STANDARD OPERATING PROCEDURE

TITLE:	**PUBLIC SAFETY MANAGEMENT PLAN**	Risk Assessment Reference No.:
Doc No.:	**SV-MS-039**	
Prepared by:	Tony Nolan	Date: 30 July 2013
Approved by:	Jacques Le Roux	Review Frequency: 3 years

INTRODUCTION:

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

This plan addresses potential subsidence impacts on public safety 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.

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. Figure 1 shows the mining area and the identified infrastructure on the surface.

Potential safety risks that may occur as a result of subsidence include:

- Surface cracking
- Ground deformations
- Damaged infrastructure (i.e. fallen electricity transmission lines, damaged roads)
- Loss of services (i.e. power, telecommunications)

The primary risk management controls under this plan include regular communication with relevant stakeholders, fortnightly monitoring of subsidence effects, and provision of appropriate warning signage at access points and around hazards as required.

STATUTORY REQUIREMENTS

The Leaseholder shall implement a public safety management plan to ensure public safety in any surface areas that may be affected by subsidence arising from the longwall mining. This plan shall include, but not be limited to, regular monitoring of areas or infrastructure/structures posing safety risks, erection of warning signs, entry restrictions, backfilling of dangerous surface cracks and securing of unstable built structures or rockmass where required and appropriate, and the provision of timely notification of mining progress to the community and any other relevant stakeholders where management of public safety is required.

The plan shall be developed and implemented to the satisfaction of the District Inspector of Coal Mines.

Subsidence monitoring is to be undertaken by a Registered Mine Surveyor

RESPONSIBILITIES

The Springvale Technical Services Manager is responsible for ensuring that sufficient resources are available to implement the requirements of this Plan.

The Springvale Environment and Community Coordinator is responsible the scheduling of monitoring and reporting.

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 SAFETY 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

POTENTIAL RISKS

The surface to be undermined is presented in Figure 1.

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 possible Public Safety risks are listed below with a summary of the Risk Assessment results relating to surface features attached as Appendix A.

- Damage (cracking) to roads / tracks
- Damage (cracking) to general surface
- Destabilisation (cracking) of rock masses / faces and/or steep slopes
- Destabilisation of surface infrastructure (power lines), tilting of poles.

Controls, monitoring and remedial actions identified as core items in SMP Condition 19 have been addressed in this Management Plan including,

- Regular monitoring of areas of infrastructure / structures posing safety risks – monitoring introduced though no high risk areas identified.
- Erection of warning signs – completed.
- Entry restrictions – identified as part of management actions and remedial measures if Public Safety Risk identified.
- Backfilling of dangerous surface cracks – noted as remedial measure if identified.
- Securing of unstable man-made structures or rockmass where required and appropriate noted as field inspection and remedial measure (if required) after identification.
- Provision of timely notification of mining progress to the community and any other stakeholders where management of Public Safety is required – noted as part of management actions.

MONITORING

Infrastructure and improvements above Longwalls 411 - 418 is presented in Figure 1.

Monitoring is conducted as per the various Management Plans submitted as part of the SMP Approval, including Conditions 7, 10, 15, 16, 17 and 18, consisting of a combination of subsidence surveys, inspections and environmental monitoring.

These Management Plans generally focus on intensive monitoring in the initial stages of longwall mining and the long term monitoring of subsidence effects and consequences that may develop over time.

INSPECTIONS

Inspection is conducted as per the various Management Plans submitted as part of the SMP Approval including Conditions 7, 10, 15, 16, 17 and 18, consisting of a combination of visual and photographic inspections.

Inspections (including photographic monitoring included in SV-MS-036) are to be undertaken by appropriately trained/experienced personnel competent in the identification of subsidence impacts.

Powerline inspections are to be undertaken by a licenced Electrician.

SCOPE OF INSPECTIONS

Regular inspections, at frequencies detailed in the various Management Plans cover the current mining area (including the area associated with the 26.5 degrees angle of draw). Inspections are concentrated on items identified in the initial survey of each longwall panel and any infrastructure.

Inspections are carried out by trained, experienced persons and follow an inspection checklist to include the items noted above.

At the completion of mining in each longwall panel a full surface inspection is conducted and included in the End of Panel Report (Condition 11).

Table 2 details a schedule of assets to be monitored.

Table 2 Asset Monitoring

Infrastructure Item	Visual Inspection Frequency	Visual Inspection by	Survey Frequency and Type	Survey by	Comments
• General surface over SMP area			Various as detailed in the Subsidence Monitoring Plan	Aurecon	Subsidence surveys over areas and at frequencies agreed with Principal Subsidence Engineer
• Surface features over current LW mining area (including small rock masses and drainage lines where possible)	Two monthly (minimum)	Craven Elliston Hayes (or Centennial Coal depending on resourcing)	Two monthly (minimum) (photographic)	Craven Elliston Hayes (or Centennial Coal depending on resourcing)	Located over current mining area
• Roads / 4WD trails	Generally fortnightly, weekly whilst being directly undermined	Springvale Environment and Community Coordinator	Visual inspection, Photographic if any changes noted	Springvale Environment and Community Coordinator	Located over LW411 - 418
• Springvale / Delta Water transfer pipeline	As above	As above	N/A	N/A	Located over LW 411 – 415. Inspection, survey and reporting frequency agreed with Delta
• Springvale 11Kv power line to No 5 Pumping Borehole (until rehabilitated)	As above	Ampletech	N/A	N/A	Located over LW 411 – 415. Springvale owned infrastructure
• Springvale 11Kv power line to No 3 Shaft	As above	Ampletech	N/A	N/A	Located over LW 411 – 415. Springvale owned infrastructure
• Springvale No 3 Shaft facility	Generally fortnightly	Ampletech	N/A	N/A	Located adjacent to LW 411 – 412. Springvale owned infrastructure
• Integral Energy 66Kv power line (and sub-station located over LW 408)	Generally fortnightly whilst undermining Annual	Ampletech Powerserve with report to Integral Energy and Springvale	Six monthly (subsidence)	Aurecon (contract survey firm) with report to Integral Energy and Springvale	Located over LW 411 – 416. Inspection, survey and reporting frequency agreed with Integral Energy

Infrastructure Item	Visual Inspection Frequency	Visual Inspection by	Survey Frequency and Type	Survey by	Comments
• Springvale No 5 Pumping Borehole (until rehabilitated)	Generally fortnightly,	Ampletech	N/A	N/A	Located adjacent to LW 415 Springvale owned infrastructure
• Rock faces adjacent to Wolgan tributary north of LWs 411 to 413	Monthly while mining in immediate vicinity	Craven Elliston Hayes	Monthly while mining in vicinity (subsidence surveys)	Aurecon	Located north of start positions of LWs 411 to 413
• Springvale 11Kv power line to No 6 Pumping Borehole - underground	This powerline will be underground and will be trenched to an appropriate depth and marked on the surface.				Located over LW 415 – 416. Springvale owned infrastructure
Springvale No 6 Pumping Borehole	Generally fortnightly,	Ampletech	N/A	N/A	Located adjacent to LW 416 Springvale owned infrastructure

Actions and Remedial Measures

Springvale has installed appropriate signage, positioned along Forest NSW roads / trails, prior to any subsidence impacts. The objective of the signage is to ensure public users of the road / trail are aware of potential hazards resulting from subsidence. Table 3 presents the GPS locations of subsidence signs. Figure 1 presents the subsidence signs on a plan.

Table 3 Subsidence Signs Locations (WGS84)

	Easting	Northing	Description
SPR-Sign1	239128	6300966	Newnes Plateau -Near Bunglebori
SPR-Sign2	238456	6301185	Newnes Plateau -Powerlines
SPR-Sign3	236283	6302362	Newnes Plateau -Powerlines
SPR-Sign4	236390	6302446	Newnes Plateau -BlackfellowsHands Rd
SPR-Sign5	238059	6305165	Newnes Plateau -Sunnyside Ridge Rd
SPR-Sign6	239650	6303702	Newnes Plateau -Forestry Trail

Public Safety Issues Identified During Inspections

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.

Remediation of Public Safety Issues

If any Public Safety issue is identified as a result of subsidence during any of the scheduled inspections that either does not require or cannot be immediately remediated that person shall:

- Notify the Mine Manager and/or Environment and Community Coordinator. The Mine Manager shall :
- Notify the District Inspector of Coal Mines
- Notify the landholder or infrastructure owner of the findings

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

ANGUS PLACE MINE
CCL 704

East Wolgan Swamp
Sunnyside Swamp
Sunnyside East Swamp
Carne West Swamp
Sunnyside West Heath
Hawkesbury / Nepean Catchment
Cox's River Catchment
Catchment Watershed
LITHGOW STATE MINE
(Abandoned)
CCL 377
ML 1537

Bore No.5
Bore No.6
Bore No.4
No.3 Ventilation Shaft
Concrete Borehole

Proposed Underground Powerline for Bore 6 Pumping Compound within Occupation Permt 2349

Proposed Underground Powerline and pipeline for Bore 6 Pumping Compound within Occupation Permt 2349

Eastern Boundary of Mining Lease ML 1326

Southern Boundary of Mining Lease ML 1326

POWERLINE
11KV
66KV INTEGRAL POWERLINE
SPRINGVALE 11KV POWERLINE

LONGWALL 409
409 PANEL
LONGWALL 410
410 PANEL
LONGWALL 411
411 PANEL
LONGWALL 412
412 PANEL
LONGWALL 413
413 PANEL
LONGWALL 414
414 PANEL
LONGWALL 415
415 PANEL
LONGWALL 416
416 PANEL
LONGWALL 417
417 PANEL
LONGWALL 418
418 PANEL
LONGWALL 419
419 PANEL
400 PANEL

Survey Network Stn
Survey stations installed to monitor rock rates along Wolgan River tributary
Flow Monitoring WT-DS
Flow Monitoring EW-DS1
Flow Monitoring EW-DS2
Flow Monitoring SS-DS
Flow Monitoring SS-US
Flow Monitoring EW-US
Flow Monitoring CW-DS
Flow Monitoring CW-US
Track
Hydrological Borehole SPR40
Hydrological Borehole SPR39
Hydrological Borehole SPR36
Hydrological Borehole SPR37
Watercourse centrelines
Ridge Piezometer REN
Ridge Piezometer RSE
Ridge Piezometer RSS
Ridge Piezometer RCW
Swamp Piezometer WE2
Swamp Piezometer WE1
Soil Moisture Monitoring WE-SM2
Soil Moisture Monitoring SS-SM2
Swamp Piezometer SS2
Swamp Piezometer SS1
Swamp Piezometer SSE3
Swamp Piezometer SSE2
Swamp Piezometer SSE1
Swamp Piezometer SSW1
Soil Moisture Monitoring SSW-SM1
Soil Moisture Monitoring CW-SM1
Swamp Piezometer CW2
Swamp Piezometer CW1
WE01
WE02
WE03
WC01
WC02
WC03
WC04
SV1
SV2
SV3B
SV4
SS01
SS02

SCHEDULE OF CO-ORDINATES

APPROVED AREA

A:	E 236 286.2	N 6 305 095.5
B:	E 239 528.8	N 6 305 183.3
C:	E 239 637.3	N 6 301 179.9
D:	E 236 394.6	N 6 301 092.1

AREA OF APPROVED AREA
1299.1 Hectares

SCHEDULE OF CO-ORDINATES

ZERO SUBSIDENCE LINE

E:	E 236 371.3	N 6 305 014.9
F:	E 239 448.2	N 6 305 098.2
G:	E 239 550.1	N 6 301 335.5
H:	E 236 473.3	N 6 301 252.1

AREA OF APPROVED AREA
1158.6 Hectares

0 250 500 Metres

LEGEND

- SMP Approval Area
- Existing Areas of Extraction
- Existing Zero Subsidence Limit at maximum depth of cover
- Permanent State Survey Mark
- Proposed Bore 6 Powerline and Pipeline Route
- Subsidence Signage
- Fauna Monitoring
- Flora Monitoring
- Soil Moisture Monitoring
- Swamp Piezo
- Ridge Piezo
- Water Flow Monitoring
- Surface Contour Line
- Formed Track
- Dewatering Pipeline
- Existing Powerlines
- Surveyed Rock Face
- Catchment Watershed
- Mining Lease Boundary

DRAWN: John Maynard	DATE: 31–July–2009
SCALE: Not to Scale	DRAWING No: Cond.17 Review Fig.1
REVISED:	DATE REVISED:
COMPUTER PATH: S:\Survey\Acad Drawings	A0V

SPRINGVALE MINE

TITLE:
SMP CONDITION 19
PUBLIC SAFETY MANAGEMENT PLAN
FIGURE No.1

Springvale Coal
SPRINGVALE MINE
Mudgee Road
Lidsdale NSW 2790
PO Box 198
Wallerawang NSW 2845
Phone: 02–63501600
Fax: 02–63551052

S:\Survey\Acad Drawings\DMR Applications\SMP Submissions\2nd Workings LW411–418\SVC Application\Additional Info\Management Plans\Condition 19

APPENDIX 2 RISK ASSESSMENT

A#	Area	S#	Sub-Area	L#	Potential Loss Scenario/ Hazard (Including Nature & Magnitude)	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Additional Controls/ Further Actions	Theoretical Worst Case Subsidence Consequence
1	Natural Features	1.01	Natural Water Courses	1.01.01	Increased erosion in water courses.	Gradient change increase flow velocity.	Low tilts and gradient changes based on site specific subsidence monitoring results.	E	5	C	22	L		5
1	Natural Features	1.01	Natural Water Courses	1.01.02	Loss of surface flow in Wolgan tributary adjacent 412/413 panel.	Surface cracking of bed due to uplift of water course bedrock.	Subsidence monitoring.	E	4	C	18	M	Set up Wolgan tributary rock bar inspection program. Develop and implement rectification plan including subsidence triggers on Panel 411.	3
1	Natural Features	1.01	Natural Water Courses	1.01.03	Change in habitat.	Localised ponding.	Base line ecological study.	E	4	D	21	L	Monitor streams being undermined. Develop and implement pond drainage plan.	4
1	Natural Features	1.02	River Catchments	1.02.01	Loss of base flow.	Surface cracking of bed due to uplift of water course beds.	Monitoring flow from Sunnyside and Carne Swamps.	E	5	E	25	L		5
1	Natural Features	1.02	River Catchments	1.02.02	Increased turbidity.	Gradient change increase flow velocity.	Monitoring water quality at discharge points from Sunnyside and Carne Swamps.	E	5	D	24	L		5
1	Natural Features	1.03	Swamps & Water-related Ecosystems	1.03.01	Loss of habitat.	Gradient change increase flow velocity. Drainage of surface aquifers.	Low gradient changes. Ongoing intensive monitoring program. No sub-surface fracturing even with worst case subsidence scenario. Clay/shale layer underlying water aquifers feeding swamps.	E	3	D	17	M		2
1	Natural Features	1.03	Swamps & Water-related Ecosystems	1.03.02	Impact on down stream water flow.	Gradient change increase/decrease flow velocity. Drainage of surface aquifers.	Flow monitoring. Swamps have large catchments resulting in any increase/decrease in flow due to subsidence having small impact.	E	4	D	21	L		4

A#	Area	S#	Sub-Area	L#	Potential Loss Scenario/ Hazard (Including Nature & Magnitude)	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Additional Controls/ Further Actions	Theoretical Worst Case Subsidence Consequence
1	Natural Features	1.04	Cliff Lines/ Steep Slopes	1.04.01	Destabilisation of rock faces adjacent to Wolgan Tributary.	Mining induced high subsidence tilts and strains.	There are no cliff lines within the zero subsidence limits from the proposed mining area. Rock faces are less than 20m by definition.	E	5	E	25	L		5
1	Natural Features	1.04	Cliff Lines/ Steep Slopes	1.04.02	Destabilisation of rock faces adjacent to Wolgan Tributary.	Mining induced subsidence tilts and strains.	There are no cliff lines within the zero subsidence limits from the proposed mining area. Rock faces are less than 20m by definition.	HS	2	E	16	M	Monitor impacts on rock face from 411 panel mining. Develop an inspection requirement prior to employees accessing the site if monitoring identifies rock face collapse potential.	2
1	Natural Features	1.04	Cliff Lines/ Steep Slopes	1.04.03	Increased erosion of slopes in localised areas.	Mining induced subsidence tilts and strains ahead of subsidence traveling face. Mining induced subsidence tilts and strains around edge of completed longwall mining block area. Mining induced subsidence tilts and strains around end of completed longwall mining block area. Some localised steep slopes exist over mining area.	Tilts are low induced by mining are 5mm/m or less measured to date. Potential for erosion negligible due to high levels of vegetation cover.	E	5	D	24	L		4

A#	Area	S#	Sub-Area	L#	Potential Loss Scenario/ Hazard (Including Nature & Magnitude)	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Additional Controls/ Further Actions	Theoretical Worst Case Subsidence Consequence
1	Natural Features	1.05	Threatened & Protected Species	1.05.01	Swamp dependent species: Boronia Deanei Blue Mountains Water Skink Stuttering Frog	Draining of swamps. Changes in swamp perimeter effects habitat.	Depth of mining and thickness of extraction limits upward extent of fracturing. Impermeable properties and characteristics of strata. Mining layout/design. Impermeable claystone layers present in base of swamps. Historical experience from mining under swamps in area in similar conditions. Geological modeling, mapping and updating. Aquifer monitoring. Ecological monitoring.	E	3	D	17	M		3
1	Natural Features	1.05	Threatened & Protected Species	1.05.02	Forest dependent species: Derwentia Blakelyi Persoonia Hindii Eastern Pigmy Possum Broad Headed Snake.	Water courses dry up.	Existing monitoring. Low levels of subsidence tilts and strains	E	4	D	21	L		4
1	Natural Features	1.06	State Forests/Natural Vegetation	1.06.01	Loss of habitat as per 1.03.01.		Base line ecological study.							
1	Natural Features	1.06	State Forests/Natural Vegetation	1.06.02	Loss of commercial resource.	Restricted access to harvest due to subsidence.	Ongoing road maintenance program in place. Inform State Forests of active subsidence area.	FL	4	E	23	L		4
1	Natural Features	1.06	State Forests/Natural Vegetation	1.06.03	Loss of vegetation/erosion.	Clearing for subsidence monitoring lines for access.	Clearing controls imposed as part of approval to install subsidence lines.	E	4	C	18	M	Consider implementing laser scanning. Utilise existing clearings where possible.	4
2	Surface Improvements	2.01	Tracks/ Roads	2.01.01	Localised increased erosion	Occurs at areas of gradient change. Localised ponding.	Ongoing road maintenance program in place. Low subsidence tilts and strains.	E	5	D	24	L		5

A#	Area	S#	Sub-Area	L#	Potential Loss Scenario/ Hazard (Including Nature & Magnitude)	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Additional Controls/ Further Actions	Theoretical Worst Case Subsidence Consequence
2	Surface Improvements	2.02	Transmission lines	2.02.01	Disruption of power supply.	Tilting of poles. Overtensioning of cables.	Low subsidence tilts and strains. Monitoring (visual and survey). Liaison program in place with Integral Energy.	FL	4	D	21	L		4
2	Surface Improvements	2.03	Pipelines	2.03.01	Leakage causing erosion.	Excessive subsidence strains and tilts.	Flow monitoring on pipe lines. Flexible welded poly pipes. Buried for most of their length.	E	4	D	21	L		4
2	Surface Improvements	2.04	Mine Infrastructure	2.04.01	Subsidence damage to No.3 shaft and facilities.	Subsidence strains and tilts.	Low subsidence tilts and strains. Location beyond the extraction line (zero to 80mm subsidence area).	FL	4	D	21	L	Design fan to accommodate potential subsidence movements. Monitoring subsidence created by Longwall 410.	4
2	Surface Improvements	2.04	Mine Infrastructure	2.04.02	Subsidence damage to proposed dewatering borehole pump facilities.	Excessive subsidence strains and tilts. Not designed and erected to with stand predicted strains and tilts.	Previous experience used to design borehole pump facilities. Steel cased borehole. Flexible coupling at top of hole. Tolerances between borehole casing and pump line.	FL	3	D	17	M		3
2	Surface Improvements	2.05	Survey Control Stations	2.05.01	Change in XYZ values.	Subsidence.		FL	4	A	10	S	Liaise with Survey section Lands Department on notification and resurvey program	4
2	Surface Improvements	2.06	Disused Airfield	2.06.01	Change in runway levels.	Subsidence.	Runway in a state of disrepair and is unusable.	FL	5	E	25	L		5
2	Surface Improvements	2.07	Public Facilities/ Amenity/Recreation Users	2.07.01	Restriction of access along roads for Forestry activities, public & mine access.	Subsidence.	Low subsidence tilts and strains. Warning signs at main entrances to State Forests about driving to road conditions.	FL	5	E	25	L	Periodic inspections and road maintenance as required.	5

A#	Area	S#	Sub-Area	L#	Potential Loss Scenario/ Hazard (Including Nature & Magnitude)	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Additional Controls/ Further Actions	Theoretical Worst Case Subsidence Consequence
2	Surface Improvements	2.07	Public Facilities/ Amenity/Users	2.07.02	User safety.	Damage to roads and tracks from subsidence. Public not notified of potential hazards caused by subsidence.	Low subsidence tilts and strains. Warning signs at main entrances to State Forests about driving to road conditions.	HS	4	E	23	L		4
3	Subsurface	3.01	Groundwater Resources (Quantity & Quality)	3.01.01	Draining the upper 2 aquifers (as identified in CSIRO report dated 2004) leading to water supply reduction to swamps.	Fracturing extends to upper aquifers. Fractures are interconnecting and open enough to drain aquifers. Geological structure extends through aquifer to bed of swamp.	Depth of mining and thickness of extraction limits upward extent of fracturing. Impermeable properties and characteristics of strata. Mining layout/design. Impermeable claystone layers present in base of swamps. Historical experience from mining under swamps in area in similar conditions. Geological modeling, mapping and updating. Aquifer monitoring. Ecological monitoring.	E	3	E	20	L	Install piezometers in swamps in new mining area. Install piezometers in boreholes in new mining area.	3
3	Subsurface	3.01	Groundwater Resources (Quantity & Quality)	3.01.02	Lower aquifers (as defined in CSIRO report dated 2004) are drained into mine. Predicted maximum inflow 350 litres/sec.(as per CSIRO report dated 2004).	Cracking extending upwards from longwall goaf (for a nominal height of 120m). (*Note:* No different for theoretical worst case subsidence.)	Mine pumping system designed to control increased water make.	E	5	A	15	S	Sinking dewatering boreholes. Reuse of mine water by Delta Electricity.	5
3	Subsurface	3.02	Groundwater recharge	3.02.01	Impact on aquifers / groundwater recharge immediately down dip of mining area.	Note: No different for theoretical worst case subsidence.	The disturbed lower aquifers do not impact on the surface environment.	E	5	A	15	S	This impact will disappear after mining is completed, the mine closed, fills with water and ground water re-establishes.	5

A#	Area	S#	Sub-Area	L#	Potential Loss Scenario/ Hazard (Including Nature & Magnitude)	Causes	Existing Controls	Loss Type	Consequence	Likelihood	Risk Rank	Risk Level	Additional Controls/ Further Actions	Theoretical Worst Case Subsidence Consequence
3	Subsurface	3.03	Increased mine water discharge	3.03.01	Increased discharge of connate water from lower aquifers creates additional hazards to environment.	Connate water being discharged from increased area of mining.	Planning to discharge this water directly to Delta Electricity. Mine pumping system designed to control increased water make. Discharge will only occur under emergency situation.	E	4	D	21	L	Sinking dewatering boreholes. Reuse of mine water by Delta Electricity. Develop an Emergency Response Discharge Action Plan.	4
4	Areas of Archaeological & Heritage Significance	4.01	Aboriginal artifacts	4.01.01	Artifacts damaged or disturbed from original location.	Subsidence effects. Clearing for subsidence survey lines.	Archaeological survey carried out with no significant sites identified. Low level subsidence tilts and strains. Ongoing liaison with aboriginal groups.	E	5	D	24	L	Further archaeological surveys to be carried out prior to planned land disturbance.	5