STANDARD OPERATING PROCEDURE

TITLE:	LAND MANAGEMENT PLAN	Risk Assessment Reference No.:
Doc No.:	**SV-MS-038**	
Prepared by:	Tony Nolan	Date: 1 August 2013
Approved by:	Jacques Le Roux	Review Frequency: 3 years

INTRODUCTION:

This Land Management Plan has been prepared as part of the SMP Approval for longwalls 411- 418.

This plan addresses potential subsidence impacts on lands within the SMP area.

Springvale Colliery has been using longwall mining to extract coal from beneath the Newnes Plateau and its surrounds since 1995. The land overlying the SMP area is State Forest and contains no private landholdings and little infrastructure. The only public infrastructure above the mining area is Forests NSW roads and trails. Any works undertaken within the State Forest shall comply with the Forest Practices Miscellaneous Conditions Macquarie Region – Appendix 3.

Private infrastructure owned by Springvale, Delta / Springvale and Integral Energy overlies the mining area. Newnes State Forest is, however, a popular recreational destination particularly for 4WD, trail bike activities, bushwalking and camping pursuits. The area is managed by Forests NSW.

Potential land management issues that may occur as a result of subsidence include:

- Slope instability and erosion
- Loss of stream flow due to cracking of rock bars
- Change in grade of localised drainage lines which could cause initiation of knick points
- Damage to fire trails

The primary risk management control under this plan comprises scheduled monitoring of identified sensitive land management areas.

STATUTORY REQUIREMENTS

The Leaseholder shall implement a management plan to ensure adequate management of any impacts associated with surface cracking, erosion, soil slumping and land degradation caused by subsidence due to longwall mining and/or activities associated with subsidence monitoring or other management actions in the application area. The management plan shall be developed within 3 months of this approval and implemented to the satisfaction of the NSW State Forests and Sydney Catchment Authorities.

RESPONSIBILITIES

The Springvale Environment and Community Coordinator is responsible for the implementation of the plan.

COMMUNICATIONS

Notifications to the general public, relevant stakeholders and appropriate authorities have been provided as required under all approvals. These include.

- Newspaper advertisements relating to the SMP Approval.
- Notification of the SMP Approval under Condition 6.
- Notification under Section 138(1) and Section 88 Approvals.
- Regular reporting to interested Stakeholders through the Subsidence Management Status
- Reporting (SMSR) process
- End of Panel review meetings with interested Stakeholders

POTENTIAL LAND MANAGEMENT RISKS

PREDICTED SUBSIDENCE

In 2011 Springvale Coal varied their existing subsidence management plan approval to adopt a narrow panel longwall design with wider chain pillars that focused on achieving reduced subsidence related impacts on the environment.

Longwall panels will be 315 metres (LW415) and 260.9 metres (LWs 416 and 417) wide and have face extraction heights of 3.25 metres. The chain pillar widths will be 45 metres and 58 metres respectively. Subsidence effect and impact predictions have been assessed in Ditton Geotechnical Services (DgS), 2011 and summarised below in table 1.

Surface crack width magnitudes and distribution will be primarily influenced by the distribution of tensile and compressive strain. They will also be influenced by the near surface lithology and surface topography. Worst case cracks are expected to range between 30 to 50 mm in surface rock bars and 20 mm in deep soil or peat after subsidence development is completed.

Table 1 Predicted Subsidence

Location	Survey Site	Predicted Subsidence	
LW415 (W=315 metres)	B and M Cross lines	Subsidence	>1.5 metres
		Tilt	> 10 mm/metres
		Tensile Strain	> 15 mm/metres
		Compressive Strain	>18 mm/metres
LW416 and 417 (W=260 metres)	B and M Cross lines	Subsidence	> 1.1 metres
		Tilt	> 7 mm/metres
		Tensile Strain	> 5 mm/m
		Compressive Strain	> 6 mm/m (plateaus) > 14 mm/m (valleys)
		Tilt	> 7 mm/metre
		Tensile Strain	> 5 mm/metre
		Compressive Strain	>14 mm/metre

NON MINING RISKS

It is important to identify the impacts of non-mining related land use during an assessment of mining related impacts. In circumstances when monitoring anomalies are identified it will be necessary to assess these non-mining related impacts before management intervention is undertaken.

The Newnes Plateau above Springvale Mine is subject to a variety of land uses. The plateau is a state forest subject to logging and is open to recreational use by public. These non-mining related land uses can result in point source and diffuse source disturbance to natural systems. These land uses include:

- Forestry activity is the most intense land use on the plateau and includes tree logging, track construction, undergrowth clearing and burning. These activities lead to significant land changes through increased run-off and sediment transport, weed invasion and an altered fire regime.
- Four-wheel drive and motor bike activity the plateau is freely accessible to the public including recreational four wheel drive enthusiasts and motor bike riders. These activities are unregulated and result in the development of tracks. Many of these tracks are unplanned and unmaintained and can result in accelerated runoff, erosion and weed invasion.
- Feral pig activity results in land disturbance during pig foraging activity. This results in accelerated erosion and a decrease in water quality in drainage lines.
- Hunting can affect native wildlife numbers and movements. New tracks are often formed which results in increased erosion and run-off.
- General public access can lead to an increased incidence of bushfires, introduction of weeds, introduction of feral animals and accumulation of rubbish.

SUBSIDENCE RELATED RISKS

A Risk Assessment was conducted as a part of the SMP application to examine the potential impact created by subsidence on the mining area (LW 411 to 418).

This Risk Assessment was reviewed (in 2013) with no additional public safety risks in the high risk category identified. All risks identified had either existing controls or additional controls / further actions which have been implemented or are available to identify, control or remediate these risks.

The potential land management impacts arising from mine related subsidence are detailed below.

- Loss of stream flow due to cracking of rock bars
- Slope instability and erosion
- Change in grade of localised drainage lines which could cause ponding or loss of flow, or initiation of knick points (erosion);
- Damage to fire trails

The surface to be undermined is presented in Appendix 1.

MONITORING

Monitoring of sensitive land management areas is conducted as per the Environmental Monitoring Program SVMS 036. Key monitoring locations are presented in Appendix 1.

SUBSIDENCE REMEDIATION

Mining related subsidence has been monitored in the SMP area for approximately 20 years. Impacts from mining related subsidence generally self-repair over a period of months. For circumstances where self-repair is not occurring the following remediation options are available.

FIRE TRAILS

It is anticipated that most cracks will self-repair due to natural processes. Where natural processes have not completely filled each crack, ripping or grading to infill the crack will be undertaken where necessary.

STABILISATION OF DRAINAGE LINES

Soft engineering solutions such as coir logs, jute matting, geotextile, rock armouring, timber log dissipaters and a range of other options that are generally designed to repair cracks and erosion and prevent recurrence by regulating the flow of surface and subsurface water. These solutions are generally biodegradable and therefore integrate into the swamp systems. Appendix 1 contains the soft engineering manual prepared by the Blue Mountains City Council. Soft engineering solutions in shrub swamps will need to be referred to state and federal regulators prior to implementation.

SEALING ROCKBARS IN DRAINAGE LINES

Hard engineering solutions such as the use of concrete and various grouting techniques can be used where subsidence cracking is persistent and results in water losses from swamps and streams. Grouting involves injecting a permanent low permeability material into cracked areas to provide a seal to control vertical or horizontal water flows. Hard engineering solutions require detailed investigation and planning prior to implementation.

PUBLIC SAFETY

If any of the scheduled inspections reveal any Public Safety issue that requires immediate remedial works to ensure Public Safety the person conducting the inspection shall:

- Immediately notify the Mine Manager and/or Environment and Community Coordinator of the findings.
- Erect danger tape (or similar) and warning signs if immediate remediation is not possible
- Take actions to remediate the immediate issue as detailed in Table 3.
- The Mine Manager shall immediately notify the District Inspector of Coal Mines, DPI, landholder and/or
- Infrastructure owner and other Government Departments as necessary.
- Contact relevant stakeholders as and if required under Condition 12.

Refer to the Public Safety Management Plan SV MS 039

QUALITY CONTROL

REPORTING

Results of subsidence surveys and the effectiveness of management strategies are to be reported in the four monthly SMSR and also the Annual Environmental Management Report. Additionally, notification will be provided to relevant Authorities and stakeholders of any occurrence or identification as required under Condition 12.

AUDIT AND REVIEW PROCESS

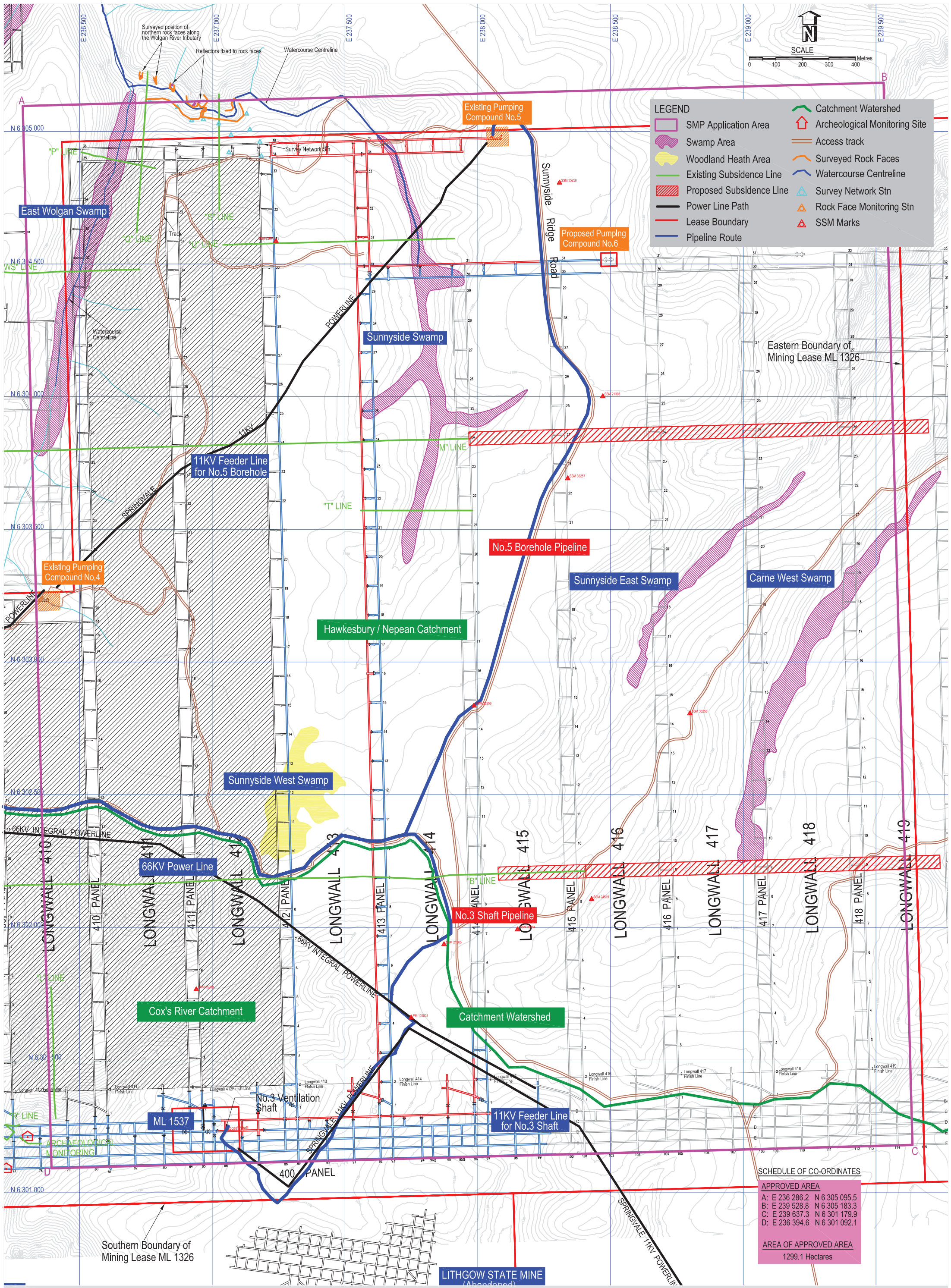
Audits are scheduled through the Business Management Framework utilising the Compliance Data Base.

Reviews required within Springvale Coal Health and Safety Management System SV-MS-001 and its associated sub-systems are to be set-up in Lotus Notes CC040 Document Control.

Reviews are also scheduled through the Business Management Framework utilising the Compliance Data Base. Both systems are calibrated to a common review date.

Audits shall be conducted in compliance with the Audit Process SVMP-0001.
Reviews shall be conducted in compliance with the Review Process SVMP-0001.

APPENDIX 1 FIGURES



LEGEND

1. Contours shown have been interpolated from laser scanning.
2. The installation of all proposed subsidence monitoring marks has been completed and confirmed with the Principal Subsidence Engineer following a site inspection.

Figure 1: Springvale Colliery Subsidence Monitoring Locations

Springvale Coal

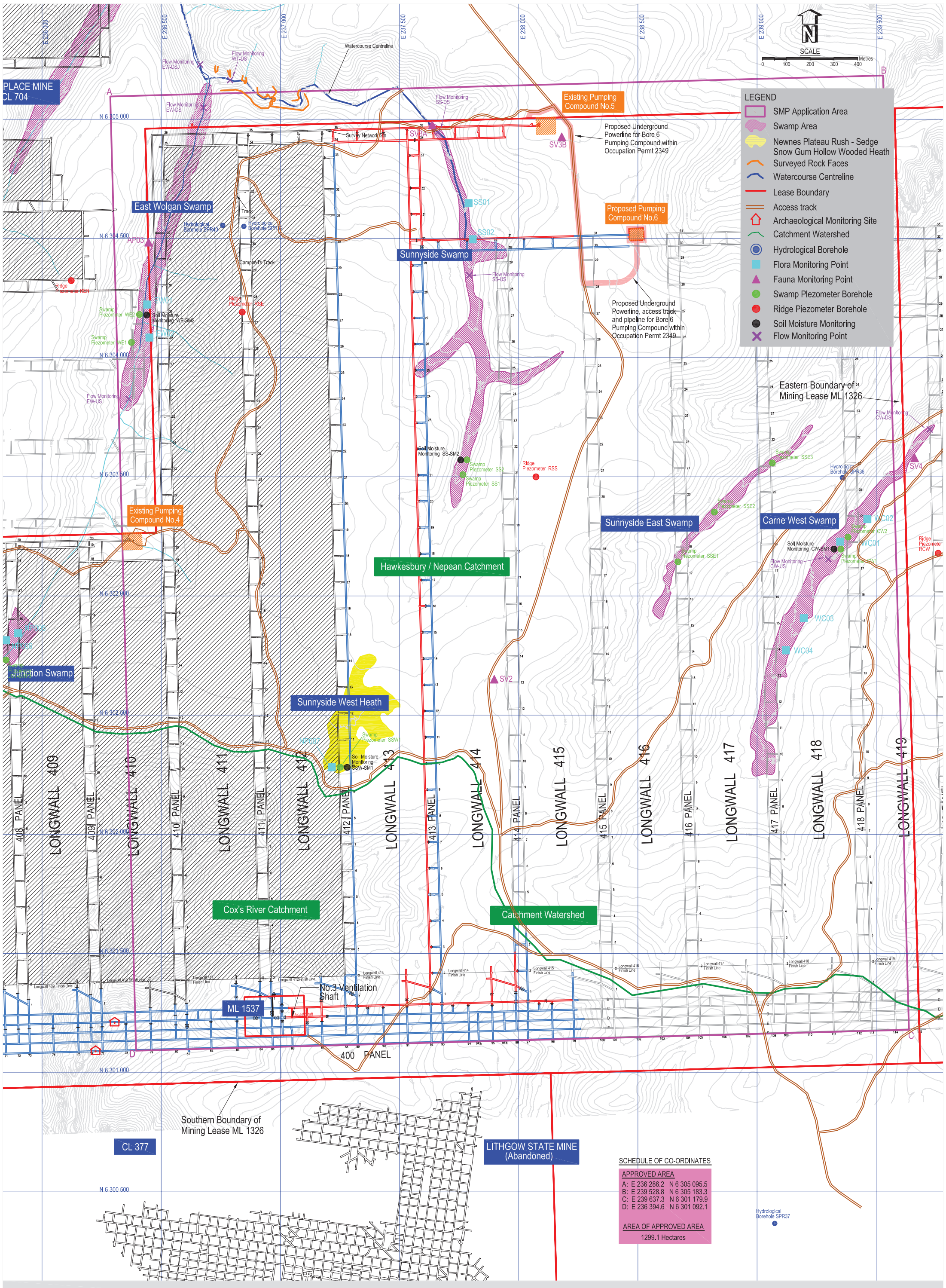


Figure 2: Springvale Colliery
Environmental Monitoring Locations

Springvale Coal

APPENDIX 2 SOFT ENGINEERING GUIDE

Soft-engineering solutions for swamp remediation a "how-to" guide

Section Three

Case Studies

- Braeside Swamp
- Marmion Swamp
- Wentworth Falls Swamp
- Happy Valley Swamp
- Ellem Gully Swamp
- Paddy's River Swamp

Glossary

References

Braeside Swamp Blue Mountains LGA

- check dams/water spreaders/infiltration cells

Context


Streambank stabilization on the edge of Braeside Swamp

Braeside swamp was being influenced by two water-courses; an intermittently high flow stream which was transporting the majority of the stormwater generated from the upstream urbanised areas around the swamp edges, as well as a smaller low flow accessory (historical drainage?) channel within the swamp itself.

The banks of the high flow stream were being actively eroded and required stabilisation.

The channel was dewatering the swamp resulting in desiccation of the swamp substrates, the die back of swamp vegetation and the subsequent domination of the swamp substrates by exotic weed grasses.

Treatment

The low flow characteristics of the accessory channel and the diversion of the more highly erosive stormwater flows around the site by the stream made the swamp suitable for remediation.

The banks of the high flow stream required bank stabilisation, toe protection and revegetation. Check dams supported by channel packing were placed at several points along the channel to prevent further dewatering subsequently causing the channel to fill up with water. Overflows were then spread over the desiccated swamp substrates with the aid of water spreading structures, and held in a series of infiltration cells. This encouraged the vertical rehydration of the swamp substrates and the recreation of the pre-channel waterlogged swamp conditions.

The water logging resulted in the die-back of the exotic weed grasses and their replacement with native sedges. More elevated areas on the edges of the swamp which were not fully rehydrated were planted out with swamp specialist Leptospermum *spp.* including *L. grandifolium, L. polyfgalifolium and L. juniperinum* to create a tea-tree thicket buffer to the swamp.

The structures created a trajectory of change that favoured swamp vegetation over the exotic grasses and resulted in spontaneous natural regeneration of swamp vegetation with very little intensive bush regeneration or planting being required. The soft engineering solution provided a cost effective and long term solution to a previously open ended and labour intensive struggle with exotic weed grasses.

Swamp remediation snapshot over a 12 month period: Braeside Swamp

- Installation of water spreaders and infiltration cells into degraded swamp substrates dominated by exotic grasses as a result of desiccation.

- Same location 6 months after installation.

Note recolonisation by sedges and the natural die-back of exotic grasses due to the increased water-logging.

- Same location 12 months after installation. Sedge species have re-established and soft engineering structures are barely visible.

Marmion Swamp Blue Mountains LGA

- check dams/sediment fencing infiltration devices/wooden bed control structures

Context

Surface stormwater flows had resulted in the chanellisation of Marmion Swamp causing desiccation of swamp substrates and the death of swamp vegetation adjacent to the channelised areas. *Blechnum nudum* ferns had begun to colonise the degraded areas of swamp.

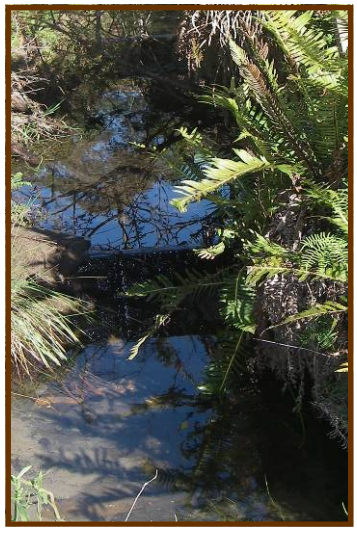
Treatment

Reinforced sediment fences were installed in the open grassed areas above the swamp to act as detention and infiltration devices to encourage surface water to infiltrate into the groundwater (rather than entering the swamp as high velocity erosive surface flows) pictured below.

Revegetation of the extensive grassed areas above the swamp was also undertaken to increase infiltration rates.

Check dams and channel packing were installed to retain water in the system and encourage the lateral hydration of swamp substrates through the channel walls.

Wooden streambed stabilisation structures were also installed to reduce further deepening of the channel and to gradually raise the streambed of the channel (below).



Wentworth Falls Lake Swamp Blue Mountains LGA

- water spreaders/infiltration cells/landowner incentives

Context

A large sediment plug associated with stormwater discharge was smothering swamp vegetation on the eastern margin of Wentworth Falls Lake through hanging swamp, and supporting an extensive area of exotic grasses.

Treatment

Road verges in the catchment were bollarded to restrict vehicle movement and parking, activities which were denuding them of vegetation making them vulnerable to erosion. Rainwater rebates, driveway sealing and verge revegetation and mulching incentives were offered to landowners in the catchment.

To prevent further inputs of sediment into the swamp, a Baramy Trap was installed upstream of the swamp, below a stormwater discharge pipe adjacent to the road (below).

A series of water spreaders and infiltration cells were installed to help waterlog the sediments to alter the trajectory of change to favour native sedge growth over exotic grasses.

The sediment was further consolidated and held by infiltration cells preventing additional movement into the system. The sediment plug was essentially converted into a giant native sedge sand filter cleansing stormwater inputs into the swamp.

Above: *Baramy Trap to catch sediment.*

Happy Valley Swamp Lithgow LGA

- water spreaders/infiltration cells/access management

Context

The electricity infrastructure corridor and the associated maintenance trails on either side of Happy Valley Swamp created a desire line across the swamp for 4WD users and trail bikes to link the trails by tracking across the swamp.

Over time the impact zone continued to be widened as crossing points became impassable and new ones were created and as 4WD users tested their machines performance in adjacent areas of swamp. Large amounts of sediment were deposited in the swamp from the heavily eroding access trails.

Treatment

A single track on the least erodible approach was hardened and left open to maintain a thoroughfare along the desire line to reduce the risk of new tracks being created in response to track closures. Extensive soil conservation works were undertaken along all the associated access tracks to reduce sources of sediment and stormwater flow.

Channelised areas of Newnes Plateau Shrub Swamp adjacent the site had check dams installed to divert water out of the channels. The diverted water was then directed over the highly compacted and desiccated areas of swamp substrates damaged by vehicular traffic. Infiltration cells were used to hold the diverted water over the degraded areas to encourage vertical rehydration of the desiccated swamp substrates.

4WD deterrent pits, barrier fencing, brushmatting, jute matting, and planting were installed to close duplicate tracks, prevent erosion and encourage revegetation.

Educational presentations to 4WD clubs and Trail bike clubs were conducted to educate members about their impacts. Workshops with NSW Forest and Integral Energy staff on how to cooperatively address the issues were also held.

Happy Valley Swamp








Ellem Gully Hanging Swamp Gosford LGA

- soil conservation and water management

Context

Ellem Gully hanging swamp is a small swamp system within McPherson State Forest west of Wyong NSW, and is classified as a Gosford Sandstone Hanging Swamp. The catchment area is approximately 4ha in size, is comprised entirely of bushland and sits atop a broad plateau. The surrounding catchment to the swamp has few disturbances except for existing formed dirt roads for logging operations, road maintenance activities (i.e. grading etc), and use by recreational vehicles (occasional 4WDs, although predominantly trail bikes).

Approximately half of the upstream catchment draining into the swamp is a revegetation area, initially planted with Blackbutt trees (*E. pilularis*) after an historic airstrip had been in use for some 15 years across the plateau. Initially established nearly 30 years ago these trees are now quite mature, with little diversity in the regenerating understory (below right).

Despite nearly 3 decades since revegetation works were undertaken, the footprint of the airstrip is still very clear from aerial photography (left).

Stakeholder observations had noted that over the last decade the swamp had not been retaining or seeping as much water as historically, and upstream ephemeral flows (including subsurface/subterranean) flows not as evident as had been in previous years.

Vegetation changes were also being observed in the swamp itself (i.e. the increasing dominance of shrubs such as *Callistemon* and *Banksia*), in preference to sedges.

Issues included;

- Upstream erosion and compaction caused by vehicle access above the swamp (predominantly trail-bikes (i.e. tracks)
- Changes to surface water-flows and hydrology
- Road maintenance activities and earth-works/soil conservation.

Investigation through the revegetated airstrip revealed many of the planted Blackbutt trees adjacent to drainage works or trail-bike ruts where water was being detained in pools, had considerably thicker trunks than neighbouring trees across flatter terrain where surface flows sheeted freely. This was consistent across the revegetation area.

Treatment

Works were applied to remove numerous earth barriers and trail bike paths across the upper catchment to help facilitate the free flow of surface water to the downstream swamp.

It was theorised that pooling water being detained in these formed earth basins may be providing additional water to these trees rather than travelling downstream to the swamp itself. The trail bike paths and mitre drains could be creating opportunities for water to be shifted from the road pooling along wheel ruts and end-points of the drains.

Tracks and inroads were reshaped, jute mesh and a number of coir logs were installed to armour the soil and redirect surface flows.

The project is being monitored to assess hydrological changes over time.

Paddy's River Swamp Wingecarribee LGA

- hydrological management and weed control

Intact swamp and wetland systems

Range of weeds within swamp

Treated weeds areas. Structures will rehydrate current dry areas of swamp and encourage desirable swamp species

Context

Paddys River swamp and wetland system has portions of swamp where the natural hydrological cycles have been altered by upstream issues in the catchment resulting in channelling and stream incision .

With this has come sediment deposition in parts of the swamp and the subsequent drying out of sections of swamp.

The fluctuations in water levels has allowed some desirable native swamp species to establish however as the areas subsequently dry out, terrestrial native plants and weeds particularly Japanese Honeysuckle and Blackberry are able to colonise the area out-competing the desirable native swamp vegetation.

Treatment

Hardwood and log structures have been installed in-stream in order to retain water to encourage 'wet' native species to permanently occupy the site and effectively out-compete the exotic species.

This will improve the overall hydrological function of the swamp as a system, and the health and vigour of native vegetation will increase as optimum conditions are returned.

In the longer term, the area should require less labour input in regard to weed management in the future as opportunities for weed establishment are reduced.

Glossary

anaerobic	Having little or no oxygen.
anthropogenic	Of or relating to humans; caused by humans.
aquifer	An underground bed or layer of rock, sediment or soil which yields water.
base flows	The usual, reliable, background level of a river or stream maintained generally by seepage from groundwater storage.
basal	Beginning or basic; of primary importance; relating to or forming a base.
biodegradable	Capable of being decomposed by biological agents, especially bacteria, commonly organic materials.
bio-filters	A pollution control technique using living material to capture and biologically degrade nutrients and other pollutants, resulting in improved water quality.
bio-region	An area constituting a natural ecological community with characteristic flora, fauna, and environmental conditions and bounded by natural rather than artificial borders.
channeling	An erosional process by which stormwater incises a drainage channel through swamps, resulting in dewatering of the swamp, lowering of the ground watertable and desiccation of swamp substrates.
check bank	A short level earth bank constructed to slow and spread runoff flows from other structures.
degraded	An area low in functionality and sustainability.
desiccated	Dried out.
dewatered	Has had water removed.
endangered	A species in danger of extinction in the near future throughout all or a significant proportion of a species range.
erosion	The process of eroding or the condition of being eroded: where material is worn away from the earths surface, and in this case from swamps, streambeds, trails, banks, the catchment etc.
eutrophication	The natural and artificial addition of nutrients to lakes, streams, wetlands, swamps and estuaries and the effects of this addition.
extraction	Removal of a substance from it's constituent body: e.g. of metals or water from the earth.
friable	A soil texture that is loose and crumbly i.e. not strongly coherent and easily eroded by water.

geomorphology	The study of the earths landforms and the forces and processes which have shaped them.
groundwater extraction	Removal of subsurface water from the soil and rock substrate.
hydrology	Study of water and its relationship with living things, its occurrence, distribution and effects on the earth.
hydrophobic	Water repelling soils.
impeded	Retarded or obstructed process.
impermeable	A surface or material through which water is unable to permeate.
impervious	A surface or material through which water is unable to penetrate.
infiltration	The process of water entering the soil.
Key threatening process	Actions or threats which adversely affect threatened species, their populations and ecological communities, or could cause them to become threatened.
loams	Soil composed of a mixture of sand, clay, silt, and organic
mudstone	Fine grained sedimentary rock, hardened mud, originally consisting of clays and mud. May include shales and/or argillite.
peat	Consolidated organic matter formed by the breakdown of swamp plant species in acidic and anaerobic conditions.
percolate	To drain or seep though a porous material.
permeable	A surface or material through which water can move through.
piping	An erosional process in which stormwater bores a narrow diameter subsurface tunnel through the swamp substrates which acts like a drainage pipe, dewatering swamp substrates.
rehabilitation	Treatment to an area to restore it as close as possible to its original condition.
remediation	Act or process of correcting a fault or deficiency.
restoration	The act of bringing an area back to its original more resilient and authentic condition. Involves re-instating biodiversity and natural ecological processes or systems, where significance disturbance has occurred and where other regeneration techniques may fail.

retention	Holding back of water or sediment.
rhizomatous	A horizontal, usually underground stem that often sends out roots and shoots from its nodes
sediment	Solid fragments of inorganic or organic material that come from the weathering of rock and soil. Sediments are frequently carried in suspension in stormwater and are deposited when water velocities slow.
sedimentation	Act or process of depositing sediment.
seepage lines	Areas where groundwater is forced to the surface by the outcropping of impermeable rock layers. They frequently occur as horizontal bands or as springs.
shale	A fissile rock composed of layers of claylike, fine-grained sediments.
silviculture	Forestry works and cultivation.
skeletal soils	Soils which are very shallow and are low in nutrients and organic material.
Sphagnum	A moss species, growing in wet conditions on peat soils.
swamp substrates	An underlying layer or substratum, of highly organic peaty medium on which swamps grow.
slumping	Channelling, tunnelling or piping creates voids into which the swamp substrates collapse or 'slump'.
swale	A vegetated permeable bund which allows infiltration of water along it whilst at the same time providing a erosion resistant conduit for surface stormwater flows.
temperate	An area characterised by moderate temperatures; neither hot nor cold.
threatened	A species at risk of extinction. Categories based on the level of risk include vulnerable, endangered or critically endangered.
tunneling	An erosional process in which stormwater bores a large diameter subsurface tunnel through the swamp substrates which acts like a large drainage pipe, dewatering swamp substrates.

urbanization	An area which is becoming more developed with housing, roads etc resulting in more hardened or impermeable surfaces, in its structure and composition.
velocity	The rate or speed with which water moves.
vulnerable	A species facing a high risk of extinction in the medium term future throughout all or a significant proportion of a species range.
watercourse	A natural or artificial channel though which water flows; ie: stream or a drain.

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APPENDIX 3 FOREST PRACTICES MISCELLANEOUS CONDITIONS - MACQUARIE REGION

FORESTS PRACTICES – MISCELLANEOUS CONDITIONS

Macquarie Region

Activities on State forest by external parties

CONTENTS

1. SAFETY

Employers will ensure the health and safety at work of themselves and their own employees, and will ensure that other forest users, including Forests NSW employees, are not put at risk by what the activities they undertake in forest workplaces over which they have responsibility for managing safety.

In order to achieve this you are required to:

- comply with *Occupational Health and Safety (OH&S) Act 2000* and *OH&S Regulation 2001*,
- assume control of the area of forest deemed to be part of the agreed workplace of your employees contractors or sub-contractors,
- Develop a safety plan for the activity, which may be required by Forests NSW, and
- exercise all duties and responsibilities as the workplace controller as defined within the *Health and Safety (OH&S) Act 2000* and *OH&S Regulation 2001.*

When preparing the safety plan please be aware that working in forests presents workers with specific hazards which include, but are not limited to:

- overhead hazards including dangerous trees,
- unpaved and variable road surfaces within the forest,
- recreational hunting,
- recreational forest users,
- poor mobile phone reception, and
- infrastructure, such as overhead powerlines.

Forests NSW require that all parties conducting operations within State forests:

- adhere to all forest signs and instructions,
- report all incidents and near misses to Forests NSW,

2. ENVIRONMENT

Where required by FNSW, external parties seeking to undertake work within State forests must undertake environmental impact assessments that meet standards defined under Part 5 of the Environmental Protection Act (1979). Where site specific assessments recommend or identify controls and actions that represent higher standards than those identified within this document, the higher standard must be implemented.

2.1 Soil

Parties working within State forest are obliged to minimise damage to soil through direct disturbance, compaction and sedimentation/erosion.

2.1.1 Wet Weather

Operations involving exposed soil (such as clearing vegetation, cultivation and trenching) must cease during heavy rain, when surface run-off is occurring, or if there is evidence of soil saturation at the work site.

Forests NSW may declare restrictions or stop operations when prolonged periods of wet weather are such that normal operational procedures would be likely to cause significant levels of soil disturbance/damage.

2.1.2 Disturbance

a. All holes caused by the removal of trees and stumps must be filled in with earth and rough levelled.

b. Where soil disturbance shows the potential to channel water run off, the site must be rough levelled and drained (using an appropriate technique) as per the following:

Slope (degrees)	Max. drainage spacing
≤5°	100
≤10°	60
≤15°	40
≤20°	25
≤25°	20
≤30°	15
≤35° & 35°>	10

Appropriate techniques may include:

- **cross bar drains (must be consolidated and > 0.25m height)**
- **silt netting (appropriately installed)**
- **cross-fall drainage**

c. Where topsoil is removed it must be stockpiled separately and respread during site rehabilitation.

d. Where practical, vegetation and slash should be re-spread across the work site to control sedimentation and soil compaction.

e. All activities with the potential to disturb soil must be approved by Forests NSW before work is carried out, including the opening of new roads or tracks.

f. Where trees are to be removed to improve access on existing roads or tracks, the removal of trees must be approved by Forests NSW. If trees are greater than 35cm in diameter, are hollow bearing or show other evidence of habitat values then all alternatives to removing the tree must be considered. Where trees must be removed, they should be felled manually by a qualified faller rather than pushed, reducing soil disturbance associated with exposure of the root ball.

g. Vegetation management activities within power-line easements must not be undertaken using techniques that have the potential to expose bare earth.

2.1.3 Rehabilitation

a. In the instance that sites have been cleared of vegetation for an operation, that operation is not considered complete until there is evidence of revegetation of the cleared site.

b. Rehabilitation works must exclude all vehicles and third parties from inadvertently entering the disturbed area.

c. Rehabilitation should include scarification where required.

d. Additional drainage may be required to protect rehabilitated areas for erosion or sedimentation.

e. Weed infestation must be monitored during the rehabilitation process, and weeds removed if evident at any stage.

2.2 Water

Drainage features within the work site must be protected according to the following minimum prescriptions:

Feature	Description	Exclusion/Restriction
Wetland or Swamp or River	Wetlands and swamps are characterised by a vegetation or soil change. Rivers are third order (or greater) streams with permanent flows.	*20m buffers measured from boundary/bank* Do not cross feature at any times unless using a designated crossing. Minimise soil disturbance within the buffer zone. Remove debris associated with the operation from drainage feature and buffer zone if practical. Do not construct windrows, cultivate or clear native vegetation within buffers. Do not push debris into buffers.
Drainage Line	Characterised by perennial flows, incised channels or evidence of active erosion.	*10m buffers measured from bank* Activities restricted as for Wetlands/Swamps and Rivers.
Depression	Shallow open drainage feature with run-off during heavy rainfall only. May have saturated zones at lowest point with changes in soil and vegetation	*Variable buffers applied to saturated zone* Do not cross or disturb feature when soil is saturated. Minimise soil disturbance particularly anything contributing to channelised water flow. Do not construct windrows across feature.

Temporary water storage dams or sumps must be constructed to completely contain predicted water volumes, and must be constructed to comply with predetermined engineering principles.

2.3 Flora & Fauna

All operations must meet specific conditions of consent associated with the management and minimisation of impacts on Flora and Fauna values.

If previously unidentified threatened flora or fauna species or ecological communities are found within the worksite, or put at risk by the work, Forests NSW must be notified and work must be halted until a determination of significance can be completed in consultation with the relevant authority.

Earthmoving equipment must be properly washed before entering State forest to reduce the risk of introducing weeds or pathogens.

3. PLANT/MACHINERY

3.1 Bulk fuel storage

For the purposes of this consent and as per AS 1940-1993 Section 2 – Minor Storage, fuel is classified as flammable or combustible liquid in quantities not exceeding 10,000 litres, where such fuel will only be stored and refuelled outdoors and above ground. For storage specifications in buildings, factories, other structures or in excess of those quantities shown below refer AS 1940-1993.

a. Maximum Quantities Class 3 PGI and PGII Fuels (e.g. petrol):
   - 5000 litres.

b. Maximum Quantities Class 3 PGIII Fuels (e.g. kerosene):
   - 1000L in packages.
   - 5000 litres.

c. Maximum Quantities Class C1 & C2 Fuels (e.g. dieseline):
   - 10,000 litres.

3.2 Precautions for storage and handling of fuel and hazardous material

a. It is the contractor and operator's responsibility to ensure safe practices are in place for receiving, storage and handling of fuels and hazardous materials. The contractor and operator shall ensure a procedure is in place for regular inspection, maintenance, spill management and record keeping.

b. Fuels and hazardous materials must be stored and handled in compliance with the relevant legislation, chemical labels and material safety data sheets.

c. Any spillages shall be cleaned up immediately and the materials used in clean up shall be disposed of safely. Waste materials shall not be kept in proximity to areas where fuels are stored or decanted. Forests NSW must be advised of spills as soon as practicable.

d. Any potential flow of spillage shall be prevented from reaching a Protected Works, drainage features or property boundary by such means as the use of natural ground slope, diversion channel, kerb or bund.

e. Storages must be separated from drainage feature buffer areas or property boundaries by not less than 15 metres, or as prescribed by Forest NSW or in Environment Management Plans.

f. Plant and equipment and other substances and materials on the work site must be handled, operated, moved and stored in a proper and efficient manner for the purposes of preventing the pollution of waters.

g. Storage tanks shall comply with AS 1692 or equivalent.

h. Fuels shall not be stored in proximity to heating or ignition sources.

i. The ground around the storage shall be kept clear of combustible vegetation or refuse for a distance of not less than 3 metres.

j. Fuel containers shall be kept closed when not in use.

k. Decanting shall be carried out in a well ventilated area, away from ignition sources and in a manner to prevent spillage.

l. Any materials that might interact dangerously if mixed with fuels shall be kept apart.

m. For premises other than residences or farms, where fuels in excess of 100 litres are stored or used, a fire extinguisher and a warning sign worded "DANGER-FLAMMABLE LIQUID-NO SMOKING-KEEP FIRE AWAY" shall be placed at an effective location adjacent to the storage.

3.3 Mechanical Servicing and Repairs

Contractors and operators must ensure that:

a. All servicing and repairs of equipment are carried out in a manner that prevents the pollution of surface and ground waters.

b. Any type of oil, fuel or fluids is not deliberately or negligently discharged onto the forest floor from machinery operating within the forest. Under no circumstances should these substances be allowed to enter a within 15m of a drainage feature.

3.4 Waste disposal

Waste includes but is not limited to, tires, drums, wire rope, oil and fluids, and litter. Contractors and Operators must ensure that:

a. The general work area is kept free of waste during operation.

b. Oil and fluids must be collected and removed from the site in an appropriate manner.

c. Waste is removed from the forest and disposed of in a proper manner. Any waste must be cleared within seven (7) days of the completion of operations in any given location.

4. INDIGENOUS & NON-INDIGENOUS CULTURAL HERITAGE

a. Any Aboriginal place or relic (as defined in the *National Parks and Wildlife Act 1974*) or any relic (as defined in the *Heritage Act 1977*) must be surrounded by a buffer zone, unless consent to disturb the place or relic is obtained under that act.

b. No clearing or disturbance is allowed within the buffer zones of places or relics.

c. On discovery of previously unidentified sites or artefacts with potential cultural significance within the work site, Forests NSW must be notified and work must be halted until an archaeological assessment can be carried out and a determination of significance can be completed in consultation with the relevant authority.

d. Recommencement of operations must be in consultation with Forests NSW and the relevant authority.

e. All work/operations will be carried out with reference to specific conditions of consent and recommendations made through Archaeological/Heritage Assessments (where completed) prior to commencement of work.

5. FIRE

During the summer period a number of legal requirements are in place to protect form bushfire:

- A **Statutory Bush Fire Danger Period** applies from the 1st October to the 31st March (under the *Bushfires Act 1949*), unless the District Bushfire Management Committee advises otherwise.
- A **Total Fire Ban** (Toban) may be declared by the NSW Rural Fire Service at any time.
- The Forests NSW Regional Manager can declare a **Forest Fire Threat Period** when additional fire restrictions are required within State forest. These include **Colour Code Red** notification where mandatory stand down conditions apply (note Section 5.5 below).

The following conditions apply to operations within State forests during the above periods.

5.1 Reporting Bushfires

All bushfires should be reported to 000.

Forests NSW shall also be notified immediately of the outbreak of any fire on or near State Forest.

Forests NSW 24 hour fire reporting telephone number is

(02) 6332 4812.

5.2 Operating Conditions

5.2.1 Machinery and equipment

At all times of the year all machinery must be operated and maintained in such a way that it will not cause a fire to start, nor will it catch fire. No person shall operate any vehicle or machinery unless:

a. it is fitted with a securely fixed, spark-free exhaust in good, serviceable condition;

b. the fuel, electrical and braking systems and all combustion chambers, manifolds, exhaust pipes and expansion chambers of the machine and the joints thereof are in all respects in good order and condition (includes fuel tanks and fuel lines being of a satisfactory design and firmly anchored);

c. the machine is free of surplus oils, dust impregnated with oil, and vegetative matter;

d. the exhaust system of any equipment working in a stationary position must be directed away from flammable material

e. It can be demonstrated that the catalytic converter of vehicles using unleaded petrol will not come into contact with dry and flammable material

Defective machinery must be withdrawn from use until the defect has been rectified and the machine made safe for operation.

5.2.2 Use of Equipment that May Cause Sparks or Flames

At all times of the year the use of any equipment that may cause sparks or flames, such as welding or oxy-acetylene equipment or angle grinders, may be carried out only on ground that has been cleared of flammable material or vegetation for a minimum of 1.5 metres.

During the **Statutory Bush Fire Danger Period** or notified **Forest Fire Threat Period** the use of equipment that may cause sparks or flames shall be restricted as per “Work Restrictions” below.

The use of any such equipment is prohibited on days of **Total Fire Ban** or **Colour Code Red** days.

5.2.3 Lighting of Fires

At all times of the year fires for heating, cooking, boiling water or similar purposes can only be lit in State forests in a fireplace surrounded by cleared ground for 2 metres, and must not left unattended.

Fires for heating, preparing meals, boiling water or for any other purposes are prohibited during the **Statutory Bush Fire Danger Period** or **Forest Fire Threat Period**, unless a permit has been obtained from the NSW Rural Fire Service.

All fires are prohibited on days of **Total Fire Ban** or **Colour Code Red** days.

5.2.4 Smoking

During the **Statutory Bush Fire Danger Period** or **Forest Fire Threat Period** smoking is only permitted in areas cleared of flammable material. Smoking is not permitted in the open within State forest on days of **Total Fire Ban** or **Colour Code Red** days.

5.2.5 Daily Machinery and Fire Fighting Equipment Inspections

During the **Statutory Bush Fire Danger Period** or **Forest Fire Threat Period** operators must thoroughly inspect, and clean if required, machinery, fire fighting equipment and the work site to ensure it is fire-safe before leaving the site after the end of operations each day.

5.2.6 Forest Closure due to Serious Fire Threat

Restrictions on operations within State forests may be imposed – including forest closure – during the **Forest Fire Threat Period**, days of **Total Fire Ban**, or **Colour Code Red** days**,** in accordance with the Regional Manager's instructions.

All operations may be suspended with or without prior notice if the forest has an existing fire or is under serious threat from an approaching fire. External parties and their employees/contractors must follow all reasonable instructions from Forests NSW personnel with regard to stand down and evacuation requirements.

Forest Fire Danger Rating (FDR) will be calculated by Forests NSW daily during the **Forest Fire Threat Period**. FDR will be used to determine Colour Codes as shown in section 5.5 - *Work Restrictions*. All FDR quoted in these conditions refer to those determined from the McArthur Forest Fire Danger Meter Mk5.

The Forests NSW Regional Manager will determine when operations may safely resume after forest closures.

5.3 Forest Fire Threat and Hazard Category Notification

5.3.1 Notification of Hazard Category

It is the responsibility of the Contractor and operators to ensure that Forests NSW has been notified on commencement of operations **and** has been provided with appropriate contact details for fire hazard notification (eg: Mobile phone number).

Forests NSW will notify nominated contacts by SMS of forecast Colour Codes before 5pm on the preceding day during the business week, or by 5pm on the preceding business day for weekends and public holidays. Where there is a change to forecast conditions Forests NSW will notify nominated contacts by SMS of updated Colour Codes by 10am.

5.3.2 Notification of resumption of operations

Where operations are suspended through notification of Colour Codes, the operation may resume at midnight following the day of suspension, or when advised otherwise by Forests NSW. Where possible, notice of expected resumption time will be given upon notification of suspension.

5.4 Fire Preparedness Requirements

During the declared **Forest Fire Threat Period**, all operators/contractors involved with external works must provide fire-fighting equipment and conduct operations as specified below, unless specific conditions of preparedness exist in an agreement with Forests NSW.

5.4.1 Category I fire preparedness requirements

Category I requirements apply to all operations throughout the declared **Forest Fire Threat Period**. Each workplace or worksite must have immediately available:

- one knapsack, minimum capacity 15 litres filled with water containing wetting agent, or an approved water-based fire extinguisher (see below);
- one approved dry chemical fire extinguisher (see below);
- at least one rake hoe in serviceable condition.

All equipment shall be kept available at the workplace, in working condition and available for immediate use.

5.4.2 Category II fire preparedness requirements

Category II requirements apply in addition to Category I requirements during the declared **Forest Fire Threat Period**, where:

a. Required in Table 1a or 1b, in *Section 5.5 - Work Restrictions*, or
b. Where specific conditions attached to approvals or access agreements note the requirement to meet Category II status.

Each workplace or worksite must have immediately available:

a. A two-way radio (or mobile telephone where reception is adequate) present at the workplace, in serviceable condition and in contact with its radio base. The radio base must be contactable by telephone. If radio or mobile telephone coverage is insufficient, communication must be managed so that notifications by Forests NSW can be relayed directly to the worksite.
b. A mobile water unit maintained in serviceable condition with the following features:
    - minimum capacity of 400 litres;
    - the tank kept full while plant are operating;
    - a pump unit with a minimum capacity of 2.2 kilowatts (3hp);
    - a minimum of 60 metres of hose;
    - fill and outlet hoses attached to the pump and nozzle with "Storz" fittings to Forests NSW specifications;
    - a nozzle capable of delivering a fog spray and jet stream;
    - the pump motor fully fuelled at all times;
    - for trailer-mounted units, a four-wheeled drive towing vehicle with suitable tow hook/ball must also be on site and the unit itself with ground clearance suitable for use on a forest track.
c. Two operators trained in the use of the fire fighting equipment and the procedure to be followed in the event of fire.

5.4.2 Approved fire extinguishers

An approved water based fire extinguisher is a stored-pressure water-style fire extinguisher of at least nine (9) litres capacity, fully pressurised (conforming to *AS.1841 Part 2 – 1997*).
An approved dry chemical-type fire extinguisher must have at least 1.25 kilogram capacity (*conforming to AS.1845 Part 5 – 1997*).

5.5 Work Restrictions.

Category I requirements apply to all operations conducted during the declared **Forest Fire Threat Period** on State forest tenure.

Table 1a Weekday work restrictions

Declared Forest Fire Threat Period	Colour Code (Hazard Category)	CONDITIONS for Operations
Not Declared	BLUE	No restriction on operations.
Declared	YELLOW (Forecast FDR 14 or less)	If Category I requirements are met: **1**. No restrictions apply. **2**. No time restriction unless otherwise advised.
	ORANGE (Forecast FDR 15 - 29)	If Category II requirements are met: **3.** No restrictions apply. If only Category I requirements are met: **4.** Trenching/ripping or other earthworks in rock to cease at 1300 hrs. **5.** Vegetation clearing/mulching operations with exposed rock to cease at 1300 hrs. **6.** All other operations may continue.
	RED (Forecast FDR 30 or more)	Conditions 1 to 2 above apply plus: **7.** No grinding, welding or other activities involving a naked flame, sparks or with the potential to cause ignition **8.** Unless specifically approved by Forests NSW all operations are to cease at 1300 hrs. **9.** Once suspended the operations are not to recommence until the following day (00:00hrs) without approval of Forests NSW.

Table 1b Weekend/Public Holiday work restrictions

Declared Forest Fire Threat Period	Colour Code (Hazard Category)	CONDITIONS for Operations
Not Declared	BLUE	No restriction on operations.
Declared	YELLOW (Forecast FDR 14 or less)	**1.** Forests NSW to be notified of proposed operations by 1500 hrs on the day preceding the weekend/holiday period. If Category 1 requirements are met: **2.** No restrictions apply. **3.** No time restriction unless otherwise advised.
	ORANGE (Forecast FDR 15 - 29)	**4.** Forests NSW to be notified of proposed operations by 1500 hrs on the business day preceding the weekend/holiday period. If Category II requirements are met: **5.** No restrictions apply. If only Category I requirements are met: **6.** Trenching/ripping or other earthworks in rockrock to cease at 1300 hrs. **7.** Vegetation clearing/mulching operations with exposed rock to cease at 1300 hrs. **8.** All other operations may continue
	RED (Forecast FDR 30 or more)	Conditions 1 to 3 above apply plus: **9.** No grinding, welding or other activities involving a naked flame or with the potential to cause ignition **10.** Unless specifically approved by the SFO all operations are to cease at 1300 hrs. **11.** Once suspended the operations are not to recommence until the following day (00:00hrs) without approval of Forests NSW

6. ROADS AND TRACKS

Any existing road or track in a State forest, wherever located, may only be used if it is operationally stable and it is drained, maintained and managed in accordance with the following minimum standards. Where required to conduct road or track maintenance or construction by Forests NSW the following minimum standards will apply. Provisions within this section apply equally to all roads, tracks, trails, and fire trails within State forests.

6.1 Road Construction

a. New roads or tracks must not cross any wetland, and may only cross any other drainage feature if there is no practical alternative route.
b. New roads or tracks may only cross a river if an Environmental Impact Assessment has been completed to satisfy the minimum conditions as specified in Part 5a *Environmental Planning and Assessment Act 1979*.
c. New roads or tracks must not be located in any wetland or cultural heritage buffer zone.
d. New roads or tracks may only enter the buffer zone of any other drainage feature if it is necessary to cross that drainage feature or it will result in the least environmental disturbance compared to any practical alternative route.
e. New roads or tracks must follow natural benches and ridges wherever possible, and should not be located on steep side slopes or unstable ground. New roads may not be constructed on ground slopes exceeding 20^{o}.
f. Clearing of native vegetation for the purpose of creating tracks or constructing sections of road may only occur if an Environmental Impact Assessment has been completed to satisfy the minimum conditions as specified in Part 5a *Environmental Planning and Assessment Act 1979*.
g. Trees, stumps or other woody debris must not be used to provide fill for road construction.
h. Any fill batter must be stabilised using one or more of the following methods or any other method that achieves a similar result:
    - allowing revegetation to grow over the batter,
    - placing a suitable protective cover over the batter
    - placing appropriate mulch material over the batter

6.2 Crossings over Drainage Features

Where permitted in section *6.1 Road Construction*, crossings over drainage features may only be made using bridges, culverts or causeways, or any combination of these.

The construction of a crossing over a drainage feature must be carried out in a manner that minimises the depositing of any loose material into the drainage feature and any disturbance to its bed or banks, and must meet the following conditions:

a. Any crossing over a drainage feature (other than a river) must be designed to convey the peak flow from a 1-in-5 year storm event.
b. The surface of any crossing, and the approaches on either side of it, must be made of stable material that is unlikely to be displaced during normal use of the crossing or approach, or by any 1-in-10 year storm event.
c. The approaches to any crossing must be effectively drained, using a drainage structure, within 5 to 30 metres of the crossing (or if this is impracticable, such other further distance that is as near as practicable to the crossing).
c. Any causeway must consist of gravel, rock, bitumen, concrete, or other stable material that is unlikely to produce water turbidity.

6.3 Drainage of Roads and Tracks

All reasonable steps must be taken to minimise soil erosion from roads and tracks. Accordingly, at least one of the following measures must be adopted, as appropriate in the circumstances:

a. maintain surface vegetative cover that protects the soil surface from erosion
b. establish a grass cover
c. cross-fall drain the road or track, or shaping the road or track to a crown so that water drains to both sides
d. construct drainage structures to convey water away from the road or track formation (for example, cross-drains, mitre drains, or relief culverts)

Drainage structures must be established on a road or track if concentrated water flow on the road's or track's surface or table drains is likely to occur for distances exceeding the relevant spacing, as shown in the Table 2 below:

Table 2 Drainage Structure Requirements

If the slope of the road or track is:	Then the drainage structure must be placed at least every:	If the slope of the road or track is:	Then the drainage structure must be placed at least every:
1°	250 m	16°	38 m
2°	200 m	18°	34 m
4°	125 m	20°	30 m
6°	90 m	22°	26 m
8°	70 m	24°	22 m
10°	60 m	26°	19 m
12°	50 m	28°	17 m
14°	40 m	30°	15 m

6.3.1 Installation of Drainage Structures

a. Any drainage structure must be designed so as to convey the peak flow from a 1-in-5 year storm event.
b. Any drainage structure must be located so that it discharges onto a stable area, or into a structure capable of filtering runoff water and trapping sediment.
c. Any type of drainage structure that is to be used to divert water from the surface of a new road or track must be installed during construction.
d. Any type of drainage structure that is to be used to divert water from the surface of an existing road or track must be installed within 7 days of completing the operations for which the track was used.

6.3.2 Maintenance of Drainage Structures

a. Any type of drainage structure that is to be used to divert water from the surface of a road or track must be maintained in effective working order.
b. Damaged or blocked drainage structures must be repaired within 72 hours of the damage or blockage being reported.
b. Scouring at the outlets of any drainage structure must not undermine the structure, or trigger gully or rill erosion. This may require the construction of receiving drains or energy dissipaters or both.

6.4 Road Maintenance

a. All roads, crossings, and drainage structures must be inspected regularly and maintained in effective working order.
b. Blading-off of roads (that is, the use of a machine to sweep drifts of loose mud, slush or soil from the surface of the road to provide temporary access following wet weather) must only occur with written permission from Forests NSW. Any soil material that is bladed-off must be stockpiled in a recoverable position and respread as soon as is practicable.

6.4 Road Closures

6.4.1 Wet Weather

Use of any road or track is not permitted during wet weather conditions if resulting rutting is likely to be more than 150 millimetres deep for any distance exceeding 20 metres.

6.4.2 ROAD DAMAGE

Use of any damaged section of road or track is not permitted (including any section of road whose surface or subsurface has broken down, as evidenced by rutting as described above). Roads must be repaired before use can recommence over damaged sections.

A section of road with a damaged or blocked drainage structure must be repaired within 72 hours of the damage being reported. If the drainage structure is not repaired within that time, use of that section of road must cease until the repairs are carried out.

6.5 Disused Roads

Where specified by Forests NSW that a road or track that is no longer being used is to be closed the following requirements apply:

a. The road must be closed to traffic,
b. Any drainage feature crossing must be removed unless its removal would cause greater disturbance to the environment than if left in place (the approaches to a removed drainage structure must be closed and cross drained),
c. Road or track drainage must be adopted as per section *6.2 Drainage of Roads and Tracks*.
c. The road or track will be rehabilitated by using one of the following measures, as appropriate in the circumstance:
    - cover the ground with slash or debris,
    - ripping and seeding compacted soils.

7. COMPLIANCE & MONITORING

It is the responsibility of the external party to ensure that all works meet minimum standards defined within this document and other relevant licences, regulation or legal instruments. Forests NSW reserves the right to monitor and review performance as required. If performance is not considered adequate Forests NSW will put in place additional standards and requirements, withdraw access privileges, seek compensation for damages or prosecute as per the Forestry Act (1916) as is deemed necessary.

It is recommended that external parties completing works on State forests put in place a formal supervisory monitoring system to ensure compliance with the relevant conditions.

8. FORESTS NSW CONTACT DETAILS

Bathurst Office:	Forests NSW PO Box 143 Bathurst NSW 2795
Phone:	(02) 6331 2044
Fax:	(02) 6331 5528
After Hours and Fire Calls:	(02) 6332 4812