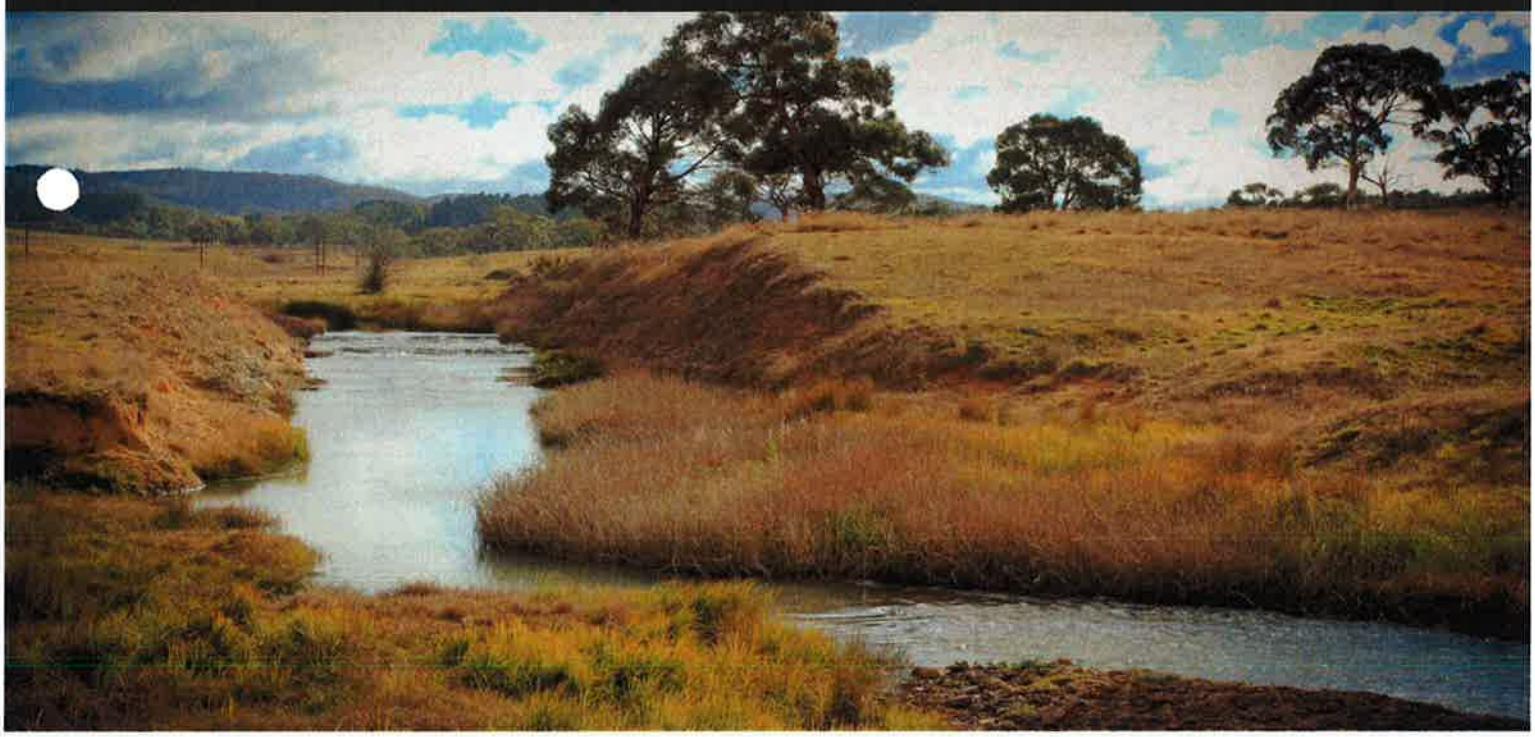
APPENDIX C:
AMENDED DEVELOPMENT APPLICATION

Springvale Water Treatment Project

Amendment to Development Application

December 2016



EnergyAustralia

Centennial Coal

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Appendices

Appendix A – Water Resources Impact Assessment

1. Introduction

1.1 Background

Springvale Coal Pty Ltd (Springvale Coal) has recently submitted a development application (DA) for the Springvale Water Treatment Project (the Project) (SSD 16_7592).

The Project involves the transfer of water from existing dewatering facilities on the Newnes Plateau to a new water treatment plant located at the Mount Piper Power Station (MPPS). Treated water will be used as a priority within the MPPS cooling water system and excess treated water was initially proposed to be released via a new licenced discharge point to Wangcol Creek.

Initial stakeholder feedback on the Project has raised concerns in regards to the release of treated water to Wangcol Creek. Springvale Coal in collaboration with Energy Australia has therefore undertaken further investigations to identify alternative options for the management of water in excess of the MPPS short term cooling water make-up requirements.

A preferred alternative has been identified that involves transfer of excess treated water to Thompsons Creek Reservoir for storage. This will facilitate subsequent reuse in the MPPS cooling water system during periods of high cooling water demand and remove the need for a discharge pipeline for environmental release to Wangcol Creek.

Thompsons Creek Reservoir forms part of the existing Cox River Water Supply System, which was established to provide water supply for local power station operations. Water is currently drawn from Lake Lyell to Thompsons Creek Reservoir, which is used as a staging dam for the MPPS cooling water system. An existing pipe network connects the Thompsons Creek Reservoir to the MPPS cooling water system forebay and can be utilised to return water from the new water treatment plant to the reservoir as part of the Project.

To ensure sufficient redundancy is incorporated into the treatment system prior to the transfer to Thompsons Creek Reservoir, it is also proposed to increase the capacity of the water treatment plant from 36 ML/day to 42 ML/day. The increase in capacity will ensure capacity to ensure treatment of any short term fluctuations in mine water make and improve the efficiency of the Project to accommodate shut down and maintenance periods.

Springvale Coal propose a minor amendment to the DA (SSD 16_7592) to facilitate the transfer to Thompsons Creek Reservoir and to increase the capacity of the water treatment plant to 42 ML/day.

1.2 Approval framework

The Project is a development that is declared to be State significant development (SSD) under section 89C of the *Environmental Planning and Assessment Act, 1979 (EP&A Act)*. The Minister for Planning (or his or her delegate, such as the NSW Planning Assessment Commission) determines development applications for SSD under Part 4 of the EP&A Act.

An Environmental Impact Statement (EIS) was prepared to support the development application (SSD 7592) and placed upon public exhibition from 27 September to 8 November, 2016.

In accordance with Section 89E of the EP&A Act, the Minister is to determine a development application in respect of SSD by either:

a. *granting consent to the application with such modifications of the proposed development or on such conditions as the Minister may determine, or*
b. *refusing consent to the application.*

It is proposed to modify the development being considered by the Minister in accordance with early submissions on the Project. The revised application is considered a minor amendment that does not substantially differ from the original application.

The amendment to the development application is being undertaken to reduce the potential environmental impact associated with the development. The development application has met the requirements for public participation in accordance with section 89F of the EP&A Act and the proposed amendment is to address early stakeholder submissions on the Project. Further public exhibition is therefore not considered to be required in accordance with section 89F (4).

1.3 Stakeholder consultation

Ongoing communication has been undertaken with the Department of Planning and Environment (DP&E) and relevant NSW government agencies in regards to the proposed minor amendments to the Springvale Water Treatment Project.

A meeting was held with DP&E on the 16th of October to discuss Springvale Coal's intention to modify the Project to include a transfer to Thompsons Creek Reservoir as part of the development application. It was discussed that a brief report would be prepared to support the amended DA to focus the key aspects of the amended DA.

An interagency meeting was held on the 17 November to discuss the modified development and attended by representatives of DP&E, WaterNSW, Environment Protection Authority (EPA), Department of Primary Industries Water (DPI Water) and Office of Environment and Heritage (OEH) together with representatives of EnergyAustralia, Centennial Coal and GHD. The meeting involved a roundtable discussion in regards to potential issues for consideration as part of the Amended DA and a site inspection of the Water Treatment Plant Site, Thompsons Creek Reservoir and sections of the existing Coxs River Water Supply transfer pipeline.

1.4 Purpose of this report

The purpose of this report is to describe the proposed minor amendments to the DA (SSD 16_7592) and consider the key environmental risks potentially arising from the amended development.

2. Need for amendment

2.1 Water management system

The overall objective of the Project is to improve environmental outcomes for the Upper Coxs River catchment. This is to be achieved through the treatment and reuse of underground mine water at the Mount Piper Power Station (MPPS).

The water management system described in the original DA was developed to maximise the direct reuse of mine water at MPPS and to achieve the Springvale Mine Extension Project SSD consent conditions for discharge water quality in relation to salinity of 500 µS/cm EC (90%ile) by 30 June 2019.

The degree of reuse achieved directly at the MPPS is dependent upon both variable mine inflows and power station generation requirements.

Transfer volumes are variable based upon the combined inflow to Angus Place and Springvale Mines and is predicted to peak at up to 36 ML/day. Following the completion of the assessment for the EIS, inflow predictions have been updated by CSIRO (CSIRO 2016) and are presented in Figure 2-1. The revised results indicate that the combined inflow into the underground workings is predicted to peak at 36.1 ML/day in March 2031, which is consistent with the inflows considered in the EIS (CSIRO 2015), however the timing of the peak occurs 16 months later than previously considered.

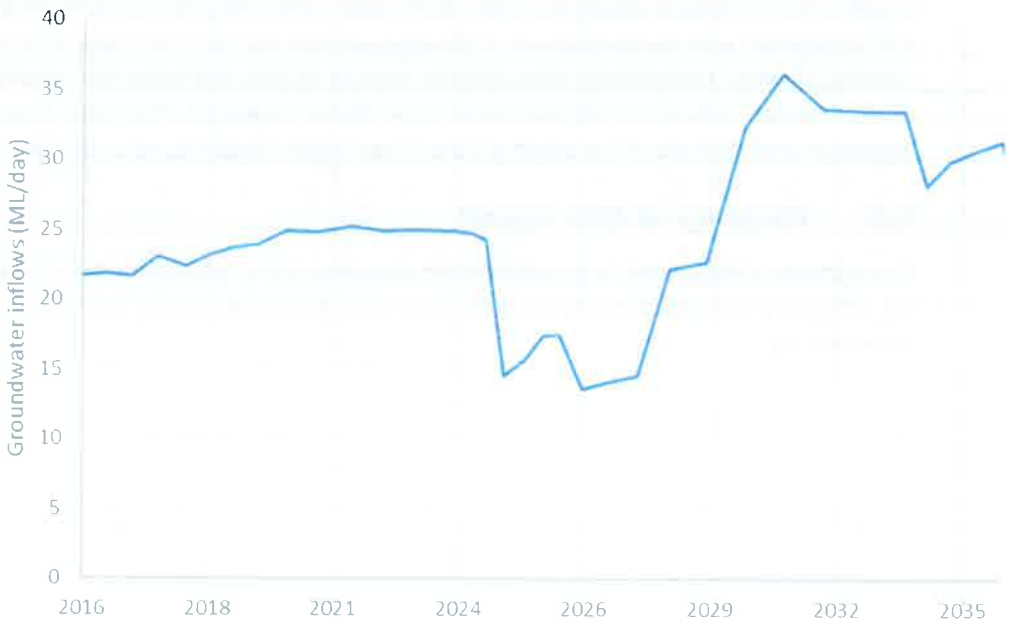


Figure 2-1 Predicted groundwater inflows into Angus Place Colliery and Springvale Mine (CSIRO 2016)

The water treatment plant includes a pre-treatment process involving clarification of the mine water for solids removal and desalination process to reduce the salinity in the treated water. The treatment process losses through the residuals and brine management streams, results in up to 32 ML/day of treated water being potentially available for use in the power station operations.

The demand for make-up water in the MPPS cooling water system varies in accordance with energy demand with an average of around 40 ML/day used in the cooling water system. Up to 54 ML/day of make-up water is required when the station is operating at full capacity which

reduces to less than 30 ML/day when the station is operating at or below approximately 50% capacity.

Treated water is proposed to be used as priority for cooling water make-up water prior to extracting water from the catchment as part of the Coxs River and Fish River Water Supply schemes. The majority of mine water is therefore anticipated to be directly reused within the MPPS operations.

The original development application included the release of any excess treated water beyond the immediate MPPS cooling water make-up requirements to Wangcol Creek in the Upper Coxs River Catchment. Both government stakeholder and community submissions on the development applications raised concerns in regards to the ongoing discharge of treated water to the receiving water catchment.

Implementation of the transfer system to Thompsons Creek Reservoir will allow the water to be temporarily stored for subsequent reuse during periods of high water demand at MPPS and has been adopted as the preferred approach for management of excess water as part of the Project.

The new transfer system will eliminate the need for a treated water pipeline and discharge infrastructure to Wangcol Creek.

2.2 Project capacity

As the Project will be operating without a direct discharge point to receiving waters, an increase to the capacity of the treatment system is required to ensure sufficient redundancy is incorporated into the Project to ensure treatment of all flows prior to transfer to Thompsons Creek Reservoir. Increasing the proposed capacity from 36 ML/day to 42 ML/day will provide for:

- Management of any short-term fluctuations in mine water make
- Provision for maintenance of individual modules within the WTP, whilst maintaining treatment capacity in the remainder of the WTP
- Flexibility to temporarily increase flows to allow catch-up following WTP maintenance or shut down periods.

2.2.1 Mine water make

Mine water inflows to the underground workings at Springvale Mine and Angus Place Colliery is variable and has been predicted to peak at 36 ML/day in detailed modelling undertaken by CSIRO as shown on Figure 2-1. Due to the spatial and temporal resolution used in the CSIRO modelling, the predicted results are considered average inflows and may not capture all short term daily fluctuations to the required pumping rates from the underground workings.

The proposed increase in capacity of the WTP will allow a buffer to ensure full treatment for any short term deviations in water make from the modelling predictions.

2.2.2 Modular operations

The WTP will be designed for modular construction and operation. This will enable individual reverse osmosis (RO) units to be taken offline for maintenance, whilst maintaining flow and treatment capacity within the remainder of the plant. Provision of a 42 ML/day treatment capacity will provide flexibility to allow maintenance to be undertaken on individual modules with the treatment plant whilst maintaining treatment performance within the remainder of the WTP.

2.2.3 Emergency storage

Provision to transfer mine inflow to the Angus Place Colliery underground storage via the existing 930 bore is also being provided to allow for emergency storage during any full water treatment plant shut down or maintenance periods. Based upon 10 days available storage within Angus Place, it is estimated that pumping an additional 6 ML/day for 50 days would be required to draw down the emergency storage within the 900 panel area for subsequent storage availability. Increasing the capacity to 42 ML/day is therefore required to allow catch-up flows to be treated, whilst continuing to treat flows from the ongoing dewatering requirements for the mining operations.

3. Amendment to DA

3.1 Proposed amendments

The Project will be undertaken in accordance with the project description included in Chapter 5 of the Springvale Water Treatment Project EIS (the EIS) subject to the minor amendments included in Table 3-1. An overview of the revised Project Application Area is presented on Figure 3-1.

Table 3-1 Amended Project components

New Project components	Removed Project Components
New treated water pipeline to lower valve station on existing Coxs River Water Supply pipeline	Treated water discharge pipeline and associated release structure to Wangcol Creek
Treated water pump station capacity to be upgraded to allow pumping to Thompsons Creek Reservoir	Treated water pump station no longer required to pump water for the proposed catchment release
Use of existing Coxs River Water Supply Pipeline to transfer excess treated water to Thompsons Creek Reservoir	No treated water to be released to Coxs River catchment via Wangcol Creek
Water treatment plant with capacity to treat 42 ML/day	Water treatment plant with capacity treat 36 ML/day
Mine water transfer system with sufficient hydraulic capacity to allow transfer of 42 ML/day	Mine water transfer system with sufficient hydraulic capacity to allow transfer 36 ML/day

3.1.1 Transfer Pipeline

A new treated water transfer pipeline would be required to connect the water treatment plant to the existing Coxs River Water Supply pipeline. The new pipeline would be approximately 300 metres long and include all required isolation valves to support the connection to the existing transfer system. Infrastructure at the pipeline junction would comprise of a flow meter, a tap point for sampling and a series of in-line water quality monitoring devices for field parameters such as pH and EC.

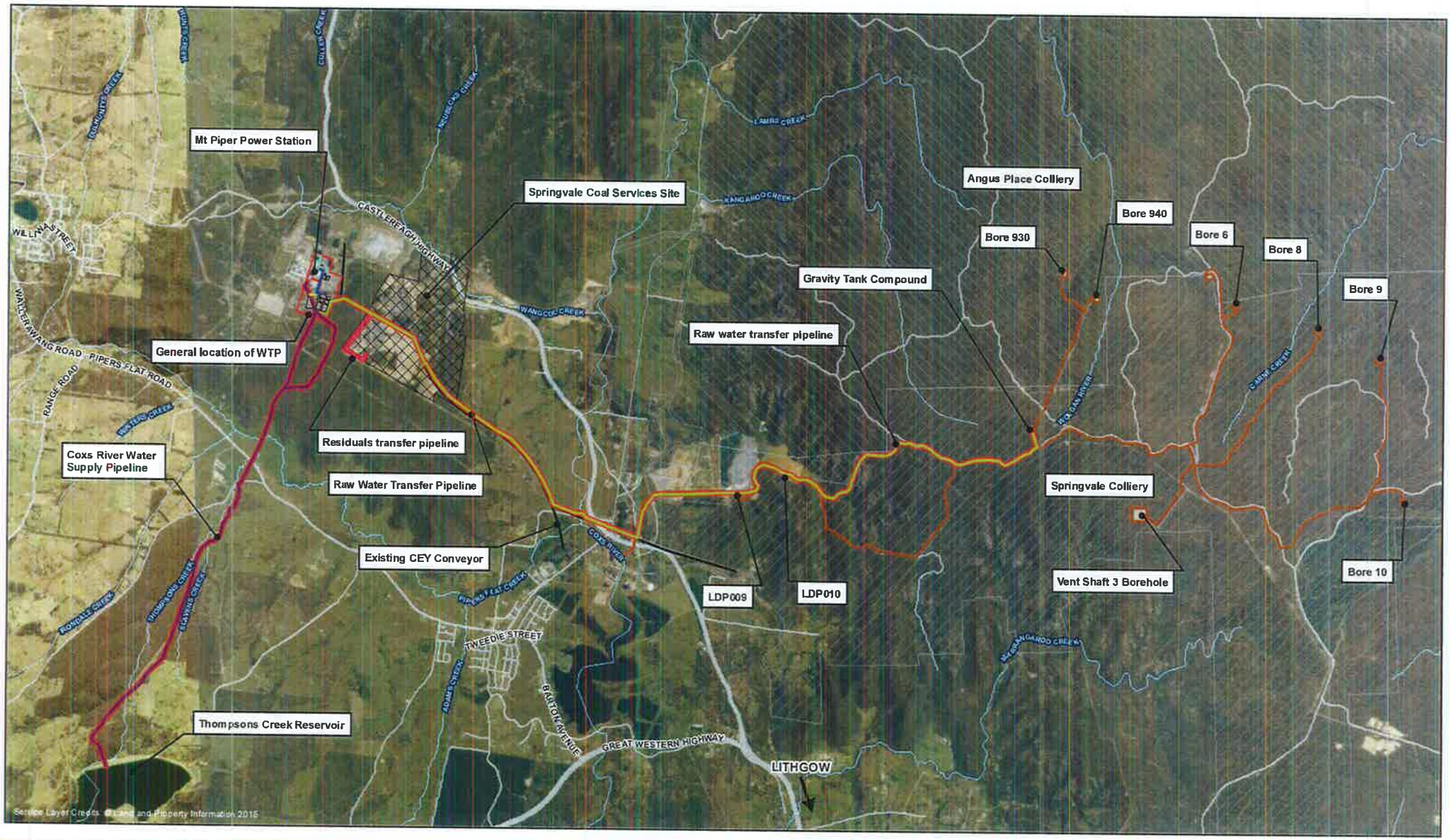
The new transfer pipeline will fall entirely within the Project Application Area described in the EIS as shown on Figure 3-2.

3.1.2 Pumping Station

The treated water pump station proposed in the EIS incorporated an indicative power rating of 200 kW to allow transfer from the water treatment plant site to Wangcol Creek. The new transfer system will require additional pumping capacity to enable the transfer to Thompsons Creek Reservoir or the surge tank and require a pump station with an indicative power rating of 630 kW. The pump station would be designed with full redundancy to enable transfer of the full range of flows passing through the water treatment plant.

3.1.3 Treated water management system

Treated water will continue to be used as priority for cooling water make-up and the majority of treated mine water is anticipated to continue to be directly reused within the MPPS operations. Transfer to Thompsons Creek Dam will only be required when MPPS is operating at less than approximately 50% capacity and the typical discharge volumes would be in the order of 0-5 ML/day. Discharges of up to 32 ML/day would only be required during total power station shut downs which would typically occur a maximum of one to two days per year.



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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LEGEND

Proposed Alignment
- Raw water transfer pipeline
- Residuals transfer pipeline
- Brine transfer pipeline
- Crystallised salt transfer pipelines
- Treated water pipeline to cooling tower forebay
- Existing and Approved SDWTS
- Existing CEY Conveyor
- Cox's River Water Supply Pipeline
- Treated water pipeline to Coxs River Water Supply Pipeline
- Proposed WTP Layout
- Project application area (representative)
- Springvale Mine
- Angus Place Colliery
- Springvale Coal Services Site

Centennial Coal and EnergyAustralia
EA/CEY Water Treatment Project

Job Number	21-25109
Revision	A
Date	02 Nov 2016

Project Application Area Figure 3-1

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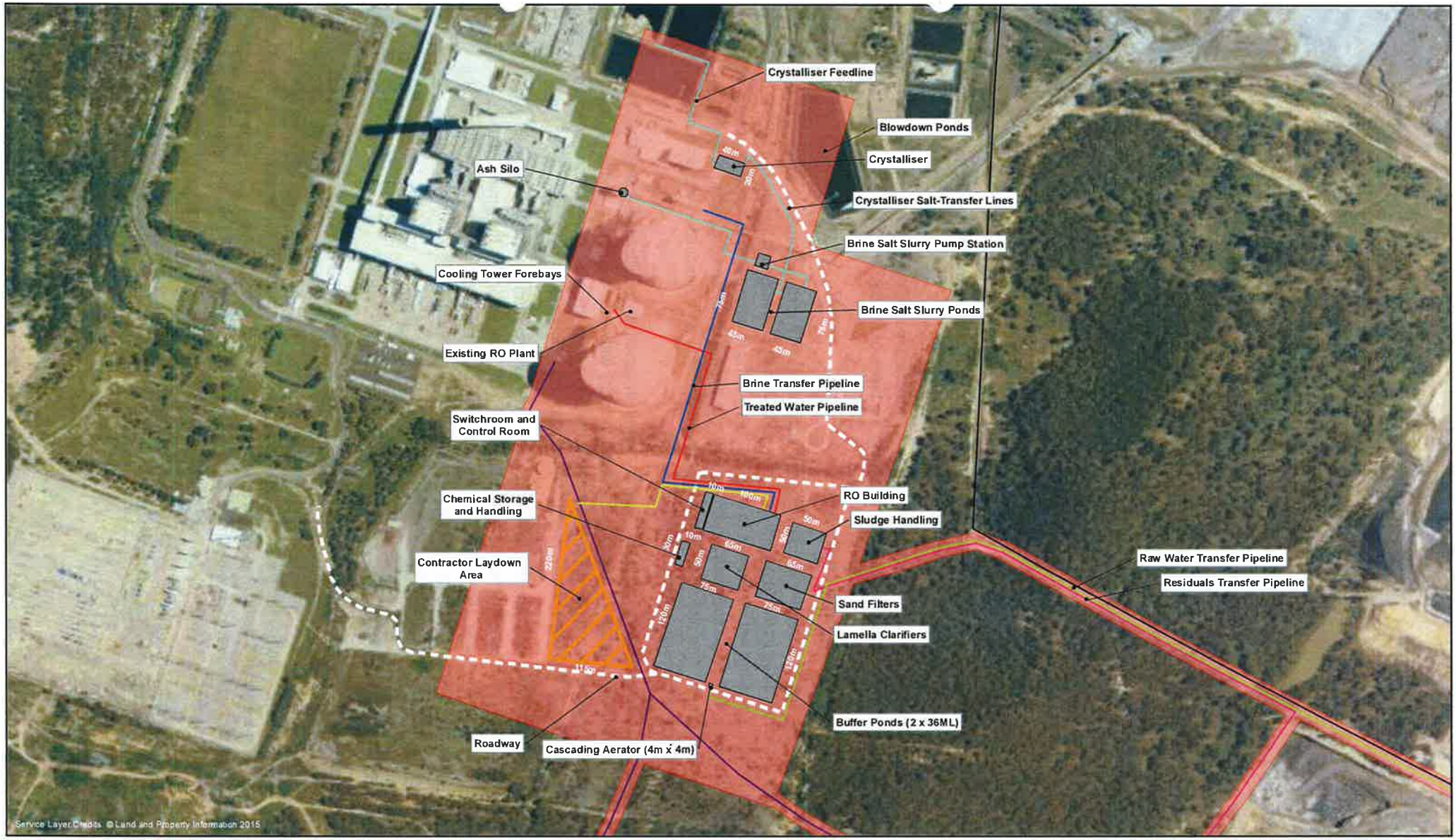
Level 15, 133 Castlereagh Street Sydney NSW 2000 T61 2 9239 7100 F61 2 9239 7199 Esydmail@ghd.com.au Wwww.ghd.com.au

Data source: General Topo - NSW LPI DTDB 2012, Imagery - sixmaps 2015. Created by:mking3



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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LEGEND

Proposed Alignment
- Raw water transfer pipeline
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- Treated water pipeline to cooling tower forebay
- Existing and Approved SDWTS
- Cox's River Water Supply Pipeline
- Treated water pipeline to Coxs River Water Supply Pipeline
- Existing CEY Conveyor
- Project application area
- Proposed WTP Layout
- Contractor laydown area

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Job Number 21-25109
Revision A
Date 02 Nov 2016

Indicative Water Treatment System Layout

Figure 3-2

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Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Data source: General Topo - NSW LPI DTDB 2012. Imagery - sixmaps 2015. Created by mking3

The treated water will be stored in Thompsons Creek Reservoir along with water drawn from Lake Lyell and will be used to supplement the cooling water make-up requirements during periods of high water demand. When the power station is operating at full capacity up to 54 ML/day of make-up water is required, providing for excess water stored in Thompsons Creek Reservoir to be effectively reused in accordance with current practices.

The new transfer system will remove the need for a treated water pipeline and discharge infrastructure to Wangcol Creek. The Project will essentially operate as a zero discharge operation and would only require release to the catchment in the case of MPPS closure or sustained operation at less than 32% power generation capacity as discussed in Section 3.3.

3.1.4 Water treatment plant capacity

The water treatment plant is proposed to include desalination processes including reverse osmosis units which are typically installed and operated in modules of 6 ML/day capacity. An additional reverse osmosis module will be required to increase the capacity from 36 ML/day to 42 ML/day.

The additional treatment module is anticipated to be accommodated entirely within the indicative water treatment system layout presented in Figure 3-2.

. The new treatment module will not increase the disturbance footprint or require any amendment to the project application area forming the basis of the DA.

3.1.5 Transfer systems capacity

The mine water transfer system will be designed with sufficient hydraulic capacity to transfer all anticipated future flows from the gravity tank compound on the Newnes Plateau to the MPPS. The size of the pipeline will be subject to detailed design and is anticipated to remain consistent with the original DA which specified a nominal 630 mm diameter pipeline subject to ongoing design development. The disturbance footprint and application area associated with transfer system will remain consistent with the EIS.

Brine and residuals transfers are anticipated to remain in accordance with the DA and EIS. The increase in capacity is required to improve the redundancy within the treatment system and will not in itself increase the overall volume of water transferred from the mining operations which is based upon the CSIRO water make predictions as shown in Figure 2-1.

The revised modelling indicates that the combined inflow to the underground workings is predicted to be consistent with the EIS and peak at 36.1 ML/day, although the timing of the peak is anticipated to occur 16 months later than previously considered. As the total volume of water is not significantly changing the management of brine and residuals will remain in accordance with the development as described in the EIS.

3.2 Construction

Construction of the Project will remain principally in accordance with the Project as described in Section 5.5 of the EIS.

The new transfer pipeline to the existing Coxs River Water Supply pipeline will be approximately 300 metres in length and be located within the existing Project Application Area. The amened water management system and will eliminate the need for an approximate 3000 metre length pipeline and discharge infrastructure to Wangcol Creek.

The new desalination module will similarly be accommodated within the indicative water treatment plant footprint presented in the EIS.

There are not anticipated to be any changes to the anticipated construction hours, workforce or Program from that presented in the EIS.

3.3 Coxs River Water Supply System

3.3.1 Existing operations

MPPS primarily sources cooling water makeup water from the Coxs River Water Supply System. The system comprises a number of storage dams, interconnecting pipelines and pumping stations which were established to provide water for local power station operations as shown on Figure 3-3.

Major water storages include:

- Lake Wallace (Wallerawang Reservoir) with a capacity of around 4,300 ML
- Lake Lyell with a capacity of around 32,000 ML
- Thompsons Creek Reservoir with a capacity about 27,500 ML

MPPS currently draws water from Lake Lyell which is either is pumped directly to the power station cooling water system or directed into Thompsons Creek Reservoir as a staging dam. A Water Management Licence Authorises up to 23 000 ML/year from the Coxs River System.

MPPS also has access to supplementary water from the Fish River via a limited water allocation of 8,184 ML/yr for supplementary flows from a Water NSW Licence for the Fish River Water supply.

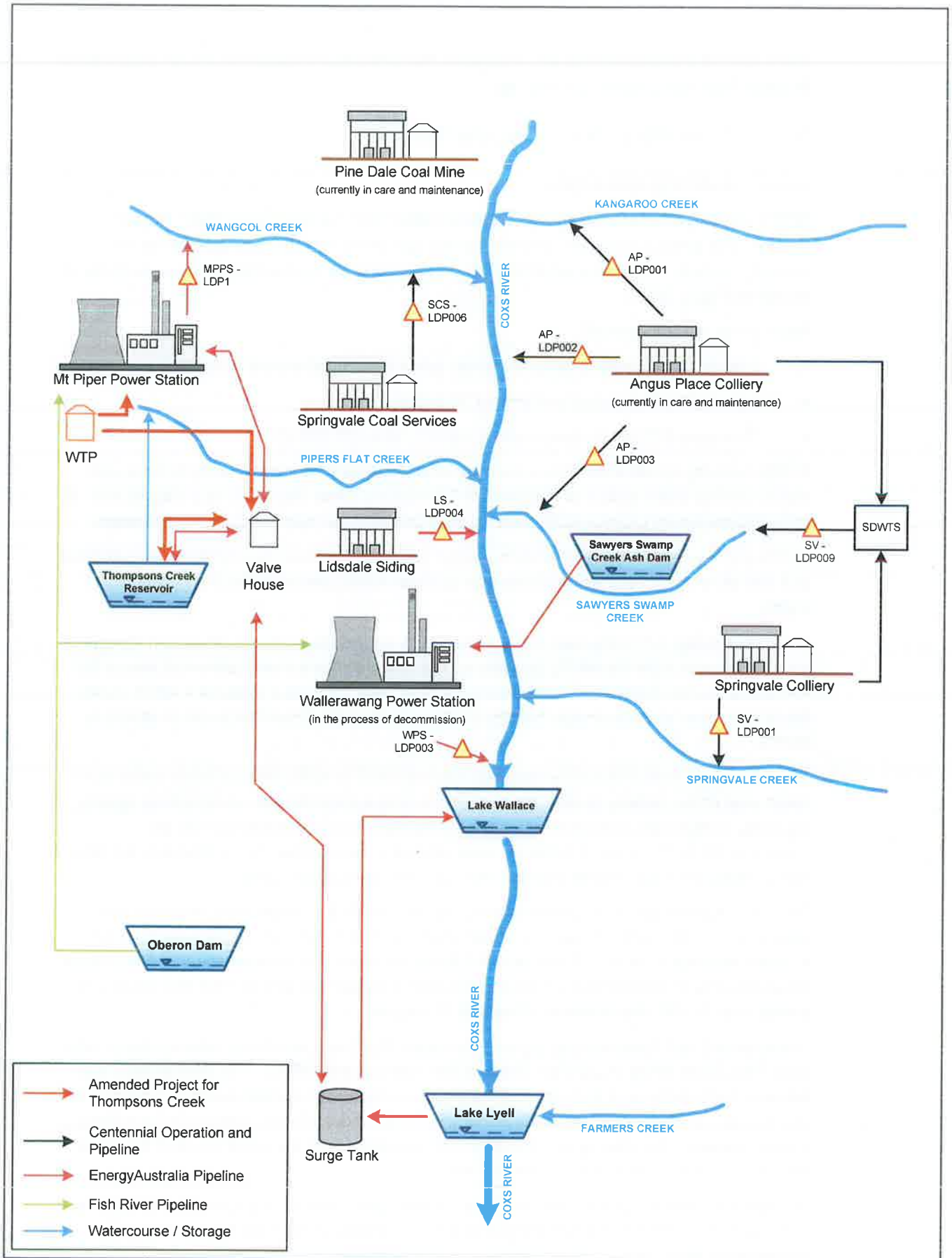
The main function of Thompsons Creek Reservoir is to provide additional off-stream storage of water to drought proof the MPPS operations. The reservoir has a small catchment area of 8.9 km^2 and is therefore primarily filled by pumping from Lake Lyell via a surge tank which gravity feeds to a valve house to enable transfer to either Thompsons Creek Reservoir or directly to MPPS.

The full storage level (FSL) at the reservoir is set at 1,033 m AHD, which is 0.3 m below the invert level of the spillway to allow the reservoir to hold any catchment run-off without spilling. On a day to day basis, the reservoir is typically operated at 0.3 m below the FSL (at 1,032.7 m AHD). The current operating level considers management requirements in addition to safety freeboard requirements between the FSL level and spillway crest.

An 11.6 m submerged inlet outlet structure is located within the centre of the reservoir and serves as an inlet when the reservoir is being filled and an outlet when water is being drawn from the reservoir to MPPS. Environmental flows are required to be maintained to Thompsons Creek equal to or greater than 0.8 ML/day between 1 September and 30 April and equal to or greater than 0.3 ML/day between 1 May and 31 August.

Thompsons Creek Reservoir has an outlet to Pipers Flat Creek which is a valve system on the main Coxs River Water Supply line between the reservoir and MPPS. The valve system has not been historically used as a result of the active management of water levels in the reservoir and the typically high water demands at the MPPS operations. A direct release to Lake Wallace is also available via pumping from the WTP or a surcharge from the valve house to the surge tank and a gravity connection to Lake Wallace.

Thompsons Creek Reservoir offers some of the best lake based fishing for trophy sized rainbow and brown trout in NSW and is managed as a trophy fishery by the Department of Primary Industries under an access agreement with EnergyAustralia.



LOCATION	Western Coalfield
SEAM	NA
DRAWN	SM
CHECKED	LH
APPROVED	SG
SCALE	NTS

Springvale Water Treatment Project
Amendment to Development Application

Coxs River Water Supply System

Centennial Coal
EnergyAustralia

DATE Dec 2016

Figure 3-3

G:\21\25109\Document Transfer\Outgoing\GHD Sydney\2016_12_23 - TCR Rev0\Figs for Karl\2125109_Western Region Water Management Schematic.vsd

3.3.2 Revised operational requirements

The proposed amendment to the development application involves the transfer of any excess treated water to Thompsons Creek Reservoir for storage and subsequent reuse during periods of high power station water demands. The amended Project will utilise the existing Coxs River Water Supply system infrastructure, including the existing valve house to regulate flows between Lake Lyell, Thompsons Creek Reservoir and the MPPS.

Figure 3-4 presents the existing water supply system with the proposed amended Project shown as orange. The amended Project seeks to implement a closed loop for reuse of treated water.

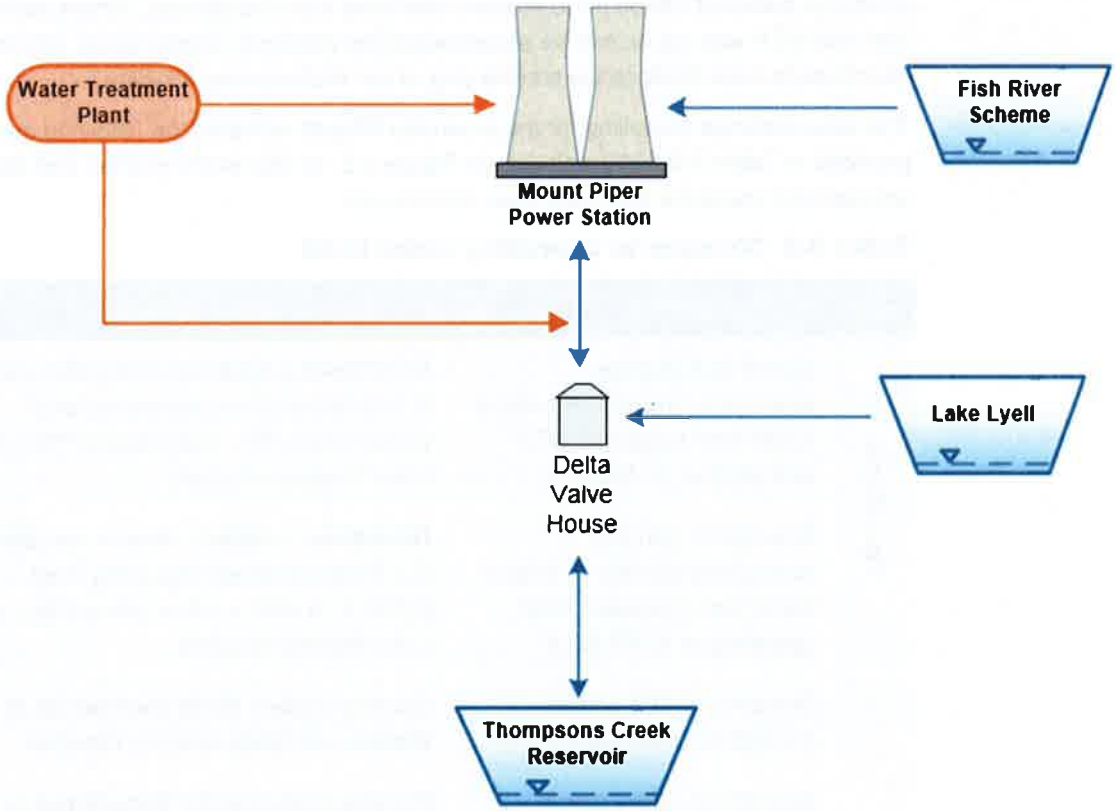


Figure 3-4 Proposed modifications to the water supply system of Thompsons Creek Reservoir

Revised water balance modelling was undertaken to consider the need to alter the existing operating levels within the reservoir to accommodate the additional water transfers. The modelling was undertaken to assess the environmental performance of the Project in accordance with variable power generation scenarios presented in the EIS and complete power station shutdowns for emergency maintenance purposes.

Thompsons Creek Reservoir is currently managed with an operating level of 1,032.7 m AHD, 0.3 m below the FSL. The amended Project proposes to lower the operating level to manage:

- Periods of reduced water demand from MPPS coinciding with increased treatment volumes from the SDWTS and proposed WTP (the assessment of 0% to 100% power generation scenarios).
- Emergency disposal of excess treated water, which may happen on any given day with minimal notice (the assessment of five and ten day shutdown periods for MPPS).

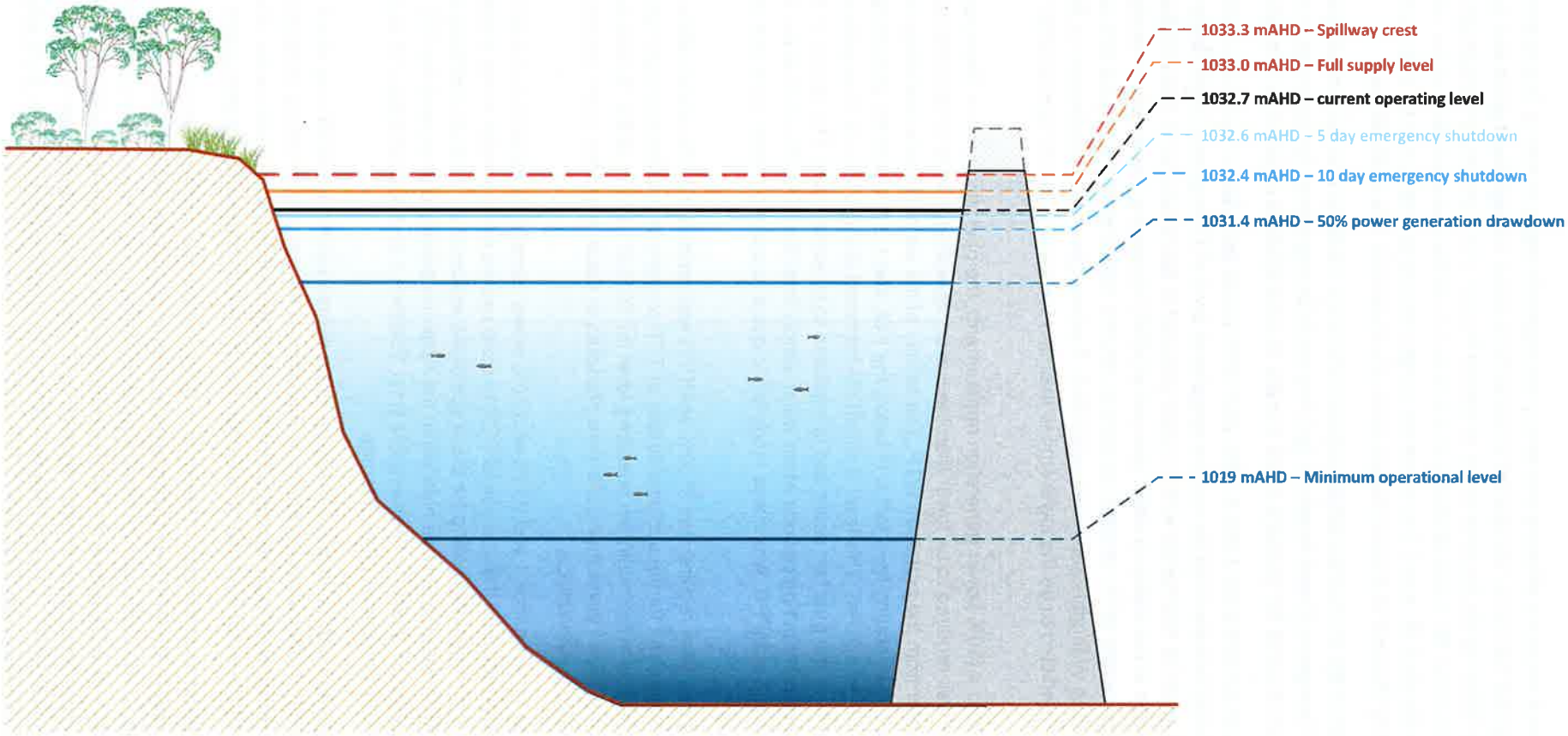
Options to draw down the reservoir to ensure there is sufficient capacity to prevent overtopping include make-up water supplied to MPPS, seepage through the dam wall, evaporation from the surface of reservoir, release to Pipers Flat Creek via a discharge valve and a surcharge system that allows for water to flow from Thompsons Creek Reservoir to Lake Wallace, via the Wallerawang Pipeline.

The operation of the Coxs River Water Supply System was refined in the water balance model to incorporate the amended Project. Any excess treated water from the WTP not able to be reused within the MPPS cooling water system was modelled to be released into Thompsons Creek Reservoir. The operational level (maintained storage level) of the reservoir was reduced to ensure sufficient freeboard to prevent overflows from the storage. Where additional water from the WTP was not able to be stored within the reservoir, excess water was modelled to contribute to Lake Wallace via surcharging of the Wallerawang Pipeline.

The water balance modelling for the amended Project indicated the following outcomes, provided in Table 3-2 and graphically in Figure 3-5, for the environmental and operational assessment scenarios that have been considered.

Table 3-2 Changes to operating water level

	Scenario	Outcome
Operational	Scenario A (five day emergency transfer of treated water from proposed WTP operating at 42 ML/day)	**Drawdown** – Reduce current operating level down 0.1 m below current operating level (1,032.6 m AHD – 0.4 m below FSL). No transfer to Lake Wallace required.
	Scenario B (ten day emergency transfer of treated water from proposed WTP operating at 42 ML/day)	**Drawdown** – Reduce current operating level down 0.3 m below current operating level (1,032.4 m AHD – 0.6 m below FSL). No transfer to Lake Wallace required.
Environmental	Scenario 1 – 0% power generation at MPPS	**Excess treated water transferred to Lake Wallace via Wallerawang Pipeline.**
	Scenario 2 – 25% power generation at MPPS	**Excess treated water transferred to Lake Wallace via Wallerawang Pipeline.**
	Scenario 3 – 50% power generation at MPPS	**Drawdown** – Reduce current operating level down 1.2 m below current operating level (1,031.4 m AHD – 1.6 m below FSL). No transfer to Lake Wallace required.
	Scenario 4 – 75% power generation at MPPS	**Maintain/drawdown** – Maintain current operating level at 1,032.6 m AHD (±0.1 m from existing operating level). No transfer to Lake Wallace required.
	Scenario 5 – 100% power generation at MPPS	**Maintain/drawdown** – Maintain current operating level at 1,032.6 m AHD (±0.1 m from existing operating level). No transfer to Lake Wallace required.



LOCATION	Springvale
SEAM	NA
DRAWN	SM
CHECKED	LH
APPROVED	SG
SCALE	NTS

Springvale Water
Treatment Project
Amendment to Development Application

Changes to operational water level

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DATE Dec 2016

Figure 3-5

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Operational decisions affecting day-to-day management requirements of Thompsons Creek Reservoir will form a key component in revisions to water management plans and operational manuals following the approval of the amended Project. For a ten day shutdown period at MPPS (Scenario B), it was predicted that a reduction in the operation level of the reservoir to 0.6 m below the FSL and 0.3 m below the current operating level would be sufficient to manage emergency disposal of excess treated water at a maximum rate of 42 ML/day.

Outcomes of the environmental assessment scenarios indicated that the current operational level of Thompsons Creek Reservoir (±0.1 m) could be maintained for scenarios 4 and 5, with drawdown required for Scenario 3 and transfer to Lake Wallace required for scenarios 1 and 2.

The results for scenarios 4 and 5 (75% and 100% power generation requirement at MPPS respectively) indicated that the current operational level of Thompsons Creek Reservoir (±0.1 m) could be maintained with no water required to be transferred to Lake Wallace. This is primarily due to the make-up water demand at MPPS exceeding the supply of treated water from the proposed WTP, which is consistent with the outcomes of the original EIS (where no discharges to Wangcol Creek were predicted). A power generation requirement at MPPS of 61% was predicted to be the lower limit to maintain the current operating level of the reservoir (±0.1 m).

For Scenario 3 (50% power generation requirement), the operating level of Thompsons Creek Reservoir was required to be lower than the current operating level to sustainably store excess treated water from the proposed WTP. The results of the water balance modelling indicate that a reduction in operating level to 1.6 m below the FSL and 1.3 m below the current operating level would be required. This level is within the historical storage level of Thompsons Creek Reservoir over the past two years and is expected to be sustainable. The reduction in operating level is necessary during periods when water supply from the SDWTS exceeds the make-up water demand at MPPS, which was modelled to occur to occur between 2029 and 2035 for Scenario 3.

A power generation requirement of 32% at MPPS was predicted by the water balance modelling to be the upper limit for the sustainable use of TCR to store excess treated water (assuming an operational level at the minimum operating level for TCR of 1,019 m AHD). Sustained power generation at levels lower than 32% were predicted to result in excess water required to be transferred to Lake Wallace.

The results for scenarios 1 and 2 (0% and 25% power generation requirement at MPPS respectively) indicated that the use of TCR to store excess treated water is not sustainable over the life of the Project. Modelling for these scenarios assumed a minimum operating level of 1,019 m AHD, with the volume held within the reservoir predicted to exceed the FSL after approximately 3.7 years (in February 2021) for Scenario 1 and approximately 18 years (in August 2035) for Scenario 2 on average.

MPPS operates with an average make-up water demand of around 40ML/day which increases to around 54 ML/day when the station is operating at full capacity. In reality all treated water is therefore anticipated to be reused within the MPPS operations with excess water drawn back to supplement the water supplied directly from the WTP during periods of higher power demand.

Power generation at the station varies on a daily basis to meet energy demand requirements and it is unlikely the MPPS would undergo sustained operations at less than 50% power generation. Even during low demand market cycles, there are expected to be periods of higher market demand such as over the peak summer months where excess water will be required to be drawn from Thompsons Creek Reservoir and Lake Lyell to supplement the treated water supply from the WTP. There is therefore likely to be ample opportunities to draw down the reservoir to manage water levels.

The MPPS currently supplies approximately 14% of the energy demand to NSW and would only operate for extended periods at below 50% during extreme circumstances such as a need to enter coal conservation mode due lack or coal supply or extreme market slow down. These circumstances cannot be realistically foreseen and would likely coincide with reduced dewatering requirements from Springvale Mine and Angus Place Colliery which is currently the main coal supply to power station.

The water balance modelling for the 0 and 25% power generation capacities does highlight that Thompsons Creek Reservoir will not provide infinite storage of water beyond the MPPS make-up water requirements. The capacity of the Project to accept additional water is limited and the need for a mechanism to release water from the Thompsons Creek Reservoir to prevent overtopping the weir.

The Coxs River Water Supply System currently operates with two disposal options to manage water levels within Thompsons Creek Reservoir including an outlet to Pipers Flat Creek in the upper Coxs River catchment or surcharging the system to release via the surge tank to Lake Wallace. Release directly to Lake Wallace is consider preferable as it is located lower in the catchment at the downstream catchment has ample capacity to accept the flows. This could also occur through pumping directly to the surge tank from the WTP pump station to ensure excess water does not directly receive the excess flows.

The excess water predicted in the water balance model to be transferred to Lake Wallace for scenarios 1 and 2 are summarised in Table 3-3. It should be noted that the 0 and 25% power generation scenarios are unlikely to occur for sustained operations the water would be a blend of water treated to Springvale MEP consent requirements and water drawn from the catchment.

Table 3-3 Predicted excess water from Thompsons Creek Reservoir

Scenario	10th percentile (ML/day)	Average (ML/day)	90th percentile (ML/day)	Corresponding year peak occurs
Scenario 1 – 0% power generation at MPPS	26.8	27.9	29.4	2031 – peak groundwater occurs this year
Scenario 2 – 25% power generation at MPPS	5.5	8.6	10.9	2035 – delay in peak due to reuse by power station demand

As Lake Wallace is currently maintained as full with excess water from the lake discharged downstream to the Coxs River, the increase of inflow volumes to the lake are unlikely to change the current operating conditions with respect to flow frequency however the flow volume is likely to increase.

3.4 Land Ownership

The existing Coxs River Water Supply system infrastructure traverses a number of land holdings either owned or subject to existing lease arrangements with Energy Australia. Table 2.1 from the Springvale Water Treatment Project EIS has been updated to reflect land holdings traversed by the revised Project Application Area including the existing pipeline between MPPS and Thompsons Creek Reservoir as shown in Figure 3-1. Minor errors to the land holdings presented in the EIS for the remainder of the Project Application Area have also been addressed in Table 3-4

Table 3-4 Lot and DP for properties in the Project area

Owner	Lot and DP
Energy Australia NSW Pty Ltd	Lot 191 DP 629212 Lot 101 DP 829410 Lot 2 DP 702619 Lot 15 DP 804929 Lots 3 and 5 DP 829137 Lots 101 and 103 DP 1164619 Lot 1 and 5 DP 1087684 Lot 1 DP 829065 Lot 9 DP 804929
Centennial Springvale Pty Ltd and Springvale SK Kores Pty Ltd	Lot 1 DP 88503 Lot 501 DP 825541 Lot 2 DP 126483 Lot 13 and 357 DP 751651 Lots 2, DP 1151441
Lithgow City Council	Wolgan Road Skelly Road Brays Lane
Ivanhoe Coal Pty Ltd	Lot 2 DP 567915 Lot 101, DP 1137972 Lot 16 DP 751651 Lot 174 DP 751651 Lot 385 and Lot 375 DP 754651
Janette Winifred Hunt (private)	Lot 371 DP 751651
NSW State Forest	Lot 502, DP 822541 Lot 3 DP 1151441
RMS	Castlereagh Highway
The Crown	Various paper roads
Existing Cox River Water Supply Pipeline (MPPS to Thompsons Creek Reservoir)	
Energy Australia NSW Pty Ltd	Lot 1 DP 829065 Lot 2 DP 702619 Lot 1 DP 800003 Lot 241 DP 8019151/1183453 Lot 191 DP 629212 Lot 254 DP 806025 Lot 103 DP 1164619
Wayne Alfred Hollands & Lorraine Elsie Hollands	Lot 1 DP 710709 Lot 101 DP 1053026 Lot 102 DP 1053026
Taranza Pty Ltd	Lot 2 DP 874368
The State of New South Wales	Lot 2 DP 1183453 Lot 47 and Lot 91 DP 751638 Lot 502 DP 825541
Alexander William Fraser and Marie Janice McCann	Lot 122 DP 751651
Edward Gerard Eustace & Glenys Joy Wilkinson Eustace	Lot 7 DP 828737
Ivanhoe Coal Pty Ltd	Lots 166, 160, 159, 165 and 164 DP 751638 Lot 1 DP 1151441
Marjon Holdings Ltd	Lot 242 DP 801915
David Jackson Turnbull & Carmel June Turnbull	Lot 123 DP 751651 Lot 1 DP 1176813
Transport for NSW	Lot 2003 DP 1221830

4. Environmental risk screening

4.1 Purpose

An environmental risk screening was undertaken to identify potential environmental impacts that may arise as a result of the proposed minor amendment to the development application beyond those identified in the EIS. The assessment was undertaken to broadly assess the potential environmental risks that may arise as a result out of the proposed amendment and to identify any areas requiring further detailed assessment.

The environmental risk screening for the Project involved:

- Identifying environmental aspects
- Identifying the source of potential risks associated with each of these aspects
- Identifying the potential impact associated with each risk
- Identifying any further assessment requirements needed to quantify the extent of impacts associated with the proposed modification.

Table 4-1 provides the environmental risk analysis for the Project, it includes:

- A summary of the potential key impacts/risks
- Consideration of the priority for the assessment
- A discussion regarding the findings of the preliminary risk screening.

Table 4-1 Preliminary environmental risk screening results

Environmental aspect	Source of risk	Potential impact	Risk rating	Discussion
Water quality	Inclusion of the transfer to Thompsons Creek Reservoir will alter the discharge patterns and pollutant loads to the catchment	Transfer of excess treated water to Thompsons Creek Reservoir is anticipated to be of overall benefit to the receiving waters. There is potential for a minor impact upon water quality in Wangcol Creek by the disposal of residuals from the pre-treatment process to the Springvale Coal Services site	High	Inclusion of the transfer to Thompsons Creek Reservoir and removal of the discharge structure to Wangcol Creek will result in an alteration to the performance of the water management system included in the EIS. A water resources impact assessment is required to assess the performance of the revised water management system and the environmental benefits for the overall Coxs River catchment.
Hydrology and hydraulics	Inclusion of the transfer to Thompsons Creek Reservoir will alter the discharge patterns and flows within the receiving water environment	Removal of the discharge to Wangcol Creek will eliminate potential risks associated with discharge of excess water to receiving waters. Potential to impact upon Thompsons Creek, Pipers Flat Creek and the Coxs River by altered management practices at Thompsons Creek Reservoir	Moderate	Management of water levels within Thompsons Creek Reservoir and consideration of any required alteration to existing management practices for the Coxs River Water Supply system to be included in the revised water resources impact assessment for the Project.
Soils	Disturbance resulting from installation of the transfer pipeline and associated infrastructure for connection to the existing Cox River Water Supply system	Risk of soil disturbance during pipeline installation is in accordance with the assessment in the EIS	Negligible	The new pipeline would be approximately 300 metres in length and fall entirely within the proposed WTP site included in the Project Application Area for the development application. The site has been previously assessed and the amendment does not introduce any new risks beyond what has been considered in the EIS. Removal of the approximate 3000 metre transfer pipeline and discharge structure to Wangcol Creek will reduce the potential for impacts associated with soil disturbance along the alignment

Environmental aspect	Source of risk	Potential impact	Risk rating	Discussion
Flora and fauna	Disturbance resulting from installation of the transfer pipeline to the existing Cox River Water Supply system	Risk to terrestrial flora and fauna is in accordance with the assessment in the EIS	Negligible	The new pipeline would be approximately 300 metres in length and fall entirely within the proposed WTP site included in the project application area for the development application. The site has been previously disturbed and is limited to regrowth with little ecological value. The site has been previously assessed and the proposed amendment does not introduce any new risks beyond what has been considered in the EIS.
Aquatic Ecology	Amendment of the proposed water management system altering water quality in Thompsons Creek Reservoir	Altered water quality associated with the Project impacting upon aquatic ecology within Thompsons Creek reservoir and the receiving environment	Moderate	All underground mine water will receive treatment prior to transfer to Thompsons Creek Reservoir and is likely to be of superior quality than water currently transferred from Lake Lyell in the Coxs River Water Supply system. Impacts upon aquatic ecology including impact upon the trout fishery to be included in an updated water resources impact assessment.
Air quality	Dust emissions during construction of new infrastructure	Risk to local air quality is considered in accordance with assessment in the EIS	Negligible	The proposed amendment to the DA will not result in any potential to increase dust emissions in comparison to the assessment within the EIS.
Noise and vibration	Additional pumping capacity required to transfer excess water to Thompsons Creek Reservoir	Noise generated during the operation of the pump station impacting upon surrounding receivers	Negligible	The WTP site is not located in close proximity any residential receivers. Any additional noise is predicted to be insignificant and will not cumulatively contribute to the ambient noise environment in the area.
Greenhouse	Minor increase in power consumption for pumping excess water to Thompsons Creek reservoir	Increase in pumping requirements will result in slight increase greenhouse emissions	Negligible	Minor increase in power consumption
Heritage	Disturbance resulting from installation of the transfer pipeline to the existing Cox River Water Supply system	Risk to Aboriginal and Non-Aboriginal heritage is in accordance with the assessment in the EIS	Negligible	All new infrastructure will fall within the proposed WTP and included in the Project application area. The site has been previously assessed and is considered to have minimal potential for any unidentified sites as a result of the level of previous disturbance in the area.

Environmental aspect	Source of risk	Potential impact	Risk rating	Discussion
Traffic and transport	Alteration to the required vehicle movements during construction or operation	There are not anticipated to be any additional vehicle movements associated with the proposed amendment. There will be no construction activities required at Thompsons Creek Reservoir or on the existing Coxs River Supply system outside of the proposed water treatment plant site.	Negligible	The proposed amendment to the DA will not result in any potential to increase impacts upon the local road network in comparison to the assessment within the EIS.
Visual	Additional visual elements associated with the proposal	Visual impacts are largely in accordance with the assessment in the EIS	Negligible	The new transfer pipeline is expected to be buried and additional treatment plant modules will be integrated within infrastructure proposed within the original development application.
Waste	Increased WTP capacity increasing the volume of residual and brine management streams requiring disposal	Risk associated with waste management is considered in accordance with the assessment in the EIS	Negligible	The additional capacity at the WTP is required to ensure sufficient redundancy is included in the water management system to ensure complete
Social	Amendment of the proposed water management system altering levels and water quality within Thompsons Creek Reservoir	Altered water quality impacting upon the use of Thompsons Creek Reservoir for trout fishing	Moderate	Altered water management requirements at Thompsons Creek reservoir are not anticipated to have a significant impact upon trout fishing in the reservoir. Further consideration will be undertaken in a revised water resources impact assessment for the Project.

4.2 Priority for assessment

Based upon the results of the environmental risk screening, the following broad qualitative risk ratings were assigned for each environmental aspect.

- High – water quality
- Moderate – hydrology and hydraulics, aquatic ecology and social
- Negligible – soils, flora and fauna, air quality, noise and vibration, greenhouse, traffic and transport, visual and waste management.

A detailed water resources impact assessment has therefore been undertaken to assess the impact of the proposed modified development application in regards to water quality, hydrology, aquatic ecology and potential impacts upon the trout fishery.

The water resources impact assessment is included in Appendix A with the key outcomes of the assessment summarised in the following section.

All other environmental aspects are considered to remain primarily consistent with the assessment included in the EIS and no further assessment has been undertaken.

5. Water resources

5.1 Introduction

A detailed water resources assessment has been undertaken to determine the potential impact of the amended Project upon the receiving water environment and is included in full in Appendix A.

The assessment investigated the potential impacts of the amended Project on the local water cycle, surface water quality, the fish community within Thompsons Creek Reservoir stream health and downstream water users. The assessment builds on the works previously prepared for the EIS with revised modelling to consider the potential impacts to surface water as a result of the transfers of excess treated water to Thompsons Creek Reservoir.

5.2 Water and salt balance

A revised water and salt balance model was developed for the Project to assess changes in the local and regional water and salt cycle. Updates to the model prepared for the EIS were undertaken to reflect:

- Refined modelling of the operation of Thompsons Creek Reservoir, Lake Lyell and the Coxs River Water Supply System.
- Updated detailed water and salt balance model for Springvale Coal Services site (SCSS).
- Updated predictions of groundwater inflows from Springvale Mine and Angus Place Colliery transferred to the SDWTS based upon CSIRO 2016 modelling data.

The modelling considered the same operational scenarios that were undertaken for the EIS including 0%, 25%, 50%, 75% and 100% power generation water demands from MPPS. Scenario 3 representing the 50% power generation requirement was used to present the results for the modelling for the existing conditions, do nothing scenario and the proposed scheme. The 50% power generation requirement is considered to be the most representative of existing and proposed conditions, as it correlates to recent historical trends of water demand at MPPS and corresponds to the approximate volume of water available from the SDWTS.

Total inflows to Lake Wallace, Lake Lyell and Lake Burragorang from the Coxs River were predicted in decrease as part of the Project when compared to existing conditions and the do nothing scenario. This is due to the predicted increase in future mine water make compared to existing conditions and maximising the use of treated water within the cooling water system as part of the Project as shown on Table 5-1.

The EC of the Coxs River at the inflow to the surface water storages is predicted to decrease by more than 50% for flows into Lake Wallace and Lake Lyell and decrease by more than 25% for flows into Lake Burragorang in Sydney's drinking water catchment. This occurs as a result of the desalination achieved within the treatment process and the reuse achieved by the Project in comparison to the modelled discharge to via LDP009 to Sawyers Swamp Creek in the Do Nothing Scenario as shown in Table 5-2.

Table 5-1 Summary of change in water volume results under proposed conditions

Location	Existing conditions (ML/year)	Do nothing scenario (ML/year)	Scenario 3 (ML/year)	Change between Scenario 3	
				Existing conditions	Do nothing scenario
Wangcol Creek at confluence with Coxs River	3,027.5	2,964.8	3,092.6	2%	4%
Coxs River flow to Lake Wallace	23,179.7	27,761.1	15,046.8	-35%	-46%
Coxs River flow to Lake Lyell	33,617.6	38,124.5	25,410.1	-24%	-33%
Coxs River flow to Lake Burragorang	123,915.2	128,299.4	126,818.6	2%	-1%

Table 5-2 Summary of change in electrical conductivity results under proposed conditions

Location	Existing conditions (µS/cm)	Do nothing scenario (µS/cm)	Scenario 3 (µS/cm)	Change between Scenario 3	
				Existing conditions	Do nothing scenario
Wangcol Creek at confluence with Coxs River	910	790	920	1%	16%
Coxs River flow to Lake Wallace	660	710	340	-48%	-52%
Coxs River flow to Lake Lyell	510	560	270	-47%	-52%
Coxs River flow to Lake Burragorang	170	190	140	-18%	-26%

The Project is anticipated to result in a small increase in the flow in Wangcol Creek at the confluence with the Coxs River by up to 2% on average compared to existing conditions and by up to 4% compared to the do nothing scenario. This is as a result of an increase in the discharge from LDP006 associated with the transfer of residual material from the Project to the Springvale Coal Services Site. The EC in Wangcol Creek was predicted to increase as a result of the discharges from LDP006, by up to 16% compared to the do nothing scenario. However, the changes in the water management system at SCSS were found to mitigate this increase with only a 1% increase in EC compared to existing conditions.

The Project is considered to provide an overall environmental benefit to Sydney's drinking water catchment. The total salt contribution from the Coxs River catchment to Lake Burragorang from 16,234 t/year in the Do nothing scenario to 11,540 t/year following implementation of the Project. This represents an improvement of 241 t/year in comparison to the scheme presented in the EIS including the transfer to Wangcol Creek. Further improvement will be achieved through management of water levels in Thompsons Creek Reservoir to prevent any subsequent release to the catchment

5.3 Water quality

The release of excess treated water to Thompsons Creek will dilute the water within the reservoir, as the treated water is predicted to be considerably less saline than existing catchment water quality. Minimal change to the water quality within the reservoir is predicted due to the large volume of the reservoir and the unlikelihood of any sustained, high-volume transfers of treated water to the reservoir.

Negligible change to the water quality in the downstream receiving environments of Thompsons Creek and Pipers Flat Creek is predicted. SSGVs were derived based on the historical water quality monitoring record for Pipers Flat Creek and the DGVs recommended by ANZECC (2000). No exceedances of the derived ANZECC site specific guideline values are predicted as a result of the amended Project.

5.4 Aquatic Ecology

The environmental tolerances of rainbow trout, brown trout and flathead gudgeon were established based on a literature review and it is considered unlikely that the amended Project will have an impact on the fish community. The temperature and the low hardness of the proposed release have the potential to be outside the ranges of trout tolerance, however these factors are not likely to effect the fish community given the size and depth of the reservoir.

The distribution of trout species within Thompsons Creek Reservoir is predicted to change in response to changes in water level, due to changes in the availability of preferred habitat, however this is not predicted to result in any mortality or reduction in survival of the species. The treated water releases are not predicted to be toxic to any of the fish species in the reservoir.

Water monitoring requirements for the amended Project have been proposed with a reduction of monitoring requirements within Wangcol Creek and an increased monitoring requirement at Thompsons Creek Reservoir and downstream of Pipers Flat Creek and Lake Wallace (in the event that transfers from Thompsons Creek Reservoir to Lake Wallace are required).

A trigger action response plan (TARP) has been prepared to demonstrate the daily management requirements to be in place as part of the operational phase of the Project. A similar trigger action response plan structure is likely to be proposed as part of revisions to site water management plans for EnergyAustralia's operations and the development of new water management plans for the proposed WTP.

The commissioning phase report remains a key requirement for the implementation of the proposed WTP following approval of the Project. As part of the amended Project, this will be modified to address the requirements of mitigating risk to TCR and for the new connection requirements of excess treated water to the main supply line from TCR to MPPS.

6. Conclusion

Springvale Coal propose a minor amendment to the DA (SSD 16_7592) to facilitate the transfer of excess treated to Thompsons Creek Reservoir and to increase the capacity of the water treatment plant to 42 /ML/day.

The Amended Project is considered predominantly consistent with the development described in the EIS for the Springvale Water Treatment Project. Potential environmental impacts are considered to be predominantly consistent with those described in the EIS.

An updated Water Resources Impact Assessment has been undertaken to consider the impacts associated with the revised water management system. The amended Project will be of overall benefit to the Coxs River catchment and will improve the overall performance of the Project.

Appendices

Appendix A – Water Resources Impact Assessment

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