

APPIN AREA 7 WATER MANAGEMENT PLAN

Private Bores									
ASPECT	MONITORING				TRIGGER				
	SITES	PARAMETERS	FREQUENCY	PURPOSE	LEVEL	ACTION	RESPONSIBILITY	TIMING	PURPOSE
Borehole Data	<p>2 bores in the SMP Area (GW101437, GW104154 over mid Panel 703)</p> <p>6 bores adjacent (GW34425, GW102584, GW103161, GW104602, GW104661, Lot24/25)</p> <p>Ref: EIS Appendix D Drawing 1</p>	<p>Location</p> <p>Standing water level</p> <p>Depth drilled</p> <p>Date drilled</p> <p>Aquifer depth</p> <p>Lithology</p> <p>Yield</p> <p>Salinity</p> <p>Purpose</p>	<p>Baseline assessment prior to mining – complete</p> <p>EIS authorised 13/04/06</p>	<p>To understand the as drilled bore function and performance</p> <p>To complete the impact assessment for mining</p>	N/A	Report in EIS	Mgr Environment	<p>Complete</p> <p>EIS authorised 13/04/06</p>	Inform stakeholders of baseline and impact assessment
Water Quality	<p>2 bores in the SMP Area (GW101437, GW104154 over mid Panel 703)</p> <p>6 bores adjacent (GW34425, GW102584, GW103161, GW104602, GW104661, Lot24/25)</p> <p>Ref: EIS Appendix D Drawing 1</p>	<p>Observable iron or salinity staining</p> <p>Laboratory/field analysis of: EC, Eh, pH, temp, TDS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, NO3, Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, Cr, Li, Ba, Cs, Rb, Sr (filtered)</p>	<p>Pre-mining - prior to mining of longwall underlying bore or mining of any immediately adjacent longwall</p> <p>Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall)</p> <p>As requested by landholder or if physical impacts to bore identified (PSMP)</p> <p>Landholder to observe</p>	<p>To provide pre-mining baseline groundwater quality for comparison with post-mining</p> <p>To identify any groundwater quality impact from mining</p> <p>To identify groundwater quality impacts related to physical changes to the bore during mining</p>	<p>Observable change in iron or salinity staining in excess of pre-mining conditions determined from comparison of pre-mining and post mining photographs (e.g. orange or white staining on ground/in pipes)</p> <p>2 std deviation change in pre-mining groundwater quality parameters – using all available data from private and</p>	<p>Inform landholder and relevant agencies of changes</p> <p>Repeat water quality sampling of impacted and adjacent bores</p> <p>Contract hydro-geologist engaged to investigate and report on changes identified</p> <p>Inform landholder and relevant agencies of results of investigation</p> <p>Provide alternate</p>	Mgr Environment	<p>Inform landholder and relevant agencies within 24hrs</p> <p>Investigation initiated within 1 week</p> <p>Monthly updates of investigation progress</p> <p>Results of investigation reported within 1 week of completion</p> <p>Alternate water supply provided as required within</p>	<p>Identify, investigate and report on impacts to bore water quality</p> <p>Provide alternate water supplies where required due to water quality impacts</p>

			during use of bore (PSMP)		<p>IC monitoring bores for statistical analysis</p> <p>Water is not available from bore or fit for purpose based on pre-mining quality and ANZECC Water Quality Guidelines</p> <p>Consistent trend toward water quality trigger levels as measured over time (using at least 3 data points with trend to reach trigger within the mining period)</p> <p>Any of above triggers identified in adjacent private or IC bore</p>	<p>water supply as needed</p> <p>Report in the End of Panel Report</p>		<p>24hrs</p> <p>Rehabilitate bore or alternate bore established as required following subsidence complete</p> <p>EoP Report within 4 months of longwall completion</p>	
Water Level	<p>2 bores in the SMP Area (GW101437, GW104154 over mid Panel 703)</p> <p>6 bores adjacent (GW34425, GW102584, GW103161, GW104602, GW104661, Lot24/25)</p> <p>Ref: EIS Appendix D Drawing 1</p>	<p>Standing groundwater level in bore using dip meter (where access inside bore is available)</p> <p>Bore pumping behaviour</p>	<p>Pre-mining - prior to mining of longwall underlying bore or mining of any immediately adjacent longwall</p> <p>Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall)</p> <p>As requested by landholder or if physical impacts to</p>	<p>To provide pre-mining baseline water levels for comparison with post-mining</p> <p>To identify any water level impact from mining</p> <p>To identify water level impacts related to physical changes to the bore during mining</p> <p>Use interlinked private bore,</p>	<p>Adverse reduction in bore yield as compared with pre-mining assessment</p> <p>Adverse bore serviceability as compared with pre-mining assessment</p> <p>>5m water level reduction over 2 month period</p> <p>Proportional loss of head in unmined</p>	<p>Inform landholder and relevant agencies of changes</p> <p>Review groundwater level data in private and IC bores</p> <p>Contract hydro-geologist engaged to investigate and report on changes identified</p> <p>Inform landholder and relevant agencies of results</p>	Mgr Environment	<p>Inform landholder and relevant agencies within 24hrs</p> <p>Investigation initiated within 1 week</p> <p>Monthly updates of investigation progress</p> <p>Results of investigation reported within 1 week of completion</p>	<p>Identify, investigate and report on impacts to bore water levels</p> <p>Provide alternate water supplies where required due to groundwater level impacts</p>

			bore identified (PSMP) Landholder to observe during use of bore (PSMP)	BHPB Piezo, mine inflow and river flow monitoring to assess if triggers are reached, and what rehabilitation may be required	Hawkesbury Sandstone aquifer not greater than 10% of saturated thickness. Consistent trend toward water level trigger as measured over time (using at least 3 data points with trend to reach trigger within the mining period) Any of above triggers identified in adjacent private or IC bore	of investigation Provide alternate water supply as needed Report in the End of Panel Report		Alternate water supply provided as required within 24hrs Rehabilitate bore or alternate bore established as required following subsidence complete EoP Report within 4 months of longwall completion	
Strata Gas	2 bores in the SMP Area (GW101437, GW104154 over mid Panel 703) 6 bores adjacent (GW34425, GW102584, GW103161, GW104602, GW104661, Lot24/25) Ref: EIS Appendix D Drawing 1	Strata gas observed Strata gas smell	Pre-mining - prior to mining of longwall underlying bore or mining of any immediately adjacent longwall Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall) As requested by landholder or if physical impacts to bore identified (PSMP) Landholder to observe during use of bore (PSMP)	To identify potential impacts to water quality or level To identify any safety hazards	Strata gas observed to be released from bore – from visual or audible signs e.g. hissing, plume Strata gas smell near bore	Make area safe with barriers and signage as required Inform landholder and relevant agencies Review groundwater level and quality data in private and IC bores Take gas sample and measure release rate if practical Contract hydro-geologist engaged to investigate and report on gas releases Inform landholder	Mgr Environment	Secure site safety and report to landholder and agencies immediately Investigation initiated within 1 week Monthly updates of investigation progress Results of investigation reported within 1 week of completion Alternate water supply provided as required within 24hrs Rehabilitate bore	Identify, investigate and report on impacts to bores from gas releases To manage any safety hazards Provide alternate water supplies where required due to groundwater impacts due to gas releases

						and relevant agencies of results of investigation Provide alternate water supply as needed Report in the End of Panel Report		or alternate bore established as required following subsidence complete EoP Report within 4 months of longwall completion	
BHPB Monitoring Bores									
ASPECT	MONITORING				TRIGGER				
	SITES	PARAMETERS	FREQUENCY	PURPOSE	LEVEL	ACTION	RESPONSIBILITY	TIMING	PURPOSE
Borehole Data	3 bores in the SMP Area (NGW3, NGW4, NGW6 over Panel 702 / 703) 6 bores adjacent (NGW5, NGW7, NGW8, NGW9, NGW10, NGW11) Ref: EIS Appendix D Drawing 1	Location Water level Depth drilled Date drilled Permeability data Lithology Water quality Purpose	Baseline assessment prior to mining – complete EIS authorised 13/04/06	To inform stakeholders of groundwater monitoring sites and installation.	N/A	Report in SMP - complete	Mgr Environment	Complete	Inform stakeholders of baseline assessment and monitoring
Water Quality	3 bores in the SMP Area (NGW3, NGW4, NGW6 over Panel 702 / 703) 6 bores adjacent (NGW5, NGW7, NGW8, NGW9, NGW10, NGW11) Ref: EIS Appendix D Drawing 1	EC, Eh, pH, temp, TDS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, NO3, Total N, Total P, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, Cr, Li, Ba, Cs, Rb, Sr (filtered)	Pre-mining - prior to mining of longwall underlying bore or mining of any immediately adjacent longwall Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall) As required to provide	To provide pre-mining baseline water quality for comparison with post-mining To identify any water quality impact from mining To identify water quality impacts related to physical changes to the bore during mining	2 std deviation change in pre-mining water quality parameters – using all available data from private and IC monitoring bores for statistical analysis	Inform landholders with adjacent bores and relevant agencies of changes Repeat water quality sampling of impacted and adjacent bores Contract hydro-geologist engaged to investigate and report on changes identified	Mgr Environment	Inform relevant landholder and agencies within 24hrs Investigation initiated within 1 week Monthly updates of investigation progress Results of investigation reported within 1 week of	Identify, investigate and report on impacts to groundwater quality To provide data for any investigation into water quality impacts in Nepean River

			additional data for any landholder bore impact investigation or if physical impacts to bore identified			Inform relevant landholder and agencies of results of investigation Report in the End of Panel Report		completion EoP Report within 4 months of longwall completion	
Water Level	3 bores in the SMP Area (NGW3, NGW4, NGW6 over Panel 702 / 703) 6 bores adjacent (NGW5, NGW7, NGW8, NGW9, NGW10, NGW11) Ref: EIS Appendix D Drawing 1 Additional multi level piezometers to be installed as required following discussion with DWE	Standing groundwater level in bore using vibrating wire piezometer and logger – 1hr recording.	Pre-mining – data has been recorded since September 2004. Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall) Monitoring to continue for at least 12 months post mining	To provide pre-mining baseline groundwater level for comparison with post-mining To identify any groundwater level impact from mining To identify groundwater level impacts related to physical changes to the bore during mining Use interlinked private bore, BHPB Piezo, mine inflow and river flow monitoring to assess if triggers are reached, and what rehabilitation may be required	>5m water level reduction over 2 month period Proportional loss of head in unmined Hawkesbury Sandstone aquifer not greater than 10% of saturated thickness. Consistent trend toward water level trigger as measured over time (using at least 3 data points with trend to reach trigger within the mining period) Relate changes to saturated thickness of the monitored aquifer Any of above triggers identified in adjacent private or IC bore	Inform landholders with adjacent bores and relevant agencies of changes Review groundwater level data in all private and IC bores Water quality sampling in impacted and adjacent bores Contract hydro-geologist engaged to investigate and report on changes identified Inform relevant agencies of results of investigation Report in the End of Panel Report	Mgr Environment	Inform relevant landholder and agencies within 24hrs Investigation initiated within 1 week Monthly updates of investigation progress Results of investigation reported within 1 week of completion EoP Report within 4 months of longwall completion	Identify, investigate and report on impacts to groundwater level To provide data for any investigation into water quality impacts in Nepean River
Strata Gas	3 bores in the SMP Area (NGW3, NGW4, NGW6 over Panel 702 / 703) 6 bores adjacent (NGW5, NGW7,	Strata gas observed being released from bore during site inspections, data downloads or by landholder Strata gas smell	Pre-mining – data has been recorded since September 2004. Post-mining - following the development of incremental subsidence	To identify potential impacts to water quality or level due to strata gas To identify any safety hazards	Strata gas observed to be released from bore – from visual or audible signs e.g. hissing, plume Strata gas smell	Make area safe with barriers and signage as required Inform landholder and relevant agencies	Mgr Environment	Secure site safety and report to landholder and agencies immediately Investigation initiated within 1	Identify, investigate and report on impacts to bores from gas releases

	NGW8, NGW9, NGW10, NGW11) Ref: EIS Appendix D Drawing 1	identified from bore during site inspections, data downloads or by landholder	for each longwall that will impact on the feature (i.e. each longwall) Monitoring to continue for at least 12 months post mining As required to provide additional data for any landholder bore impact investigation or if physical impacts to bore identified		near bore	Review groundwater level and quality data in private and IC bores Take gas sample and measure release rate if practical Contract hydro-geologist engaged to investigate and report on gas releases Inform landholder and relevant agencies of results of investigation Provide alternate water supply as needed Report in the End of Panel Report		week Monthly updates of investigation progress Results of investigation reported within 1 week of completion EoP Report within 4 months of longwall completion	
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Nepean River									
ASPECT	MONITORING				TRIGGER				
	SITES	PARAMETERS	FREQUENCY	PURPOSE	LEVEL	ACTION	RESPONSIBILITY	TIMING	PURPOSE
Water Quality	7 sampling sites in Nepean River (NR2, NR4, NR6, NR7, NR9, NR11, NR20) 4 sampling sites in tributaries (NR3, NR5, NR8, NR10) Observations along entire length of Nepean River between Cataract River and	Observable iron or salinity staining Springs in Nepean River gorge Photo points Laboratory/field analysis of: EC, Eh, pH, temp, TDS, TSS, Na, K, Ca, Mg, F, Cl, SO4, HCO3, NO3, Total N, Total P,	Laboratory sampling monthly Field analysis weekly Observation weekly	To provide pre-mining baseline water quality for comparison with post-mining To identify any water quality impact from mining To identify water quality impacts related to physical changes within the	Observable increase from baseline in iron or salinity staining determined from comparison of pre and post mining photographs (e.g. orange or white staining in water or on banks/seeps) Identification of a new spring releasing	The action to not mine directly under the Nepean River has been taken to prevent and minimise water quality impacts to the Nepean River. Inform relevant agencies of changes Repeat water	Mgr Environment	Inform relevant agencies within 24hrs Investigation initiated within 1 week Monthly updates of investigation progress Results of investigation reported within 1	Identify, investigate and report on impacts to river water quality Investigate any mitigation measures required and implement in consultation with key agencies

	Ousedale Creek) Ref: EIS Appendix E Drawing 2	DOC, Cu, Pb, Zn, Ni, Fe, Mn, As, Se, Cd, Cr, Li, Ba, Cs, Rb, Sr (filtered)		Nepean River (e.g. new groundwater spring developed during mining)	groundwater into the River Water quality indicators above pre-mining baseline range – all available data from Nepean River prior to mining aggregated and flow banded (0-10, 10-20, >20ML/day) to conduct the comparison 2 std deviation change in downstream (NR11) water quality parameters not displayed at upstream site (NR6) Consistent trend toward water quality trigger levels as measured over time (using at least 3 data points with trend to reach trigger within the mining period)	quality sampling Increase sampling frequency to fortnightly Contract hydrologist engaged to investigate and report on changes identified Inform relevant agencies of results of investigation Prepare and implement a site mitigation/action plan in consultation with relevant agencies Report in the End of Panel Report		week of completion Commence preparation of mitigation/action plan within 1 week EoP Report within 4 months of longwall completion	
Nepean River Water Level	Monitoring locations NR6, 7, 9, 11 Islands 1, 2 Shallow Areas 1, 2, 3, 4 All locations are identified in EIS Appendix C Drawing MSEC209-08	Field measurement of water height compared with time and river flow measured at Menangle Weir Flow connectivity between pools compared with time and flow	Observation weekly Measurement of water level weekly Measurement benchmarks surveyed pre-mining - prior to mining of longwall immediately adjacent and post-mining -	To provide pre-mining baseline water levels for comparison with post-mining To identify any water level impact from mining To identify water	Measured change in water level with similar flows in river by comparing pre-mining baseline measurements with post mining Observation of loss of flow	The action to not mine directly under the Nepean River has been taken to prevent water level impacts to the Nepean River. Inform relevant agencies of	Mgr Environment	Inform relevant agencies within 24hrs Investigation initiated within 1 week Monthly updates of investigation progress	Identify, investigate and report on impacts to river water level Investigate any mitigation measures required and implement in consultation with key agencies

	<p>Predicted maximum upsidence points identified in EIS Appendix C Drawing MSEC209-34.</p> <p>Observations along entire length of Nepean River between Cataract River and Ousedale Creek)</p> <p>Cross river subsidence movement monitoring sites identified on the approved subsidence movement monitoring program for Longwall 701 and additional monitoring agreed with DPI prior to each longwall being extracted</p>	<p>measured at Menangle Weir</p> <p>Areas of dry riverbed compared with time and flow measured at Menangle Weir</p> <p>Areas of flooded riverbed compared with time and flow measured at Menangle Weir</p> <p>Erosion of banks compared with time and flow measured at Menangle Weir</p> <p>Photo points</p> <p>Monitoring of closure and associated movements along the Nepean River</p>	<p>following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall)</p>	<p>level impacts related to physical changes within the Nepean River</p> <p>To identify any flow-on impacts from changes in river water level</p> <p>To provide data to any surface to mine connectivity investigation</p> <p>To identify if subsidence movements are developing as predicted</p> <p>Use interlinked private bore, BHPB Piezo, mine inflow and river flow monitoring to assess if triggers are reached, and what rehabilitation may be required</p>	<p>connectivity between pools within river by comparing pre-mining baseline observations with post mining</p> <p>Observation of areas of dry riverbed by comparing pre-mining baseline observations with post mining</p> <p>Observation of areas of flooded riverbed in excess of baseline conditions by comparing pre-mining baseline observations with post mining</p> <p>Observation of erosion of banks in excess of baseline conditions by comparing pre-mining baseline observations with post mining</p> <p>Subsidence movements at the DPI Approved cross river monitoring lines greater than predicted at that location</p>	<p>changes</p> <p>Repeat water level measurements</p> <p>Review mine water budget against approved triggers</p> <p>Contract hydrologist engaged to investigate and report on changes identified and options to address changes</p> <p>Inform landholders and relevant agencies of results of investigation</p> <p>Prepare and implement a site mitigation/action plan in consultation with key agencies</p> <p>Report in the End of Panel Report</p>		<p>Results of investigation reported within 1 week of completion</p> <p>Commence preparation of mitigation/action plan within 1 week</p> <p>EoP Report within 4 months of longwall completion</p>	
Nepean River Water Pumps	6 pumps in Nepean river with 3 in the SMP Area	Pump submergence and function	Weekly visual inspection	To identify any flow-on impacts from changes in	Pump intake not submerged	Review river level and observational data	Mgr Environment	Inform landholder and relevant agencies within 24	Identify, investigate and report on impacts

	Observations along entire length of Nepean River between Cataract River and Ousedale to identify any additional pumps installed			river water level to pumps To identify any physical disturbance or loss of function to pumps from subsidence movement	Pump not functioning due to physical disturbance from subsidence	Inform landholder and relevant agencies of event Provide alternate water supply as needed and arrange for repair Report in the End of Panel Report		hours Provide alternate water within 24 hours and undertake repairs as soon as they can be arranged Review completed within 1 week Results of investigation reported within 1 week of completion EoP Report within 4 months of longwall completion	to river water level and pump Provide alternate water supplies where required due to impacts to pumps
Strata Gas	7 sampling sites in Nepean River (NR2, NR4, NR6, NR7, NR9, NR11, NR20) 4 sampling sites in tributaries (NR3, NR5, NR8, NR10) Observations along entire length of Nepean River between Cataract River and Ousedale Creek) Ref: EIS Appendix E Drawing 2)	Strata gas observed Strata gas smell	Observation weekly As required by any report from the community/landholders	To identify potential impacts to water quality due to strata gas To identify any safety hazards	Strata gas observed to be released from river or banks – from visual or audible signs e.g. hissing, bubbling, plume Strata gas smell within gorge	Make area safe with barriers and signage as required Inform landholder and relevant agencies Collect water quality sample in vicinity of release Take gas sample and measure release rate where applicable Report in the End of Panel Report	Mgr Environment	Report to relevant agencies and adjacent landholder within 24 hours Secure site safety and report to landholder and agencies immediately EoP Report within 4 months of longwall completion	Identify and report on gas releases in Nepean River To manage any safety hazards
Surface to Mine Connectivity	Active mining areas – longwall face and roadway development	Groundwater make increasing from historical range as measured by mine	Daily statutory mine inspections Mine dewatering	To identify potential connectivity to the surface or large	20% increase in water make from mining areas – calculated on a 1	Inform relevant agencies of changes	Mgr Environment	Inform relevant agencies within 24hrs	Identify, report and respond to surface to mine connectivity

	Mined goaf areas – 701, 702, 703, 704	dewatering monitoring Inflow event from mining area Water sample of any inflow event (Laboratory Analysis for major Cations & Anions as well as Stable Isotopes) for comparison to surface waters	monitored throughout the mining process by flow meter of water pumped into and discharged from workings	groundwater make To provide data for surface impact investigations Use interlinked private bore, BHPB Piezo, mine inflow and river flow monitoring to assess if triggers are reached, and what rehabilitation may be required	month rolling average 10% increase in water make from mining areas – calculated on a 1 year rolling average Consistent trend toward surface to mine connectivity trigger levels as measured over time (using at least 3 data points with trend to reach trigger within the mining period) Inflow event from mining area requiring notification to the mining inspectorate Water Chemistry or age indicates connectivity to the surface	Contract hydro-geologist engaged to investigate and report on changes identified Inform relevant agencies of results of investigation Prepare and implement a site mitigation/action plan in consultation with key agencies Report in the End of Panel Report		Investigation initiated within 1 week Monthly updates of investigation progress Results of investigation reported within 1 week of completion Commence preparation of mitigation/action plan within 1 week EoP Report within 4 months of longwall completion	
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Upland Streams and Farm Dams									
ASPECT	MONITORING				TRIGGER				
	SITES	PARAMETERS	FREQUENCY	PURPOSE	LEVEL	ACTION	RESPONSIBILITY	TIMING	PURPOSE
Dam and Stream Water Quality	Farm dams within the SMP Area LW701 - 3 dams LW702 – 10 dams LW703 – 13 dams LW704 – 10 dams Opportunistic sampling of ephemeral streams	Observable iron or salinity staining Photo points Interview with landholder Field analysis of: EC, Eh, pH, temp, DO	Pre-mining - prior to mining of longwall underlying dam or stream or mining of any immediately adjacent longwall Post-mining - following the development of incremental subsidence	To provide pre-mining baseline water quality for comparison with post-mining To identify any water quality impact from mining	Observable increase from baseline in iron or salinity staining (e.g. orange or white staining in water or on banks/seeps) in excess of pre-mining conditions determined from	Inform landholder and relevant agencies of impacts Repeat water quality sampling Provide alternate water supply as required	Mgr Environment	Inform landholder and relevant agencies within 24 hours Investigation initiated within 1 week Monthly updates of investigation	Ensure adequate water supplies for landholders Identify, investigate and report on impacts to dam and ephemeral stream water quality

	<p>during rain events</p> <p>Ref: EIS Appendix C Drawings MSEC 209-18 to MSEC209-20</p> <p>4 sampling sites in tributaries (NR3, NR5, NR8, NR10)</p>		<p>for each longwall that will impact on the feature (i.e. each longwall)</p> <p>As requested by landholder or if physical impacts to dam or stream identified (PSMP)</p> <p>Landholder to observe dams and streams (PSMP)</p> <p>Opportunistic monitoring of flow in ephemeral streams where access is suitable</p>	<p>To identify water quality impacts related to physical changes (e.g. groundwater spring, gas release)</p>	<p>comparison of pre-mining and post-mining photographs</p> <p>Identification of a new spring /gas into dam or stream</p>	<p>Initiate laboratory water quality sampling on a monthly basis</p> <p>Contract hydrologist engaged to investigate and report on changes identified</p> <p>Inform landholders and relevant agencies of results of investigation</p> <p>Prepare and implement a site mitigation/action plan in consultation with key agencies and in accordance with Section 54 of the Water Management Act</p> <p>Report in the End of Panel Report</p>		<p>progress</p> <p>Results of investigation reported within 1 week of completion</p> <p>Commence preparation of mitigation/action plan within 1 week</p> <p>EoP Report within 4 months of longwall completion</p>	<p>Investigate any mitigation measures required and implement in consultation with key agencies and landholders</p>
<p>Dam and Stream Water Level</p>	<p>Farm dams within the SMP Area</p> <p>LW701 - 3 dams LW702 – 10 dams LW703 – 13 dams LW704 – 10 dams</p> <p>Opportunistic observation of ephemeral streams during rain events</p> <p>Ref: EIS Appendix C Drawings</p>	<p>Water level in dams</p> <p>Photo points</p> <p>Interview with landholder</p> <p>Flow connectivity between pools during run-off events</p> <p>Areas of increased flooding in</p>	<p>Pre-mining - prior to mining of longwall underlying dam or stream or mining of any immediately adjacent longwall</p> <p>Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall)</p>	<p>To provide pre-mining baseline water levels for comparison with post-mining, condition of dam and existing leaks</p> <p>To identify any water level impact from mining</p> <p>To identify water level impacts related to physical</p>	<p>Rapid decline in dam water level greater than calculated evaporation, seepage and use from dam</p> <p>Observation of loss of flow connectivity within a flowing ephemeral stream</p> <p>Observation of</p>	<p>Inform landholder and relevant agencies of impacts</p> <p>Repeat water level measurements</p> <p>Provide alternate water supply as required</p> <p>Contract hydrologist engaged to</p>	<p>Mgr Environment</p>	<p>Inform landholder and agencies immediately</p> <p>Arrange alternate water supply within 24 hours</p> <p>Investigation initiated within 1 week</p> <p>Monthly updates of investigation progress</p>	<p>Ensure adequate water supplies for landholders</p> <p>Identify, investigate and report on impacts to stream and dam water level</p> <p>Investigate any mitigation measures required and implement in consultation with</p>

	MSEC 209-18 to MSEC209-20 4 sampling sites in tributaries (NR3, NR5, NR8, NR10)	ephemeral streams Erosion of stream banks or dam walls	As requested by landholder or if physical impacts to dam or stream identified (PSMP) Landholder to observe dams and streams (PSMP) Opportunistic monitoring of flow in ephemeral streams where access is suitable	changes within dams or ephemeral streams To identify any flow-on impacts from changes in dam or stream water level	areas of flooded stream in excess of baseline conditions – identified by extended flooding within a terrestrial habitat and from comparison of pre-mining and post-mining photographs Observation of erosion of stream and dam banks in excess of baseline conditions identified from comparison of pre-mining and post-mining photographs	investigate and report on changes identified Inform landholders and relevant agencies of results of investigation Prepare and implement a site mitigation/action plan in consultation with key agencies Report in the End of Panel Report		Results of investigation reported within 1 week of completion Commence preparation of mitigation/action plan within 1 week EoP Report within 4 months of longwall completion	key agencies
Dam Water Pumps	Farm dams within the SMP Area LW701 - 3 dams LW702 – 10 dams LW703 – 13 dams LW704 – 10 dams Ref: EIS Appendix C Drawings MSEC 209-18 to MSEC209-20	Pump submergence and function Interview with landholder	Pre-mining - prior to mining of longwall underlying dam or stream or mining of any immediately adjacent longwall Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall) As requested by landholder or if physical impacts to dam identified (PSMP) Landholder to observe dams and infrastructure	To identify any flow-on impacts from changes in dam water level to pumps To identify any physical disturbance or loss of function to pumps from subsidence movement	Pump intake not submerged Pump not functioning due to physical disturbance from subsidence Observation of impacts identified from comparison of pre-mining and post-mining photographs, observations and interview	Inform landholder and relevant agencies of impacts Review dam water level and observational data Inform landholder and relevant agencies of event Provide alternate water supply as needed and arrange for repair Report in the End of Panel Report	Mgr Environment	Inform landholder and relevant agencies of impacts immediately Provide alternate water within 24 hours and undertake repairs as soon as they can be arranged Review completed within 1 week Results of investigation reported within 1 week of completion EoP Report within	Identify, investigate and report on impacts to dam water level and pump Provide alternate water supplies where required due to impacts to pumps

			(PSMP)					4 months of longwall completion	
Strata Gas	<p>Farm dams within the SMP Area</p> <p>LW701 - 3 dams LW702 – 10 dams LW703 – 13 dams LW704 – 10 dams</p> <p>Opportunistic observation of ephemeral streams during rain events</p> <p>Ref: EIS Appendix C Drawings MSEC 209-18 to MSEC209-20</p> <p>4 sampling sites in tributaries (NR3, NR5, NR8, NR10)</p>	<p>Strata gas observed</p> <p>Strata gas smell</p> <p>Interview with landholder</p>	<p>Pre-mining - prior to mining of longwall underlying dam or stream or mining of any immediately adjacent longwall</p> <p>Post-mining - following the development of incremental subsidence for each longwall that will impact on the feature (i.e. each longwall)</p> <p>As requested by landholder or if physical impacts to dam or stream identified (PSMP)</p> <p>Landholder to observe dams and streams (PSMP)</p> <p>Opportunistic monitoring of flow in ephemeral streams where access is suitable</p>	<p>To identify potential impacts to water quality due to strata gas</p> <p>To identify any safety hazards</p>	<p>Strata gas observed to be released from dams or streams – from visual or audible signs e.g. hissing, bubbling, plume</p> <p>Strata gas smell within mining area</p>	<p>Make area safe with barriers and signage as required</p> <p>Inform landholder and relevant agencies</p> <p>Provide alternate water supply as needed</p> <p>Collect water quality sample in vicinity of release</p> <p>Take gas sample and measure release rate where applicable</p> <p>Contract hydro-geologist engaged to investigate and report on changes identified</p> <p>Report in the End of Panel Report</p>	Mgr Environment	<p>Secure site safety and report to landholder and agencies immediately</p> <p>Provide alternate water within 24 hours and undertake repairs as soon as they can be arranged</p> <p>Results of investigation reported within 1 week of completion</p> <p>EoP Report within 4 months of longwall completion</p>	<p>Identify and report on gas releases in dams and streams</p> <p>Provide alternate water supplies where required due to impacts from gas releases</p>

Note:

1. This monitoring and management program should be read in conjunction with the Area 7 EIS and SMP.
2. The stated monitoring and triggers are likely to cater for most events related to subsidence within the SMP Area. Should additional monitoring or triggers be identified as appropriate they will be implemented in consultation with DPI.
3. Access to the IC monitoring bores for water quality sampling is difficult as they were established predominately for water level monitoring.
4. Access to private bores for water level and quality sampling may be difficult due to bore installation and wellhead configuration.
5. Access to any monitoring site on private land is subject to suitable landholder acceptance of access to the monitoring site.
6. Stated notification and investigation timeframes are from when triggers have been confirmed by the Manager Environment.
7. This plan will be reviewed and any improvement opportunities will be proposed within each End of Panel report.

Contract hydrogeologist/hydrologist investigations and reports will include:

1. Scope of the study.
2. Consider any relevant aspect from this plan.
3. Analysis of trends.
4. Assessment of any impacts against prediction.
5. Root cause analysis of any change or impact.
6. Options for management and mitigation.
7. Assessment for the need for contingent measures.
8. Any recommended changes to this plan.
9. Appropriate consultation.

Site specific mitigation/action plans will include:

1. A description of the impact to be managed.
2. Results of the hydrogeologist/hydrologist investigations.
3. Aims and objections for the plan.
4. Specific actions required to mitigate/manage.
5. Timeframes for implementation.
6. Roles and responsibilities.
7. Identification of and gaining appropriate approvals from landholders and government agencies.
8. Consultation and communication plan.

Impacts to water quality, water level, accessibility or landholder use will be addressed through the development of site specific mitigation and management plans which could include the following actions:

1. Provision of alternate water supply through regular delivery to tank, dam or other vessel.
2. Provision of alternate water supply through modification, repair or replacement of existing water supply e.g. deepening a bore, alternate bore drilled, deepening a dam or construction of a new dam.
3. Provision of water treatment facilities to address any water quality impacts e.g. dosing or filtration.
4. Repair of any subsidence impacts to water infrastructure eg. pipes and pumps.

Potential safety impacts related to strata gas release will be addressed through the development of site specific mitigation and management plans which could include the following actions:

1. Immediate barricading and signage to reduce exposure to gas release area.
2. Immediate notification of relevant stakeholders including landholders, government agencies and the community where safety issues are identified within public areas.
3. Modification to bores as required to vent gas safely.
4. Grouting and rehabilitation of bores where required and following the provision of suitable alternate water supplies.
5. Provision of alternate water supply as required to reduce exposure to the gas release area.
6. Regular monitoring of safety aspects at the site.
7. Provision of a safety officer as deemed necessary in areas of high public exposure.

Impacts to water quality, water level, accessibility or use within the Nepean River will be addressed through the development of site specific mitigation and management plans which could include the following actions:

1. Immediate barricading and signage to reduce exposure to unsafe areas such as vigorous gas release, areas of shallow water or rock fall areas.
2. Immediate notification of relevant stakeholders including landholders, government agencies and the community where safety issues are identified.
3. Regular monitoring of safety aspects at the site.
4. Provision of a safety officer as deemed necessary in areas of public exposure to safety concerns.
5. Grouting and rehabilitation of areas of river where required, with appropriate government approvals. This would be triggered by identification of surface water flow identified being lost from the Nepean River system to deep storage or the mine workings.
6. Dredging of sand bars that restrict access along the river, with appropriate government approvals.
7. Minor earthworks to prevent erosions such as overland flow diversion works, establishment of banks, smoothing and re-contouring, with appropriate government approvals.
8. Revegetation works such as planting, seeding, mulching, weed control and plant maintenance, , with appropriate government approvals.

9. Active preservation of life such as relocation of stranded fish and watering of exposed aquatic vegetation where this is practical.

Impacts to vegetation, water quality, flow or pool level to upland streams will be addressed through the development of site specific mitigation and management plans which could include the following actions:

1. Grouting and rehabilitation of areas where required, with appropriate government approvals. This would be triggered by identification of surface water flow being lost from the catchment to deep storage or the mine workings or loss of a significant permanent pool.
2. Minor earthworks to prevent erosions such as overland flow diversion works, establishment of banks, smoothing and re-contouring, with appropriate government approvals.
3. Revegetation works such as planting, seeding, mulching, weed control and plant maintenance, with appropriate government approvals..