures remain appropriate to the operational activities.