APPENDIX A: MASTER TARPS

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
SURFACE WATER									
Surface Water Management Plan	Cataract Creek and Tributaries	CC3 CC4 CC5 CC6 CC7 CC8 CC9 CC10 CT3 3A 4 4A SPC1	pH EC TSS Stability	Monthly	To determine if mining operations are impacting surface water quality.	Level 1: Normal Operations pH 6.0 to 6.8; and EC < 200 µS/cm; and TSS < 6 mg/L; and Stability: No visible erosion	Continue monitoring.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager) Environmental Monitoring Team Leader to monitor for trends in data.
						Level 2: pH: 3 consecutive samples outside of 6.0 – 6.8 range (20^{th}/80^{th} percentiles); or EC: 3 consecutive samples greater than 200 µS/cm (80^{th} percentile); or TSS: 3 consecutive samples > 6 mg/L; (80^{th} percentile); or Stability: Evidence of bed and band erosion and scouring	1. Investigate potential cause of exceedances (e.g., climatic; systemic; failure) 2. Identify mitigation options 3. Review monitoring frequency and parameters 4. Report potential impact, and response, within six monthly reporting.	1. One Month 2. One Month, commence works within two months 3. One Month 4. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager) Environmental Monitoring Team Leader
						Level 3: pH: 1 sample outside of 4.9 – 7.5 range (5^{th}/95^{th} percentile); or EC: 1 sample outside of 30- to 350 µS/cm range (ANZG 2018 95^{th} percentile – upland rivers); or TSS: 1 sample above 64.6 mg/L (95^{th} percentile); or Stability: Visible migration (rerouting) of watercourse	1. Inform DPE and WaterNSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic; systemic; failure) 3. Inform DPE and WaterNSW of preliminary investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One Week 2. Commence within1 Week 3. One Month 4. Commence works within 2 months 5. One Month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Surface Water Management Plan	Cataract River	CR3 CR4	pH EC TSS Stability	Monthly	To determine if mining operations are impacting surface water quality.	Level 1: Normal Operations pH 6.1 to 6.8; and EC < 200 µS/cm; and TSS < 6 mg/L; and Stability: No Visible erosion	Continue monitoring.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager) Environmental Monitoring Team Leader to monitor for trends in data.
						Level 2: pH 3 consecutive samples outside of 6.1 – 6.8 range (20^{th}/80^{th} percentiles); or EC 3 consecutive samples greater than 188 µS/cm (80th percentile); or TSS: 3 consecutive samples < 6 mg/L; (80th percentile for Cataract Creek and Tributaries); or Stability: Evidence of bed and band erosion and scouring	1. Investigate potential cause of exceedances (e.g., climatic; systemic; failure) 2. Identify mitigation options 3. Review monitoring frequency and parameters 4. 4. Report potential impact, and response, within six monthly reporting.	1. One Month 2. One Month, commence works within two months 3. One Month 4. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager) Environmental Monitoring Team Leader

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
						Level 3: pH: 1 sample outside of 5.8 – 7.3 range (5^{th}/95^{th} percentile); or EC 1 sample outside of 30- to 350 µS/cm range (ANZG 2018 95th percentile – upland rivers); or TSS: 1 sample above 64.6 mg/L (95^{th} percentile for Cataract Creek and Tributaries); or Stability: Visible migration (rerouting) of watercourse	1. Inform DPE and WaterNSW 2. Commence investigation on the cause of the trigger exceedances (e.g. climatic; systemic; failure) 3. Inform DPE and WaterNSW of preliminary investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One Week 2. Commence within one Week 3. 1 Month 4. Commence works within two months 5. One Month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Surface Water Management Plan	Swamps	CCus3 CCus4c CRus1c (plus proposed new locations)	pH EC	Monthly	To determine if mining operations are impacting surface water quality of swamp outflows	Level 1 Normal Operations pH 3.8to 6.3 and EC < 188 µS/cm	Continue monitoring.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager) Environmental Monitoring Team Leader to monitor for trends in data.
						Level 2 pH 1 samples outside of 3.8 – 6.3 range (Swamp Piezo trigger from the GWMP); or EC 3 consecutive samples greater than 188 µS/cm (80th percentile)	1. Investigate potential cause of exceedances (e.g., climatic; systemic; failure) 2. Identify mitigation options 3. Review monitoring frequency and parameters 4. Report potential impact, and response, within six monthly reporting.	1. One Month 2. One Month, commence works within 2 months 3. One Month 4. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager) Environmental Monitoring Team Leader
						Level 3: pH: 2 consecutive samples outside of 3.8 – 6.3 range (Swamp Piezo trigger from the GWMP); or EC 1 sample outside of 30-to 350 µS/cm range (ANZG 2018 95^{th} percentile – upland Rivers)	1. Inform DPE and WaterNSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic; systemic; failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One Week 2. Commence within one week 3. One Month 4. Commence works within two months 5. One Month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
GROUNDWATER									
Groundwater Management Plan	Swamp water quality	Existing swamp piezometers: PB4 B near swamp BCUS4 PCc10 (A/B) at CCUS10 PCc12 A at CCUS12 PCc2 at CCUS2 PCc4 © at CCUS4 PCc5 (B) at CCUS5 PCr1 (B) at CRUS1 For newly installed swamp piezometers, refer to USMP	EC	Field analysis when piezometers are manually dipped • Every 2 months prior to and after swamp is mined under; • Monthly during period when swamp is mined under.	Detection of potential impact to swamp water conditions due to mine activities	Level 1: No exceedance of Level 2 or Level 3	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 193 µS/cm	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings above the trigger of 193 µS/cm	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
Groundwater Management Plan	Swamp water quality	Existing swamp piezometers: PB4 B near swamp BCUS4 PCc10 (A/B) at CCUS10 PCc12 A at CCUS12 PCc2 at CCUS2 PCc4 (C) at CCUS4 PCc5 (B) at CCUS5 PCr1 (B) at CRUS1 For newly installed swamp piezometers refer to USMP	pH	Field analysis when piezometers are manually dipped Every 2 months prior to and after swamp is mined under; Monthly during period when swamp is mined under.	Detection of potential impact to swamp water conditions due to mine activities	Level 1: No exceedance of Level 2 or Level 3	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading outside of the trigger range of 3.8 to 6.3	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings outside of the trigger range of 3.8 to 6.3	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Swamp water levels	Existing swamp piezometers: PB4 B near swamp BCUS4 PCc10 (A/B) at CCUS10 PCc12 A at CCUS12 PCc2 at CCUS2 PCc4 (C) at CCUS4 PCc5 (B) at CCUS5 PCr1 (B) at CRUS1 For newly installed swamp piezometers refer to USMP,	Water level	Daily – water level monitoring with logger set 6 hourly interval. Data downloaded and manually dipped - Every 2 months prior to and after swamp is mined under; - Monthly during period when swamp is mined under.	Detection of potential impact to swamp water conditions due to mine activities	Level 1: Water level readings consistently above the water level trigger* or levels below trigger during periods of low rainfall (<20 mm/month)	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One monthly water level reading below the water level trigger of: PCc10A: 0.56 mbgl; or PCc2: 1.6 mbgl; or PCc4C: 1.05 mbgl; or PCc5B: 1.13 mbgl; or PCr1B: 0.68 mbgl; or and the trigger is recorded following a month of rainfall above 20 mm/month	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive monthly water level readings below the water level trigger of: PCc10A: 0.56 mbgl; or PCc2: 1.6 mbgl; or PCc4C: 1.05 mbgl; or PCc5B: 1.13 mbgl; or PCr1B: 0.68 mbgl; or and the trigger is recorded following a month of rainfall above 20 mm/month	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameter 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Hawkesbury Sandstone water quality	Existing open standpipes: NRE A, NRE C, NRE D, GW1A, RV18, RV19, RV21, RV22A Newly installed open standpipes:	EC	2 monthly – field analysis for open standpipes Quarterly – discrete analysis for open standpipes	Detection of potential impact to Hawkesbury Sandstone water due to mine activities	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 376 µS/cm	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
		RV40, RV41, RV42, RV45, RV46, RV47				Level 3: Two consecutive readings above the trigger level of 376 µS/cm	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Hawkesbury Sandstone water quality	Existing open standpipes: NRE A, NRE C, NRE D, GW1A, RV18, RV19, RV21, RV22A Newly installed open standpipes: RV40, RV41, RV42, RV45, RV46, RV47	pH	2 monthly – field analysis for open standpipes Quarterly – discrete analysis for open standpipes	Detection of potential impact to Hawkesbury Sandstone water due to mine activities	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading outside of the trigger range of 3.7 to 6.5	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings outside of the trigger range of 3.7 to 6.5	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Hawkesbury Sandstone water levels	Existing open standpipes: NRE A, NRE C, NRE D, GW1A, RV18, RV19, RV21, RV22A Newly installed open standpipes: RV40, RV41, RV42, RV45, RV46, RV47	Water level	Monthly manual dipped water level in areas being actively undermined	Detection of potential impact to Hawkesbury Sandstone water due to mine activities	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One monthly water level reading below the water level trigger	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive monthly water level readings below the water level trigger	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
Groundwater Management Plan	Bulgo Sandstone water quality	Newly installed open standpipes, which may include: RV43A and RV44	EC	2 monthly – field analysis for open standpipes	Verification of characterisation of Bulgo Sandstone water quality and detection of changes in quality post mining and closure, outside of predicted impacts	Level 1: No exceedance of Level 2 or Level 3 triggers	Report negligible impact in routine reporting.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 376 µS/cm within the first 12 months of installation	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings above the trigger level of 376 µS/cm within the first 12 months of installation	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Bulgo Sandstone water quality	Newly installed open standpipes, which may include: RV43A and RV44	pH	2 monthly – field analysis for open standpipes	Verification of characterisation of Bulgo Sandstone water quality and detection of changes in quality post mining and closure, outside of predicted impacts	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading outside of the trigger range of 3.7 to 6.5 within the first 12 months of installation	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings outside of the trigger range of 3.7 to 6.5 within the first 12 months of installation	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Bulgo Sandstone water levels	Newly installed open standpipes, which may include: RV43A and RV44	Water level	Monthly manual dipped water levels	Detection of changes in Bulgo Sandstone groundwater level post mining and closure, outside of predicted impacts	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One monthly water level reading below the water level trigger	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review weather station data, groundwater quality and level data and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
						Level 3: Two consecutive monthly water level readings below the water level trigger	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Groundwater levels and vertical head profile	Existing VWPs: NRE1B, NRE1D, GW1, RV16, RV17, RV20, RV22, RV23, RV24, RV25, RV27, RV29, RV35 and RV36	Water level	Daily – water level monitoring with logger set at 6 hourly interval and downloaded monthly in areas being actively undermined	Impact on groundwater levels and vertical head profile due to mining impacts/subsidence impacts beyond those already predicted.	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: Detection of a significant change in vertical head gradient at one VWP sensor, as indicated by movement of the head profile below (to the left) of the minimum predicted head profile and baseline observation data (refer Appendix H)	1. Review condition of the VWP equipment 2. If the data is representative, review climate trends, groundwater trends within other sensors and nearby monitoring locations and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Detection of a significant change in vertical head gradient at more than one VWP sensor, as indicated by movement of the head profile below (to the left) of the minimum predicted head profile and baseline observation data across multiple sensor levels (refer Appendix H)	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Groundwater levels and vertical head profile	Newly installed VWPs, which may include: RV43 and RV48	Water level	Daily – water level monitoring with logger set at 6 hourly interval and downloaded monthly	Impact on groundwater levels and vertical head profile due to mining impacts/subsidence impacts and recovery post mining, beyond those already predicted.	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: Detection of a significant change in vertical head gradient at one VWP sensor, as indicated by movement of the head profile below (to the left) of the minimum predicted head profile.	1. Review condition of the VWP equipment 2. If the data is representative, review climate trends, groundwater trends within other sensors and nearby monitoring locations and subsidence monitoring to identify whether further investigation is warranted. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Detection of a significant change in vertical head gradient at more than one VWP sensor, as indicated by movement of the head profile below (to the left) of the minimum predicted head profile.	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
Groundwater Management Plan	Underground workings	Mine inflows	Inflow	Daily volumetric flow monitoring of mine inflow and discharge	Inflows volumes to underground workings is in line with predictions and captured by appropriate water licences.	Level 1: Mine pump volumes are within predicted mine inflow range (< 1 ML/day) – excluding changes in dewatering volumes to manage inrush risk or due to equipment maintenance.	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: Increase in flow rate of >1 ML/day (above predictions) for 4 successive days from active mining areas - excluding changes in dewatering volumes to manage inrush risk or due to equipment maintenance.	1. Review equipment to verify if the reading is representative. If not, remeasure. 2. If the data is representative, review mine water quality and inflow data, ground water data and geotechnical/subsidence records to identify any adverse trends that may indicate any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Increase in flow rate of >1 ML/day (above predictions) for 7 successive days from active mining areas - excluding changes in dewatering volumes to manage inrush risk or due to equipment maintenance.	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Underground workings	Mine inflows	pH	Monthly – field analysis Quarterly – discrete analysis	Underground mine water quality will not impact current beneficial use of groundwater in Permian coal measures	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading outside of the trigger range of 7.7 to 9.4	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review mine water quality and inflow data, groundwater data and geotechnical/subsidence records to identify any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings outside of the trigger range of 7.7 to 9.4	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Underground workings	Mine inflows	EC	Monthly – field analysis Quarterly – discrete analysis	Underground mine water quality will not impact current beneficial use of groundwater in Permian coal measures	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 5,226 µS/cm	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review mine water quality and inflow data, groundwater data and geotechnical/subsidence records to identify any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
						Level 3: Two consecutive readings above the trigger level of 5,226 µS/cm	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Underground workings	Mine inflows	Sulfate	Quarterly – discrete analysis	Underground mine water quality will not impact current beneficial use of groundwater in Permian coal measures	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 167 mg/L	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review mine water quality and inflow data, groundwater data and geotechnical/subsidence records to identify any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings above the trigger level of 167 mg/L	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Underground workings	Mine inflows	Dissolved Al	Quarterly full metals analysis	Underground mine water quality will not impact current beneficial use of groundwater in Permian coal measures	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 0.11 mg/L	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review mine water quality and inflow data, groundwater data and geotechnical/subsidence records to identify any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings above the trigger level of 0.11 mg/L	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
Groundwater Management Plan	Underground workings	Mine inflows	Dissolved As	Quarterly – Full metals analysis	Underground mine water quality will not impact current beneficial use of groundwater in Permian coal measures	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 0.03 mg/L	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review mine water quality and inflow data, groundwater data and geotechnical/subsidence records to identify any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings above the trigger level of 0.03 mg/L	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Underground workings	Mine inflows	Dissolved Mo	Quarterly – full metals analysis	Underground mine water quality will not impact current beneficial use of groundwater in Permian coal measures	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 0.09 mg/L	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review mine water quality and inflow data, groundwater data and geotechnical/subsidence records to identify any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Two consecutive readings above the trigger level of 0.09 mg/L	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Groundwater Management Plan	Underground workings	Mine inflows	Dissolved Sb	Quarterly – full metals analysis	Underground mine water quality will not impact current beneficial use of groundwater in Permian coal measures	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring.	Report negligible impact in routine reporting.	Russell Vale Colliery (Group Environment Manager)
						Level 2: One reading above the trigger level of 0.03 mg/L	1. Review sampling methodology/ equipment to verify if the reading is representative. If not, resample and test within 7 days of the result. 2. If the data is representative, review mine water quality and inflow data, groundwater data and geotechnical/subsidence records to identify any adverse trends that may indicate an impact beyond previous predictions. If an impact due to mining is identified progress to Level 3.	1. One week. 2. Two weeks to assess whether further investigation is required. Commence investigation if exceedance of Level 3 criteria identified (see Level 3 reporting requirements). 3. One to two months to complete depending on timing of review of second data period.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
						Level 3: Two consecutive readings above the trigger level of 0.03 mg/L	1. Inform DPE and Water NSW 2. Investigate and report on the cause of the trigger exceedances (e.g. climatic, systemic, failure) 3. Inform DPE and WaterNSW of investigation outcomes 4. Identify mitigation options 5. Review monitoring frequency and parameters 6. Report potential impact, and response, within six monthly reporting.	1. One week 2. Commence within one week 3. One month 4. Commence works within 2 months 5. One month 6. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
BIODIVERSITY									
Biodiversity Management Plan	Aquatic biodiversity	Monitoring of water quality and aquatic macroinvertebrate at five impact sites in Cataract Creek and Cataract River. Monitoring of water quality and aquatic Macroinvertebrates at four control sites.	A comprehensive visual inspection and photographic record of each monitoring site will be collected each time a site is visited. Physico-chemical water quality parameters, including temperature, conductivity, pH, Oxidation, dissolved oxygen and turbidity. Physicochemical properties of waterways are compared to ANZECC AMRANZ (2000) guidelines. Condition of aquatic habitats based on AUSRIVAS method. Upper and lower limits of aquatic habitat will be established using OE50TaxaScores and SIGNAL2 scores.	Minimum 12 months of baseline monitoring prior to mining. Monitoring during mining. A minimum of one years of monitoring post-mining. Macroinvertebrate monitoring is undertaken in spring and autumn.	To determine if subsidence effects resulting from mining result in impacts to aquatic habitats or threatened species. Inform stakeholders of baseline assessment and monitoring. Identify, investigate and report on impacts to aquatic ecology.	Within prediction (Level 1): Negligible environmental consequences for creeks, as illustrated by no significant changes in water quality or data collected during macroinvertebrate sampling.	Continue monitoring. Report negligible impact in six monthly reports.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Within prediction (Level 2): Negligible environmental consequences for creeks, as illustrated by a short term (1 year) reduction in aquatic habitat, as shown by: • Water quality data exceeding upper or lower limits of baseline monitoring; or • Change in OE50Taxa Score; or • Change in AUSRIVAS Band.	1. Continue monitoring. 2. Review frequency and location of monitoring and determine if additional monitoring is required. 3. Inform BCD, and DAWE of potential impact. 4. Report potential impact in six monthly reports.	1. Six monthly reporting in accordance with Extraction Plan approval 2. Monitoring plan reviewed within one month of potential impact being identified. 3. BCD, and DAWE notified of potential impact within one week of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)
						Exceeding prediction (Level 3): Reduction in aquatic habitat at impact sites only for an extended timeframe (>2 years), as shown by: • Water quality data exceeding upper or lower limits of baseline monitoring; or • Change in OE50Taxa Score; or • Change in AUSRIVAS Band	1. Engage ecologist to investigate and report on the cause of trigger exceedances and advise of potential impacts. 2. Inform BCD and DAWE of investigation outcomes. 3. Review monitoring program, including frequency and location, and modify if necessary. 4. Develop and implement impact mitigation and remediation measures in consultation with BCD and DAWE. 5. Develop a monitoring plan to determine the success of mitigation / remediation measures. 6. If mitigation/Remediation measures are unsuccessful or not feasible, determine whether offsets will be required. An offset strategy/offset management plan will be developed in consultation with BCD and DAWE. 7. Report in annual reviews and six monthly reports to inform relevant agencies of results of monitoring.	1. BCD, and DAWE notified of potential impact within one week of impact being identified. 2. Investigation initiated within one week of impact being identified. 3. Investigation results reported to BCD and DAWE within one week of completion. 4. Monitoring plan reviewed within one week of impact being identified. 5. Commence preparation of mitigation/ action and monitoring plan within one week of impact being identified, if required. 6. Monthly updates of investigation progress to BCD and DAWE, if required. 7. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
UPLAND SWAMP									
Upland Swamp Monitoring Plan	Vegetation monitoring and observational monitoring	Category 1A or 1B: BCUS4 CCUS1 CCUS3 CCUS5 CCUS6 CCUS20 CCUS10 CRUS1	TSR and species composition	Category 1 & 2: Collection of data on all species observed in 30 0.5m x 0.5m quadrats along 15 m transects. Statistical analysis of TSR and species composition.	To determine if the project results in changes to vegetation composition within coastal upland swamps exceeding negligible levels	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring. Report negligible impact in six monthly reports.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Level 2: Negligible change to the composition or distribution of species, as illustrated by a short term (less than one-year duration – first year after mining commences) significant statistical difference between control and impact sites or between before and after mining at the impact sites or minimal dieback recorded during observational monitoring.	1. Continue monitoring. 2. Review frequency and location of monitoring and determine if additional monitoring is required. Report potential impact in six monthly reports.	1. Six monthly reporting in accordance with Extraction Plan approval. 2. Monitoring plan reviewed within one month of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
		CRUS2 CRUS3 Category 2 (if triggered): CCUS2 CCUS14		Category 1, 2 & 3: Observational monitoring will be undertaken across the study area opportunistically during surveys including photo-point monitoring.		Level 3: Change to the composition or distribution of species as illustrated by a long term (greater than one year) significant statistical difference between control and impact sites or between before and after mining at the impact sites or significant dieback in more than one area recorded during observational monitoring.	1. Engage ecologist to investigate and report on the cause of trigger exceedances and advise of potential impacts. 2. Inform BCD and DAWE of investigation outcomes. 3. Review monitoring program, including frequency and location, and modify if necessary. 4. Develop and implement impact mitigation and remediation measures in consultation with BCD and DAWE. 5. Develop a monitoring plan to determine the success of mitigation / remediation measures. 6. If mitigation / Remediation measures are unsuccessful or not feasible, determine whether offsets will be required. An offset strategy/offset management plan will be developed in consultation with BCD and DAWE. 7. Report in annual reviews and six monthly reports to inform relevant agencies of results of monitoring.	1. BCD, and DAWE notified of potential impact within one week of impact being identified. 2. Investigation initiated within one week of impact being identified. 3. Investigation results reported to BCD and DAWE within one week of completion. 4. Monitoring plan reviewed within one week of impact being identified. 5. Commence preparation of mitigation/ action and monitoring plan within one week of impact being identified, if required. 6. Monthly updates of investigation progress to BCD and DAWE, if required. 7. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Upland Swamp Monitoring Plan	Giant Dragonfly monitoring	BCUS4 CCUS1 CCUS4 CCUS5 CCUS10 CRUS1	Number of exuviae recorded within a 1.5 m wide belt transect of variable length through suitable habitat. Sex, height above ground level, perch plant species, and distance to burrow (if identified) and seepage water will be recorded for all exuviae sighted. Exuviae will then be removed	A minimum of one year baseline data collection before any mining under the swamp. Monitoring annually during mining. A minimum of one year post mining monitoring at coastal upland swamps showing negligible impacts (level 1). Surveys are undertaken in summer with two replicates per year.	To determine if the project results in changes to Giant Dragonfly breeding within coastal upland swamps exceeding negligible levels.	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring. Report negligible impact in six monthly reports.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Level 2: Decline in exuviae numbers observed when compared to control sites. Decline is one year duration, and in the absence of changes in other parameters	1. Continue monitoring. 2. Review frequency and location of monitoring and determine if additional monitoring is required.	1. Six monthly reporting in accordance with Extraction Plan approval. 2. Monitoring plan reviewed within one month of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Decline in exuviae numbers observed when compared to control sites. Decline is for greater than one year duration, in conjunction with declines in soil moisture or piezometer data as available.	1. Engage ecologist to investigate and report on the cause of trigger exceedances and advise of potential impacts. Inform BCD and DAWE of investigation outcomes. Review monitoring program, including frequency and location, and modify if necessary. Develop and implement impact mitigation and remediation measures in consultation with BCD and DAWE. 2. Develop a monitoring plan to determine the success of mitigation/ remediation measures. If mitigation/ Remediation measures are unsuccessful or not feasible, determine whether offsets will be required. An offset strategy/offset management plan will be developed in consultation with BCD and DAWE. Report in annual reviews and six monthly reports to inform relevant agencies of results of monitoring.	1. BCD, and DAWE notified of potential impact within one week of impact being identified. Investigation initiated within one week of impact being identified. Investigation results reported to BCD and DAWE within one week of completion. Monitoring plan reviewed within one week of impact being identified. 2. Commence preparation of mitigation/ action and monitoring plan within one week of impact being identified, if required. 3. Monthly updates of investigation progress to BCD and DAWE, if required. 4. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Upland Swamp Monitoring Plan	Swamps within EP Area	Coastal upland swamp extent size and sub-community composition is mapped using LiDAR and field inspection.	TSR and species composition	One baseline survey prior to mining. Not required during mining. If greater than negligible impacts are identified through other monitoring	To determine if the project results in changes to upland swamp extent or sub-community composition within coastal upland swamps exceeding negligible levels.	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring. Report negligible impact in six monthly reports.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Within prediction: (Level 2) Minor change in swamp extent or sub-community composition within a coastal upland swamp. One year of decline in swamp extent or change in community composition greater than the mean (±SE) decline of the control group, taking into account any differences in variation between control and impact groups	1. Continue monitoring. 2. Review frequency and location of monitoring and determine if additional monitoring is required. Report potential impact in six monthly reports.	1. Six monthly reporting in accordance with Extraction Plan approval Monitoring plan reviewed within one month of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
				methods, e.g. subsidence, peizometer or vegetation transect monitoring, additional LiDAR surveys will be undertaken at 2 to 5 year intervals.		Level 3: Trending reduction in swamp extent or sub-community composition within an upland swamp. A multi-year of decline in swamp extent or change in community composition greater than the mean (±SE) decline of the control group, taking into account any differences in variation between control and impact sites.	1. Engage ecologist to investigate and report on the cause of trigger exceedances and advise of potential impacts. 2. Inform BCD and DAWE of investigation outcomes. 3. Review monitoring program, including frequency and location, and modify if necessary. 4. Develop and implement impact mitigation and remediation measures in consultation with BCD and DAWE. 5. Develop a monitoring plan to determine the success of mitigation / remediation measures. 6. If mitigation / Remediation measures are unsuccessful or not feasible, determine whether offsets will be required. An offset strategy/offset management plan will be developed in consultation with BCD and DAWE. 7. Report in annual reviews and six monthly reports to inform relevant agencies of results of monitoring.	1. BCD, and DAWE notified of potential impact within one week of impact being identified. 2. Investigation initiated within one week of impact being identified. 3. Investigation results reported to BCD and DAWE within one week of completion. 4. Monitoring plan reviewed within one week of impact being identified. 5. Commence preparation of mitigation/ action and monitoring plan within one week of impact being identified, if required. 6. Monthly updates of investigation progress to BCD and DAWE, if required. 7. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
HERITAGE									
Heritage Management Plan	Aboriginal Heritage	Bulli Mine Shaft 20 (AHIMS 52-3-0311) Bulli Mine Shaft 29 (AHIMS 52-3-0313) Bulli Mine Shaft 26 (AHIMS 52-3-0323) Bulli Mine Shaft 27 (AHIMS 52-3-0325) Wonga East 4 (AHIMS 52-2-4170) Wonga East 5 (AHIMS 52-2-4171)	Baseline recording and comparative photograph monitoring regime.	Baseline archival recording 3 months prior to second workings within 350m of site. Continuous subsidence monitoring using GNSS units within the extraction area. Six monthly monitoring from the commencement of mining within 350m of the site. Final assessment recording within 12-24 months of second workings mining being completed within 350m of site.	To determine if subsidence effects resulting from bord and pillar mining system result in impacts to Aboriginal heritage sites and the heritage values of those sites.	Level 1: No change in site condition observed; and Less than 100mm recorded subsidence	Continue monitoring. Report negligible impact in six monthly reports.	Six monthly reporting	Russell Vale Colliery (Group Environment Manager)
						Level 2: **Change in site condition is observed but the heritage values of the site are not impacted. or** • Greater than 100mm and less than 300mm recorded subsidence; or • Cracking in sandstone platforms or shelter walls/ceilings; or • Movement along existing joints and/or bedding planes; or • Changes to the water seepage patterns or water flow regime through the sandstone.	1. Continue monitoring 2. Increase the review of subsidence monitoring data to weekly 3. Undertake a review of the panel design parameters in consultation with geotechnical advice. 4. Inform DPE, Resources Regulator, Heritage NSW and RAPs of potential impact, and consult on proposed adaptive management and, if required, remediation. 5. Undertake site inspection with RAPs to document and photograph any observed changes / impacts. 6. Investigate potential cause of observed changes in site condition. 7. Where the investigation identifies mining as a likely cause of the changes, consultation and meetings with RAPs to determine the most appropriate mitigation measures and management of the site. 8. Cease operations and implement adaptive management if assessed as a requirement 9. Review the mine plan for future mining areas to avoid impacts to sites potentially impacted by future second workings 10. Report potential impacts in six monthly reports.	1. DPE, Heritage NSW and RAPs informed within one week. 2. Investigations into potential cause of observed changes to be commenced within 2 days of being detected. 3. Six monthly reporting.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
						Level 3: • **Change in site condition is observed, and the heritage values of the site are impacted; or** • Greater than 300mm recorded subsidence.	1. Continue monitoring and increase the review of subsidence monitoring data for that area to daily. 2. Inform DPE, Resources Regulator, Heritage NSW, and RAP of potential impact. 3. Undertake a review of the panel design parameters in consultation with geotechnical advice 4. Undertake site inspection of surface areas to document and photograph any observed changes / impacts. 5. Investigate potential cause of observed changes in site condition. 6. Where the investigation identifies mining as a likely cause of the changes, consultation on potential remediation / mitigation action will be undertaken with Heritage NSW and RAP. 7. Cease mining operations in the impacted area and implement adaptive management and contingency plan. 8. Review the mine plan for future mining areas to avoid impacts to sites potentially impacted by future second workings. 9. Where required, use appropriate specialists to undertake physical remediation activities 10. Report potential impacts in six monthly reports.	1. DPE, Heritage NSW and RAP informed within one week. 2. Investigations into potential cause of observed changes to be commenced within 2 days of being detected. 3. Commence preparation of mitigation/action and monitoring plan within one week (if required). 4. Within 14 days of the exceedance occurring, submit a report to the DPE and Heritage NSW describing the remediation options and any preferred remediation measures of other course of action 5. Six monthly reporting.	Russell Vale Colliery (Group Environment Manager)
Heritage Management Plan	Historical Heritage – Subsidence	Cataract Dam	Subsidence Monitoring LiDAR Visual Inspection GNSS	Impact assessment recording, within six months after each predicted subsidence movement at the site (that is when the bord and pillar mining system is closest traverse to the FSL of Cataract Reservoir). Final assessment recording within 6 months of completion of all subsidence movements at the site.	To determine if subsidence effects resulting from bord and pillar mining system result in impacts to the heritage values of Cataract Dam.	Within prediction (Level 1): No change in site condition observed; and Less than 100mm recorded subsidence.	Continue monitoring. Report negligible impact in six monthly reports	End of panel reporting.	Russell Vale Colliery (Group Environment Manager)
						Within in prediction (Level 2): • Change in site condition is observed, but the heritage values of the site are not impacted; or • Greater than 100mm and less than 300mm recorded subsidence.	**Monitoring and remediation action** 1. Continue monitoring. 2. Increase the review of subsidence monitoring data to weekly to determine if changes are persistent. 3. Undertake a review of the panel design parameters in consultation with geotechnical advice 4. Inform DPE and Heritage NSW of potential impact. 5. Undertake site inspection of surface area to document and photograph any observed changes / impacts. 6. Investigate potential cause of observed changes in site condition. Where investigation identifies minign as a potential cause, review mine planning for future minig areas to avoid further impacts. 7. Report potential impacts in six monthly reports.	1. DPE and Heritage NSW and informed within one week. 2. Investigations into potential cause of observed changes to be commenced within 2 days of being detected. 3. Six monthly reporting.	Russell Vale Colliery (Group Environment Manager)
						Exceeding prediction (Level 3): • Change in site condition is observed, and the heritage values of the site are impacted; or • Greater than 300mm recorded subsidence.	Monitoring and remediation action 1. Continue monitoring and increase the review of subsidence monitoring data for that area to daily to monitor trends. 2. Stop mining in the impacted area and investigate causes of the increased subsidence 3. Undertake a review of the panel design parameters in consultation with geotechnical advice	1. DPE and Heritage NSW and informed within one week. 2. Investigations into potential cause of observed changes to be commenced within 2 days of being detected. 3. Commence preparation of mitigation/action and monitoring plan within one week (if required).	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
							4. Inform DPE and Heritage NSW of potential impact. 5. Implement adaptive management and contingency plan 6. Undertake site inspection of surface area to document and photograph any observed changes / impacts. 7. Investigate potential cause of observed changes in site condition. 8. Where the investigation identifies mining as a likely cause of the changes, consultation on potential remediation/mitigation works will be conducted with Heritage NSW. 9. Review mine planning for future mining areas to avoid further impacts 10. Where required, use appropriate specialists to undertake physical remediation activities. 11. Report potential impacts in six monthly reports.	4. Within 14 days of the exceedance occurring, submit a report to the DPE and Heritage NSW describing the remediation options and any preferred remediation measures of other course of action 5. Six monthly reporting.	
LAND									
Land Management Plan	Cliffs, Steep Slopes, Rocky Outcrops	All land features present within EP Area as outlined within the LMP.	Visual Monitoring of EP Area Stage 1a Stage 1b Stage 2	Monitoring of key landscape features prior to, during and post mining for any potential impacts will be undertaken.	To determine if subsidence effects resulting from bord and pillar mining system result in impacts to land features.	Level 1: No exceedance of Level 2 or Level 3 triggers	Continue monitoring. Report negligible impact in six monthly reports.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Level 2: Change in land features condition is observed LiDAR	1. Continue monitoring. 2. Inform DPE and WaterNSW of potential impact. 3. Undertake site inspection to document and photograph any observed changes/impacts. 4. Report potential impacts in six monthly reports.	1. DPE and WaterNSW informed within one week. 2. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Change in land features condition is observed, and impact greater than predicted occurs. LiDAR	1. Continue monitoring. 2. Submit an incident report to DAWE, DPE and WaterNSW of potential impact. 3. Undertake site inspection to document and photograph any observed changes/impacts. 4. Discussion of potential remediation/ mitigation. Consultation with relevant stakeholders will be required if remediation or mitigation measures are required. 5. Use appropriate specialists to undertake physical remediation activities. 6. Report potential impacts in six monthly reports.	1. DPE and WaterNSW are informed immediately. 2. DAWE to be notified within 48 hours. 3. Commence preparation of mitigation/action and monitoring plan within one week (if required). 4. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
SUBSIDENCE									
Subsidence	Vertical Subsidence	Surface terrain (non-swamp monitoring points	Millimetres	GNSS units and LiDAR	To determine the level of subsidence effects resulting from bord and pillar mining system.	<100 mm	Continue to monitor trends	Six monthly reporting in accordance with Extraction Plan approval.	Group Environment Manager Environmental Monitoring Team Nominated Mining Surveyor
						>100 mm, <250 mm	1. Group Environment Manager to inform subsidence specialist within 24hrs 2. Continue to monitor trends	1. DPE and WaterNSW informed within one week. 2. Six monthly reporting in accordance with Extraction Plan approval.	Group Environment Manager Environmental Monitoring Team Nominated Mining Surveyor
						>250 mm,	1. Group Environment Manager to inform Subsidence specialist within 24hrs 2. Subsidence specialist to assess and provide advice on potential impacts and actions required including any adaptive management measures, recognising the performance measure of 300 mm.	1. DPE and WaterNSW and informed immediately and DAWE within 48 hours. 2. Commence preparation of mitigation/action and monitoring plan within one week (if required). 3. Six monthly reporting in accordance with Extraction Plan approval.	Group Environment Manager Environmental Monitoring Team Nominated Mining Surveyor
Subsidence	Closure	Valley Closure – Cataract Creek CC1-CC4	Millimetres	**GNSS** Point to Point Survey measurement across Cataract Creek	To determine the level of subsidence effects resulting from bord and pillar mining system.	<100 mm	Continue to monitor trends	Six monthly reporting in accordance with Extraction Plan approval.	Group Environment Manager Environmental Monitoring Team Nominated Mining Surveyor
						>100 mm, <150 mm	1. Group Environment Manager to inform subsidence specialist within 24hrs 2. Continue to monitor trends	1. DPE and WaterNSW informed within one week. 2. Six monthly reporting in accordance with Extraction Plan approval.	Group Environment Manager Environmental Monitoring Team Nominated Mining Surveyor
						>150 mm,	1. Group Environment Manager to inform Subsidence specialist within 24hrs - Subsidence specialist to assess and provide advice on potential impacts and actions required including any adaptive management measures.	1. Immediately notify DPE and DAWE.	Group Environment Manager Environmental Monitoring Team Nominated Mining Surveyor
Subsidence	Vertical Subsidence (Stage 1 Upland Swamps (Direct GNSS monitoring) CCUS1	GNSS#1 GNSS#2 GNSS#3	mm (vertical subsidence)	Daily (weekly Average)	Monitor levels of vertical subsidence	**Level 1** No exceedance of Level 2 or Level 3 triggers. (< 50mm or 100mm at GNSS#1)	Continue monitoring.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
		CCUS4 CCUS5	GNSS#13 GNSS#11			**Level 2:** >50 mm observed subsidence at all GNSS other than GNSS#1 >100 mm at GNSS#1	1. Review potential cause 2. Determine need for any changes to mine plan or mining method. 3. Review subsidence predictions. 4. Continue monitoring. 5. Review frequency and location of monitoring and determine if additional monitoring is required. 6. Report potential impact in six monthly reports.	1. Six monthly reporting in accordance with Extraction Plan approval 2. USMP Monitoring plan reviewed within one month of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)
		CRUS1 CCUS15 CCUS17 CCUS18 CCUS19	GNSS#12 GNSS#14			Level 3: >100 mm observed subsidence at GNSS (other than GNSS#1 – no Level 3 swamp trigger for GNSS#1)	1. Immediately cease operations in any near active mining areas. 2. Inform DPE and DAWE of performance criteria exceedance1 3. Investigate cause of potential exceedance. 4. Revise underground mine plan/mining methods (if necessary).	1. BCD, and DAWE notified of potential impact within 24 hours of impact being identified. 2. Investigation of cause initiated within 24 hours week of impact being identified. 3. Investigation results reported to BCD and DAWE within one week of completion.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
							5. Inspect areas of swamp to identify any material surface impacts including slumping or surface cracking. Develop and implement impact mitigation and remediation measures in consultation with BCD, WaterNSW and DAWE. 6. Review need for more frequent monitoring of groundwater and biodiversity features within affected swamp. 7. Report in annual reviews and six monthly reports to inform relevant agencies of results of monitoring.	4. Groundwater and biodiversity monitoring plan for affected swamp reviewed within one week of impact being identified. 5. Commence preparation of mitigation/ action and monitoring plan within one week of impact being identified (if required). 6. Monthly updates of investigation progress to BCD and DAWE, if required. 7. Six monthly reporting in accordance with Extraction Plan approval.	
Subsidence	Vertical Subsidence - Upland Swamps (Stage 1 Indirect GNSS Monitoring) CCUS2	GNSS#3 GNSS#15 Underground observations in PC07 and PC08	mm (vertical subsidence)	Daily (weekly Average)	Monitor levels of vertical subsidence	**Level 1** No exceedance of Level 2 or Level 3 triggers. (< 50mm)	Continue monitoring.	Reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
	CCUS20	GNSS#1 GNSS#2 Underground Observations in PC08 LiDAR				**Level 2:** >50mm observed subsidence at GNSS#14 and GNSS#15; or >80mm observed at GNSS#2 and GNSS#3; or >100mm at GNSS#1	1. Review potential cause and need for any changes to mine plan or mining method. 2. Review subsidence predictions. 3. Continue monitoring. Review frequency and location of monitoring and determine if additional monitoring is required.	1. Reporting in accordance with Extraction Plan approval Monitoring plan reviewed within one month of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)
	CRUS3	GNSS#14 GNSS#15 Underground observations in PC07 and PC08				**Level 3:** Strata failure in second workings within 250m of swamp. > 100mm subsidence observed in LiDAR relative to pre-mining baseline (validated through underground monitoring or GNSS).	1. Immediately cease operations in any near active mining areas. 2. Inform DPE and DAWE of performance criteria exceedance 3. Investigate cause of strata failure. 4. Revise underground mine plan/mining methods (if necessary). 5. Inspect areas of swamp to identify any material surface impacts including slumping or surface cracking. Develop and implement impact mitigation and remediation measures in consultation with BCD, WaterNSW and DAWE. 6. Undertake LiDAR Survey to investigate where subsidence performance criteria exceeded. 7. Review need for more frequent monitoring of groundwater and biodiversity features within affected swamp.	1. BCD, and DAWE notified of potential impact within 24 hours of impact being identified. 2. Investigation of cause initiated within 24 hours week of impact being identified. 3. Investigation results reported to BCD and DAWE within one week of completion. 4. Groundwater and biodiversity monitoring plan for affected swamp reviewed within one week of impact being identified. 5. Undertake LiDAR survey of potentially affected area at soonest reasonable opportunity. 6. Commence preparation of mitigation/ action and monitoring plan within one week of impact being identified (if required). 7. Monthly updates of investigation progress to BCD and DAWE, if required. 8. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Subsidence	Vertical Subsidence - Upland	Adjacent GNSS units	mm (vertical subsidence)	Daily (weekly Average)	Monitor levels of vertical subsidence	**Level 1** No exceedance of Level 2 or Level 3 triggers. (< 50mm)	Continue monitoring.	Reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
	Swamps (Stage 2 Direct GNSS Monitoring) BCUS4 BCUS6 BCUS7 BCUS11 CCUS4 CCUS5 CCUS9 CCUS10 CCUS11 CCUS12 CCUS13 CCUS24 CRUS6 CRUS7					**Level 2:** >50mm observed subsidence at adjacent GNSS units	1. Review potential cause. 2. Determine need for any changes to mine plan or mining method. 3. Review subsidence predictions. 4. Continue monitoring. Review frequency and location of monitoring and determine if additional monitoring is required.	1. Reporting in accordance with Extraction Plan approval USMP reviewed within one month of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)
						Level 3: >100 mm observed subsidence at adjacent GNSS units Strata failure observed underground in workings within 350 m of swamp extent LiDAR survey results indicate >100 mm subsidence relative to pre-mining data (validated through underground monitoring or GNSS)	1. Immediately cease operations in any near active mining areas. 2. Inform DPE and DAWE of performance criteria exceedance 3. Investigate cause of strata failure. 4. Revise underground mine plan/mining methods (if necessary). 5. Inspect areas of swamp to identify any material surface impacts including slumping or surface cracking. Develop and implement impact mitigation and remediation measures in consultation with BCD, WaterNSW and DAWE. 6. Undertake LiDAR Survey to investigate where subsidence performance criteria exceeded. 7. Review need for more frequent monitoring of groundwater and biodiversity features within affected swamp.	1. BCD, and DAWE notified of potential impact within 24 hours of impact being identified. 2. Investigation of cause initiated within 24 hours week of impact being identified. 3. Investigation results reported to BCD and DAWE within one week of completion. 4. Groundwater and biodiversity monitoring plan for affected swamp reviewed within one week of impact being identified. 5. Undertake LiDAR survey of potentially affected area at soonest reasonable opportunity. 6. Commence preparation of mitigation/ action and monitoring plan within one week of impact being identified (if required). 7. Monthly updates of investigation progress to BCD and DAWE, if required. 8. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
Subsidence	Vertical Subsidence - Upland Swamps (Stage 2 Indirect GNSS Monitoring) BCUS2 BCUS3 BCUS5 BCUS8 BCUS9 BCUS14 BCUS15 BCUS16 CCUS16 CCUS22	Nearest GNSS units	mm (vertical subsidence)	Daily (weekly Average)	Monitor levels of vertical subsidence	**Level 1** No exceedance of Level 2 or Level 3 triggers. (< 50mm)	Continue monitoring.	Reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Level 2: >50mm observed subsidence at nearest GNSS units	1. Review potential cause. 2. Determine need for any changes to mine plan or mining method. 3. Review subsidence predictions. 4. Continue monitoring. Review frequency and location of monitoring and determine if additional monitoring is required.	1. Reporting in accordance with Extraction Plan approval USMP reviewed within one month of potential impact being identified.	Russell Vale Colliery (Group Environment Manager)
						Level 3: >100 mm observed subsidence at nearest GNSS units Strata failure observed underground in workings within 350 m of swamp extent LiDAR survey results indicate >100 mm subsidence relative to pre-mining data (validated through underground monitoring or GNSS)	1. Immediately cease operations in any near active mining areas. 2. Inform DPE and DAWE of performance criteria exceedance 3. Investigate cause of strata failure. 4. Revise underground mine plan/mining methods (if necessary). 5. Inspect areas of swamp to identify any material surface impacts including slumping or surface cracking. Develop and implement impact mitigation and remediation measures in consultation with BCD, WaterNSW and DAWE. 6. Undertake LiDAR Survey to investigate where subsidence performance criteria exceeded. 7. Review need for more frequent monitoring of groundwater and	1. BCD, and DAWE notified of potential impact within 24 hours of impact being identified. 2. Investigation of cause initiated within 24 hours week of impact being identified. 3. Investigation results reported to BCD and DAWE within one week of completion. 4. Groundwater and biodiversity monitoring plan for affected swamp reviewed within one week of impact being identified. 5. Undertake LiDAR survey of potentially affected area at soonest reasonable opportunity. 6. Commence preparation of mitigation/ action and monitoring plan within one week	Russell Vale Colliery (Group Environment Manager)

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
							biodiversity features within affected swamp.	of impact being identified (if required). 7. Monthly updates of investigation progress to BCD and DAWE, if required. 8. Six monthly reporting in accordance with Extraction Plan approval.	
Subsidence	Roof Rib Pillar Surface	Underground	Ingress of water Failure of rib in roadway Onset of floor heave in outbye Pillar creep Surface subsidence monitoring	Daily / Weekly	Monitor of underground conditions	**Level 1** Continuous application of SMP parameters to the mine plan design including pillar and roadway dimension.	Continuous review of GNSS subsidence monitoring data against alarm triggers (as described above). Review of LIDAR as it becomes available. Weekly review of subsidence data and roadway conditions via Strata committee. Daily recording of underground strata observations.	Weekly WCL strata management team meeiting.	Control Room Operator • Monitor GNSS for alarms. Geotechnical engineer • Attend weekly strata review. • Weekly review of underground roadway mining shift condition reports. • Mapping of underground roadways. Environmental Manager or delegate • Present GNSS data at weekly strata meet. Mining Engineering Manager. • Conduct normal statutory duties Technical Services Manager. • Conduct normal duties
						Level 2 Roof • Sudden ingress of water into workings from roof where roadway was previously dry. Rib • Sudden failure of rib in roadway, outbye of face, for length of roadway (>20m). Pillar • Onset of floor heave in outbye roadway for length of roadway (>20m). Pillar Creep • Pillars formed below 2.11 FOS. Surface • GNSS results identify subsidence >100 mm and <300 mm. • LiDAR results identify abnormal/unexpected subsidence impacts.	Actions as for Level 1. Investigate to determine if any surface subsidence TARP exceedance. Review detailed mine plan including pillar design for forward secondary workings.	Morning WCL meeting. Weekly WCL strata management team meeiting.	Geotechnical engineer • Assist Strata Management Team to investigate, document and respond to underground triggers. • Review of available underground roadway mining shift condition reports. • Control Room Operator • Notify Geotechnical Engineer of underground triggers. • Notify Environmental Manager of GNSS alarm triggers. Mining Engineering Manager. • Assess the need to review current mine plan in consultation with Geotechnical Engineer. Environment Manager or delegate • Respond to triggers when notified by Control Room Operator. • Co-ordinate monitoring of GNSS data relative to area. • Consult with Mine surveyor. • Determine extent and severity of any surface movement and communicate to Technical Services Manager Report to appropriate regulatory bodies where required. Technical Services Manager

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
									• Participate in investigation as required by Mining Engineering Manager.
						Level 3 Roof • Roof fall above bolted horizon in working seam with the entire roadway obstructed by fall material and unable to determine extent of fall. Rib • Failure of rib beyond bolted horizon, outbye of face, for length of roadway (>20m). Pillar • Pillar Failure. Surface • GNSS results identify subsidence >300 mm. • LiDAR results identify abnormal/unexpected subsidence impacts.	• Actions as per Levels 1 and 2. • Carry out immediate review of surface subsidence information to determine if any TARP exceedance. • Review most recent LiDAR information available to identify any abnormal/unexpected subsidence impacts. • Implement outcomes of detailed mine plan review, as necessary (i.e. adaptive management).	Immediately following incident. Morning WCL meeting. Weekly WCL strata management team meeting.	Geotechnical engineer • Assist Strata Management Team to investigate, document and respond to underground triggers. Control Room Operator • Notify Geotechnical Engineer of underground triggers. • Notify Environmental Manager of GNSS alarm triggers. Technical Services Manager • Participate in investigation as required by Mining Engineering Manager. Mining Engineering Manager. • Co-ordinate investigation and response to underground triggers. • Assess the need to review current mine plan in consultation with Geotechnical Engineer. Subsidence Specialist • Participate in investigation as required by Mining Engineering Manager.

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
BUILT FEATURES									
Bult Features	330 kV Transmission Line 11 Dapto to Sydney South and Towers	330KV Single Circuit – Suspension Towers: 54, 55, 56, & 57	Observable surface deformations – **LIDAR** Separation between tower legs – **prism/ point Survey** Vertical subsidence – **GNSS # 5, 6, 7, 17** Tilt - **prism/ point Survey**	**Prior to second workings** conduct baseline survey Prism/ point - Survey and GNSS continuous reading prior to second workings **During second workings within 350m of sites** Prism/ point - Survey After each panel or annual or by TARP trigger and LIDAR – Quarterly and GNSS - continuous During mining over active secondary extraction area GNSS data reviewed weekly Monthly in all other areas, or as required by TARP trigger. **Post mining** 12 months after completion of each panel.	To determine if subsidence effects resulting from pillar and bord mining system result in impacts to built features	**Observations within predictions.**			
						Continuous Monitoring • <20 mm vertical subsidence (GNSS) **Attended Survey** • No observable surface deformations; and • <5 mm leg vertical differential; and • Tilt <1 mm/m.	Data and report to: • TransGrid • RR subsidence portal	Within 1 week following collection & processing of data, document report quarterly during secondary extraction.	Russell Vale Colliery (Group Environment Manager) Survey Manager
						Observations potentially exceed predictions.			
						Continuous Monitoring • Vertical subsidence >20 mm (GNSS) **Attended Survey** • Observable surface deformations and/or • Separation between tower legs (10 to 20 mm); or • Tilt >1mm/m	1. Notify the following key stakeholders within 24hours of becoming aware of the trigger: • TransGrid • Principal Subsidence Engineer RR. 2. Continue consultation with TransGrid	1. Notify the Key Stakeholders, as appropriate, within 24hrs of becoming aware of the trigger:	Russell Vale Colliery (Group Environment Manager) Survey Manager
						Observations continue to exceed predictions.			
						Continuous Monitoring • Vertical subsidence greater than predicted maximum (Upper 95% CL – identified as 100mm) **Attended Survey** • Observable surface deformations or • Separation between tower legs (>20mm) • Tilt >1 mm/m	1. Notify the following Key Stakeholders, as appropriate: - TransGrid - Principal Subsidence Engineer RR. 2. Implement adaptive management and contingency measures e.g. a. Confirm readings b. Cease underground mining immediately and review mining options. c. Undertake additional 3D survey and check against pre-mining data and review against predictions; d. TransGrid and RVC to undertake joint visual inspections accordingly; e. Liaise with TransGrid regarding any action/s required. f. RVC to review mine planning for future mining areas to avoid further impacts.	1. Notify the Key Stakeholders, as appropriate, immediately following awareness of trigger being met.	Russell Vale Colliery (Group Environment Manager) Survey Manager
Built Features	132 kV Transmission Line 132 kV Single Circuit – Tower No. E66 to E69	132 kV Single Circuit – Tower No E66 to E69	Observable surface deformations – **LIDAR** Vertical subsidence - **GNSS** Tilt **– prism/ point Survey** Separation between tower legs – prism/point survey	**Prior to second workings** conduct baseline survey Prism/ point – Survey and GNSS continuous reading prior to second workings **During second workings** within 350m of sites Prism/ point - Survey After each panel or annual or by TARP trigger and LIDAR – Quarterly and GNSS - continuous During mining over active secondary extraction area GNSS data reviewed weekly	To determine if subsidence effects resulting from pilar and bord mining system result in impacts to built features	**Observations within predictions**			
						GNSS Unit • <20 mm vertical subsidence **Attended Survey** • No observable surface deformations; and • <5 mm leg vertical differential and • Tilt <1 mm/m.	Data and report to: • Endeavour Energy • RR subsidence portal	Within 1 week following collection and processing of data, document and report quarterly during secondary extraction.	Russell Vale Colliery (Group Environment Manager) Survey Manager
						Observations potentially exceed predictions			
						GNSS Unit • vertical subsidence > 20 mm **Attended Survey** • Observable surface deformations; or • Tilt >1 mm/m or • Separation between tower legs (10 to 20 mm)	1. Notify the following key stakeholders within 24hours of becoming aware of the trigger: - Endeavour Energy - Principal Subsidence Engineer RR. 2. Continue consultation with Endeavour Energy. 3. Continue monitoring and increase the review of subsidence monitoring data to weekly. 4. Undertake a review of the panel design parameters in consultation with Geotechnical advice. 5. Inform key stakeholders of potential impact. 6. Undertake site inspection of surface area to document and photograph any observed changes / impacts. 7. Carry out attended survey.	1. Notify the Key Stakeholders, as appropriate, within 24hrs of becoming aware of the trigger.	Russell Vale Colliery (Group Environment Manager) Survey Manager

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
				Monthly in all other areas, or as required by TARP trigger. **Post mining** - 12 months after completion of each panel.			8. Investigate potential cause of observed changes in site condition and, if identified as potential caused by mining, review mining geometry until relative movement is controlled.		
						Observations continue to exceed predictions.			
						GNSS Unit • Subsidence greater than 100 mm (>100 mm) **Attended Survey (132 kV Towers)** • Observable surface deformations or • Separation between tower legs (>20mm) or • Subsidence greater than predicted maximum (Upper 95% CL – identified as 100 mm)	1. Notify the following Key Stakeholders, as appropriate: • Endeavour Energy • Principal Subsidence Engineer RR. **Monitoring and remediation action** 1. Implement adaptive management and contingency measures e.g. • Confirm readings. • Continue monitoring and increase the review of subsidence monitoring data for that area to daily. • Stop mining in the impacted area and investigate causes of the increased subsidence. • Undertake a review of the panel design parameters in consultation with Geotechnical advice. • Contact Endeavour Energy to undertake joint site inspection of surface area to document and photograph any observed changes/impacts. 2. Investigate potential cause of observed changes in site condition. Where the investigation identifies mining as a likely cause of the changes: • RVC to review mine planning for future mining areas to avoid further impacts. • Liaise with Endeavour Energy regarding any action/s required.	1. Notify the Key Stakeholders, as appropriate, **immediately following awareness** of trigger being met.	Russell Vale Colliery (Group Environment Manager) Survey Manager
Built Features	33 kV Transmission Line 33KV pylons within span between 132 kV tower E66-E69	33 kV pylons within span between 132 kV tower E66-E69	Observable surface deformations – **LIDAR** Vertical subsidence – **GNSS #31, #32** Tilt **– prism/ point Survey**	**Prior to second workings** • conduct baseline survey Prism/ point – Survey and • GNSS continuous reading prior to second workings **During second workings within 350m of sites** • Prism/ point - Survey After each panel or annual or by TARP trigger and	To determine if subsidence effects resulting from pilar and bord mining system result in impacts to built features	**Observations within predictions**			
						GNSS Unit • <50 mm vertical subsidence **Attended Survey** • No observable surface deformations; and/or • Tilt <1 mm/m.	Data and report to: • Endeavour Energy • RR subsidence portal.	Within 1 week following collection and processing of data, document and report quarterly during secondary extraction.	Russell Vale Colliery (Group Environment Manager) Survey Manager
						Observations potentially exceed predictions			
						GNSS Unit • vertical subsidence > 50 mm **Attended Survey** • Observable surface deformations; and/or • Tilt >1 mm/m	1. Notify the following key stakeholders within 24hours of becoming aware of the trigger: - Endeavour Energy - Principal Subsidence Engineer RR. 2. Continue consultation with Endeavour Energy. 3. Continue monitoring and increase the review of subsidence monitoring data to weekly. 4. Undertake a review of the panel design parameters in consultation with Geotechnical advice. 5. Inform key stakeholders of potential impact.	1. Notify the Key Stakeholders, as appropriate, within 24hrs of becoming aware of the trigger.	Russell Vale Colliery (Group Environment Manager) Survey Manager

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
				• LIDAR – Quarterly and • GNSS - continuous During mining over active secondary extraction area GNSS data reviewed weekly Monthly in all other areas, or as required by TARP trigger. **Post mining** • 12 months after completion of each panel.			6. Undertake site inspection of surface area to document and photograph any observed changes / impacts. 7. Carry out attended survey. 8. Investigate potential cause of observed changes in site condition and, if identified as potential caused by mining, review mining geometry until relative movement is controlled.		
						Observations continue to exceed predictions.			
						GNSS Unit • Subsidence greater than 100mm (> 100 mm) **Attended Survey** • Observable surface deformations and/or • Subsidence greater than predicted maximum (Upper 95% CL – identified as 100 mm)	1. Notify the following Key Stakeholders, as appropriate: • Endeavour Energy • Principal Subsidence Engineer RR. **Monitoring and remediation action** 1. Implement adaptive management and contingency measures e.g. • Confirm readings. • Continue monitoring and increase the review of subsidence monitoring data for that area to daily. • Stop mining in the impacted area and investigate causes of the increased subsidence. • Undertake a review of the panel design parameters in consultation with Geotechnical advice. • Contact Endeavour Energy to undertake joint site inspection of surface area to document and photograph any observed changes/impacts. 2. Investigate potential cause of observed changes in site condition. Where the investigation identifies mining as a likely cause of the changes: • RVC to review mine planning for future mining areas to avoid further impacts. • Liaise with Endeavour Energy regarding any action/s required.	1. Notify the Key Stakeholders, as appropriate, **immediately following awareness** of trigger being met.	Russell Vale Colliery (Group Environment Manager) Survey Manager
Built Features	**Mt Ousley Rd** Carriageway General Carriageway– Cataract Creek (100m) Carriageway- Mt Ousley Road – tension zone at ridge (P46)	**GNSS** GNSS 1, 2, 8, 14, 16 **Crackmeter** Across slot on each carriageway **Drive-through inspections** At traffic speed by TfNSW **Surveys** CC1-CC4 Q-Line Tension crack monitoring (SXC1 – SXC2, SXC3 – SXC4 and QCN – QCS,	**GNSS** Vertical subsidence monitoring (real time) GNSS 1, 2, 8, 14, 16) Valley closure at Cataract Creek based on relative horizontal movement between GNSS 1<->8 and 2<->8 Ground movement at tension zone based on relative horizontal movement between GNSS 14 <->16 and 2<->16 **Crackmeter** Slot closure on southbound and	**GNSS and Crackmeter** Real time monitoring Data reviewed weekly during mining over active mining area or as required by TARP trigger or Technical Committee Data reviewed monthly in all other areas, or as required by TARP trigger or Technical Committee **Drive-through inspections** Twice weekly	To determine if subsidence effects resulting from pilar and bord mining system result in impacts to built features	**Observations within predictions**			
						GNSS • Vertical subsidence at GNSS 1, 2, 8, 14, 16, not greater than 50mm • Valley Closure between GNSS 1<->8, 2<->8, relative horizontal movement not greater than 30mm • Ground Movement between GNSS 14<->16 and 2<->16, relative horizontal movement not greater than 30mm **Crackmeter:** • Closure not greater than 30mm **Survey** • Quarterly CC1-CC4 or as determined by Technical Committee **Drive through survey:** • No reports of potential or actual mining related damage to TfNSW infrastructure	Continue to monitor as per monitoring plan	Ongoing	WCL
						Observations potentially exceed predictions			
						GNSS • Vertical subsidence at GNSS 1, 2, 8, 14, 16, >50mm, not greater than 100mm	**GNSS 1,2,8,14,16 (subsidence)** • Carry out Q-Line survey • Carry out CC1-CC4 survey **GNSS 1<->8 and 2<->8**	**Q-Line Survey** • Within 7 days **CC1-CC4 Survey** • Within 7 days	**WCL** • Q-Line Survey • CC1-CC4 Survey • Visual road inspection

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
			northbound carriageway **Drive-through inspections** TfNSW to report on new defects and comment on possible repairs required **Surveys** CC1-CC4 Valley closure at Cataract Creek Q-Line General subsidence and strain along southbound carriageway Tension crack monitoring for relative movement between monitoring points	**Surveys** CC1-CC4 quarterly or as determined by Technical Committee Q-line survey after amber trigger and then as determined by Technical Committee Tension crack monitoring after amber trigger and then as determined by Technical Committee		• Valley closure at GNSS 1<->8 and 2<->8 Relative horizontal movement between units > 30mm but not greater than 100 mm • GNSS 14<->16 and 2<->16 Relative horizontal movement between units > 30mm but not greater than 100 mm. **Crackmeter:** • >30mm, not greater than 100mm closure. **Drive through inspections:** • Reports of potential mining related damage to TfNSW infrastructure.	• Carry out Q-Line survey • Carry out CC1-CC4 survey • Carry out visual road inspection **GNSS 14<->16 and 2<->16** • Carry out SXC1 – SXC2, SXC3 – SXC4 and QCN – QCS survey • Carry out visual road inspection **Crackmeter** • Carry out Q-Line survey • Carry out CC1-CC4 survey • Carry out visual road inspection **Drive through inspections** • Inspect and determine cause of damage **General** • Review underground mining • Review results of Q-Line/CC1-CC4/Tension Crack monitoring surveys • Commence investigation into potential red trigger exceedance • Check slot closure and consider re-cutting slot. • Technical Committee to meet to review monitoring data to decide on and to direct proactive action.	**Visual road inspection** • Within 7 days **SXC1-SXC2, SXC3 – SXC4 and QCN – QCS Survey** • Within 7 days **Drive-through inspections:** • In accordance with TfNSW protocols **General** • Inform the Technical Committee within 7 days • Investigation commences immediately • Notify DPE of potential exceedance.	• SXC1-SXC2, SXC3 – SXC4 and QCN – QCS Survey • General **TfNSW** • Visual road inspection
						Observations continue to exceed predictions			
						GNSS 1,2,8,14,16 • Vertical subsidence greater than 100mm **GNSS 1<->8 and 2<->8** • Relative horizontal movement between units greater than 100 mm. **GNSS 14<->16 and 2<->16** • Relative horizontal movement between units greater than 100 mm. **Crackmeter:** • Greater than 100mm closure. **Drive through inspections:** • Reports of actual mining related damage to TfNSW infrastructure.	Implement adaptive management and contingency measures e.g • Stop mining and review mining options • TfNSW to inspect pavement • TfNSW to notify Traffic commander via TMC to enforce immediate speed restriction – enforced by traffic commander and NSW police • Carry out surveys and inspections as for amber trigger • Commence investigation into exceedance • TFNSW TC to meet to review monitoring data to decide on and to direct proactive action • WCL and TfNSW to undertake visual inspections if safe to do so.	• TfNSW pavement inspection and traffic commander notification within 2 hours • Inform the Technical Committee within 24 hours • Investigation commence immediately • Notify DPE within 48 hours • Notify RR with written confirmation within 48 hours.	WCL
Built Features	**Bridges** Picton Rd interchange - B7926 Steel Arch over Rocky Creek Culvert – B7932 Culvert over Cataract River – B814	**GNSS** GNSS 16 **Drive-through inspections** At speed by TfNSW. **Prism survey** Existing monitoring prisms on Picton Rd bridge. **Visual bridge inspection** By TfNSW certified engineer	**GNSS** Absolute horizontal ground movement **Drive-through inspections** TfNSW to report on new defects, and comment on possible causes and action. **Prism Survey** Prism X, Y, Z movements distance as measured between any pair of prisms.	**GNSS** Real time monitoring GNSS data reviewed weekly during mining over active mining area or as required by TARP trigger or Technical Committee. Data reviewed monthly in all other areas, or as required by TARP trigger or Technical Committee.	To determine if subsidence effects resulting from pilar and bord mining system result in impacts to built features	**Observations within predictions**			
						GNSS16 • Absolute horizontal ground movements no greater than 30mm. **Drive through survey:** • No reports of potential or actual mining related damage to TfNSW infrastructure	Continue to monitor as per monitoring plan	Ongoing	WCL
						Observations potentially exceed predictions			
						GNSS 16 • Total horizonal movement greater than 30mm. **Drive-through inspections:** • Report of potential or actual mining related damage to bridge.	**GNSS 16** • Carry out prism survey of the bridge • Carry out visual bridge inspection **Drive-through inspections:** • TfNSW to report on new defects and comment on possible causes and action. **General** • Review underground mining • Bridge Engineer to review prism survey results and bridge inspection report and assess impacts on bridge.	**Prism survey of bridge** • Within 7 days **Visual bridge inspection** • Within 7 days **Drive-through inspections:** • In accordance with TfNSW protocols **General** • Inform the Technical Committee within 7 days noting trigger actions	**WCL** • Undertake survey and visual bridge inspection with specialists as required **TfNSW** • Review specialistsreports and/or survey outcomes as required

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
			Visual bridge inspection General condition of bridge.	**Drive-through inspections** Twice weekly. **Prism Survey** After amber trigger and then as determined by Technical Committee. **Visual bridge inspection** After amber trigger and then as determined by Technical Committee.			• Commence investigation into potential red trigger exceedance. • Technical Committee to meet to review monitoring data to decide on and to direct proactive action • WCL and TfNSW to undertake visual inspections.	• Investigation commences immediately • Notify DPE of potential exceedance.	
						Observations continue to exceed predictions			
						• Structural defects noticeable. • Advice from bridge engineer that bridge has become unsafe or is in an unserviceable condition.	Implement adaptive management and contingency measures e.g. • Stop mining and review mining options • TfNSW/bridge specialist to inspect bridge • TfNSW to notify Traffic commander via TMC to enforce bridge and road closure – enforced by traffic commander and NSW police Commence investigation into exceedance • Technical Committee to meet to review monitoring data to decide on and to direct proactive action • WCL and TfNSW to undertake visual inspections.	• TfNSW/bridge specialist inspection and traffic commander notification within 2 hours • Inform the Technical Committee within 24 hours • Investigation commences immediately • Notify DPE within 48 hours • Notify RR with written confirmation within 48 hours.	**WCL** • Engage bridge specialist for inspection and review **TfNSW** • Inspection and Engineering review with specialist
Built Features	**Culverts** Cataract Creek Culverts Multiple Culverts	**GNSS** GNSS 1, 2, 8 **Crackmeter** Across slot on each carriageway **Culvert prism survey** Existing monitoring prisms on culverts **Survey** CC1- CC4 **Visual inspection** By TfNSW engineer	**GNSS** General vertical subsidence Valley closure at Cataract Creek based on relative movement between GNSS 1<->8 and 2<->8 **Crackmeter** Slot closure on southbound and northbound carriageways **Culvert prism survey** General subsidence along or nearby culverts Deformation of culverts **Survey** Valley closure at CC1-CC4 **Visual inspection** General condition of culvert and any movements at joints	**GNSS** Real time monitoring Data reviewed weekly during mining over active mining area Data reviewed monthly in all other areas, or as required by TARP trigger **Crackmeter** Real time monitoring. Data reviewed weekly during mining over active mining area or as required by TARP trigger or Technical Committee Data reviewed monthly in all other areas, or as required by TARP trigger or Technical Committee **Culvert prism survey** After amber trigger and then as determined by Technical Committee **Survey**	To determine if subsidence effects resulting from pilar and bord mining system result in impacts to built features	**Observations within predictions**			
						GNSS 1,2,8 • Vertical subsidence not greater than 100mm **GNSS 1<->8, 2<->8** • Relative horizontal movement between units not greater than 30mm. **Crackmeter:** • Closure not greater than 30mm closure. **Drive-through inspections:** • No reports of potential or actual mining related damage to TfNSW infrastructure.	Continue to monitor as per monitoring plan	Ongoing	WCL
						Observations potentially exceed predictions			
						GNSS 1, 2, 8 • Vertical subsidence > 100mm, not greater than 280mm **GNSS 1<->8 and 2<->8** • Relative horizontal movement between units > 30mm but not greater than 100 mm. **Crackmeter:** • >30mm, not greater than 100mm closure. **Drive-through inspections:** • Reports of potential mining related damage to TfNSW infrastructure.	**GNSS 1, 2, 8** • Carry out prism survey of culvert • Commence CC1-CC4 monitoring • Carry out visual culvert inspection **GNSS 1<->8 and 2<->8** • Carry out prism survey of culvert • Commence CC1-CC4 survey • Carry out visual culvert inspection **Crackmeter:** • Carry out prism survey of culvert • Commence CC1-CC4 survey • Carry out visual culvert inspection **Drive-through inspections:** • Inspect and determine cause of potential damage **General** • Review underground mining • Commence investigation into potential exceedance • Technical Committee to meet to review monitoring data to decide on and to direct proactive action • Consider carrying out deformation analysis on culvert based on culvert prism survey and set upper limit for culvert deformation. • WCL and TfNSW to undertake visual inspections.	**Prism survey of culvert** • Within 7 days **CC1-CC4 Survey** • Within 7 days **Visual culvert inspection** • Within 7 days **Drive-through inspections:** • In accordance with TfNSW protocols **General** • Inform the Technical Committee within 7 days or 14 days noting trigger actions • Investigation commences immediately • Notify DPE of potential exceedance.	**WCL** • Prism survey of culvert • CC1-CC4 Survey • Visual culvert inspection • General **TfNSW** • Carry out visual culvert inspection

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
				Quarterly survey of CC1-CC4 **Visual inspection** After amber trigger and then as determined by Technical Committee		**Observations continue to exceed predictions**			
						GNSS 1,2,8 • Vertical subsidence greater than 280mm **GNSS 1<->8 and 2<->8** • Relative horizontal movement between units greater than 100 mm. **Crackmeter** • Greater than 100mm closure. **Culvert deformation analysis** • Deformation exceeds permissible deformation upper limit. **Drive through survey:** • Reports of significant actual mining related damage to TfNSW infrastructure.	Implement adaptive management and contingency measures e.g. • Stop mining and review mining options. • TfNSW to inspect pavement • TfNSW to notify Traffic commander via TMC to enforce immediate speed restriction – enforced by traffic commander and NSW police • Carry out prism survey of culvert if safe to do so • Commence investigation into exceedance • Technical Committee to meet to review monitoring data to decide on and to direct proactive action • Consider strengthening culvert • WCL and TfNSW to undertake visual inspections if safe to do so.	• TfNSW pavement inspection and traffic commander notification within 2 hours • Inform the Technical Committee within 24 hours • Investigation commences immediately • Notify DPE within 48 hours • Notify RR with written confirmation within 48 hours.	WCL
Built Features	**Slopes** ARL2 – 955771/ 95770/ 13482 ARL3 – 10839/ 13483/ 13484/ 13485	**GNSS** GNSS 1, 2, 8, 14, 16 **Drive-through inspections** At traffic speed by TfNSW. **Visual slope inspection** Inspection by geotechnical engineer.	**GNSS** General vertical subsidence Valley closure at Cataract Creek based on relative movement between: • GNSS 1 <-> 8 and 2 <-> 8 • GNSS 14 <->16 and 2<->16 **Drive-through inspections** TfNSW to report on new defects, and comment on possible repairs required. **Visual slope inspection** Inspection of slope to assess changes from previous condition.	**GNSS** Real time monitoring. Baseline readings measured prior to second workings. Data reviewed weekly during mining over active mining area. Data reviewed monthly in all other areas, or as required by TARP trigger. **Drive-through inspections** Twice weekly. **Visual slope inspection** After amber trigger and then as determined by Technical Committee.	To determine if subsidence effects resulting from pilar and bord mining system result in impacts to built features	**Observations within predictions**			
						GNSS 1,2,8,14,16 • Vertical subsidence <150mm **GNSS 1<->8, 2<->8** • Relative horizontal movement between units not greater than 50mm **GNSS 14<->16 and 2<->16** • Relative horizontal movement between units not greater than 50mm **Drive through survey:** • No reports of potential or actual mining related damage to TfNSW infrastructure.	Continue to monitor as per monitoring plan	Ongoing	WCL
						Observations potentially exceed predictions			
						GNSS 1,2,8,14,16 • Vertical subsidence >150mm **GNSS 1<->8, 2<->8 and GNSS 14<->16 and 2<->16** • Relative horizontal movement between units greater than 50mm. **Drive through inspections:** • Reports of actual mining related damage to TfNSW infrastructure.	**GNSS 1,2,8,14,16 (subsidence), GNSS 1<->8 and 2<->8, GNSS 14<->16 and 2<->16** • Carry out Q-Line survey • Carry out visual slope inspection • Carry out SXC1 – SXC2, SXC3 – SXC4 and QCN – QCS survey **Drive through inspections:** • Inspect and determine cause of damage • Carry out visual Inspection of slope to assess changes in slope condition. **General** • Review underground mining • Commence investigation into potential red trigger exceedance • Consider trimming or stabilising affected slope (rockfall mesh, barriers etc) • Technical Committee to meet to review monitoring data to decide on and to direct proactive action • WCL and TfNSW to undertake visual inspections;	1. Inform the Technical Committee within 7 days or 14 days noting trigger actions 2. Investigation commences immediately 3. Notify DPE of potential exceedance.	WCL
						Observations continue to exceed predictions			
						GNSS 1,2,8,14,16 • Vertical subsidence >280mm **GNSS 1<->8, 2<->8 and GNSS 14<->16 and 2<->16** • Relative horizontal movement between units greater than 100mm. **Drive through inspections:**	Implement adaptive management and contingency measures e.g. • Stop mining and review mining options • TfNSW to inspect pavement and slope • TfNSW to notify Traffic commander via TMC to enforce immediate speed restriction – enforced by traffic commander and NSW police	• TfNSW pavement inspection and traffic commander notification within 2 hours • Inform the Technical Committee within 24 hours • Investigation commences immediately • Notify DPE within 48 hours	WCL

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
						• Reports of significant ground movement or failure at slopes.	• Carry out slope visual inspection to identify nature and scale of issues and possible solutions • Commence investigation into exceedance • Technical Committee to meet to review monitoring data to decide on and to direct proactive action • WCL and TfNSW to undertake visual inspections.	• Notify RR with written confirmation within 48 hours.	

Key Component Management Plan	Aspect	Location	Parameters	Frequency/ timing	Purpose	Level	Action/Reporting	Report timing	Responsibility
PUBLIC SAFETY									
Public Safety Features	All public safety features present in the EP Area as outlined in the PSMP within EP stages: 1a 1b 2	All public safety features present in the EP Area as outlined in the PSMP within EP stages: 1a 1b 2	Visual monitoring of key landscape features. (Note: Public safety parameters relating to Built Features are outlined in the BFMP TARP).	Prior to, during and post secondary extraction.	To determine if subsidence effects resulting from pilar and bord mining system result in impacts to public safety.	Level 1: No change in condition of features observed.	Continue monitoring. Report negligible impact in six monthly reports.	Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Level 2: Change in features condition is predicted to occur. No change to the condition of features is observed.	1. Continue monitoring. 2. Inform DPE and WaterNSW of potential impact. 3. Undertake site inspection to document and photograph any observed changes / impacts. 4. Report potential impacts in six monthly reports.	1. DPE and WaterNSW informed within one week. 2. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)
						Level 3: Change in features condition is observed, and impact greater than predicted occurs.	1. Make area safe as soon as practicable. 2. Continue monitoring. 3. Inform DPE and WaterNSW of potential impact. 4. Undertake site inspection to document and photograph any observed changes / impacts. 5. Discussion of potential remediation/ mitigation. Consultation with relevant stakeholders will be required if remediation or mitigation measures are required. 6. Use appropriate specialists to undertake physical remediation activities. 7. Report potential impacts in six monthly reports.	1. DPE and WaterNSW and informed within one week. 2. Commence preparation of mitigation/action and monitoring plan within one week (if required). 3. Six monthly reporting in accordance with Extraction Plan approval.	Russell Vale Colliery (Group Environment Manager)