REQUEST FOR ADVICE

Summary			
Requesting agency/agencies	NSW Department of Planning, Industry and Environment (DPIE) and the Commonwealth Department of the Environment and Energy (DoEE)		
Project title	Glendell Continued Operations Project	**Applicant**	Glendell Tenements Pty Ltd, a wholly-owned subsidiary of Glencore Coal Pty Ltd (Glencore)
Reference no.	SSD 9349 EPBC 2019/8409	**State**	NSW
Project stage	The *Environmental Impact Statement* (EIS) for the Project is on public exhibition from 11 December 2019 until 31 January 2020. Following exhibition, Glencore will prepare a Submissions Report for consideration in DPIE's Assessment Report.		
Timing	IESC's advice is required for input to DPIE's consideration of the Applicant's EIS and in the preparation of the Assessment Report.		
Documentation	The EIS with the supporting appendices is available at: https://www.planningportal.nsw.gov.au/major-projects/project/10086		
Description of the proposed project			
Development type	☐ Coal Seam Gas	☒ Open cut coal mine	☐ Underground coal mine
	☐ Other:	**Site**	☐ New ☒ Expansion
Operational life	Extension of approved mine life by approximately 20 years to 2044.	**Scale**	• Extraction of an additional 135 million tonne of run-of-mine (ROM) coal over the life of the Project. • An increase in the maximum production rate from 4.5 million tonne per annum (Mtpa) to 10 Mtpa of ROM coal.
Geological basin	Hunter coalfield towards the northeastern margins of the Permian and Triassic Sydney basin. Local geology comprises: • Quaternary alluvium • Jerrys Plans Subgroup • Vane Subgroup	**Coal resource**	Wittingham Coal Measures – comprising lowermost coal bearing formations of Burnamwood, Bulga and Foybrook. Seven target seams (from the Bayswater seam to Hebden seam) to a maximum depth of

	• Saltwater Creek Formation.		approximately 240 m below ground surface will be mined. The seams comprise: • Bayswater (top most seam) • Lemington • Pikes Gully • Arties • Liddell • Barrett • Hebden
Assessment of impacts to water resources			
Surface water catchment	The Project is located within the Bowmans Creek catchment and the sub-catchments of Swamp Creek, Yorks Creek and Bettys Creek. The following Water Sharing Plans (WSPs) and management zones apply to surface flows and alluvial systems in the vicinity of the Project: • *WSP for the Hunter Unregulated and Alluvial Water Sources 2009:* o Jerrys Water Source o Glennies Water Source o Hunter Regulated River Alluvium (Glennies Creek alluvium) • *WSP for the Hunter Regulated River Water Source 2016:* o Management Zone 3A – Glennies Creek o Station Creek surface water.	**Groundwater basin**	The groundwater system in the Permian strata falls under the Sydney Basin – North Coast Groundwater Source under the *WSP for the North Coast Fractured and Porous Rock Groundwater Sources 2016.*
Key water related assets	**Surface water:** • Bowmans Creek and Glennies Creek are the two main significant watercourses in the vicinity of Glendell Mine. The Glennies Creek catchment is not likely to be directly affected by the Project. • The Project Area is primarily located in the Bowmans Creek catchment (and the sub-catchments of Swamp Creek, Yorks Creek and Bettys Creek). Bowmans Creek is a tributary of the Hunter River. Bowmans Creek is a semi-permanent creek, with flows heavily influenced by rainfall. Yorks Creek and Swamp Creek are ephemeral systems. • The Project is regulated by the Hunter Unregulated and Alluvial Water Sources WSP and Hunter Regulated WSP. The licensing of predicted take of surface water would be met through a combination of existing licences,		

	harvestable rights and catchment adjustments. The licensing requirements would be reviewed throughout the life of the Project. The review of the adequacy of the available licences would have regard to licensing requirements for all approved operations at the Mount Owen Complex which also includes Glencore's Mount Owen (North Pit) and Ravensworth East (Bayswater North Pit) operations. • The Project includes the realignment of the lower section of Yorks Creek, an ephemeral tributary of Bowmans Creek, of which approximately 1.5 km section has previously been diverted. The realigned Yorks Creek would join Bowmans Creek upstream of the current alignment. • The proposed Glendell Pit Extension has been set back at least 200 m from the high bank of Bowmans Creek to minimise potential impacts. • Sections of Yorks Creek and Swamp Creek traversing the Glendell Pit Extension would be directly intercepted by mining. • The Project proposes to use existing infrastructure in the Mount Owen Complex, including the coal handling and preparation plant (CHPP), the Mount Owen Complex Water Management System (WMS) and rail loading facilities. • No surface water discharges from Glendell Mine are proposed. Mine water and tailings would continue to be managed in accordance with the existing Glendell WMS, which is integrated with the Mount Owen Complex WMS and the overarching Greater Ravensworth Area Water and Tailings Scheme (GRAWTS). • The GRAWTS also manages mine water and tailings management from two other Glencore operations, Ravensworth Operations and Liddell Coal Operations. Excess mine water discharge from the Mount Owen Complex WMS occurs at Ravensworth Operations and/or Liddell Coal Operations pursuant to licences held by those operations. • The Project's EIS has assessed the following potential impacts of the proposed mining in the Project on surface water resources arising from: o increased disturbed area o changes to site water balance and impacts to GRAWTS o permanent realignment of lower reach of Yorks Creek resulting in changes to catchment changes, flood regimes and behaviour, geomorphology and downstream water quality o changes to the final void resulting in Glendell final void / pit lake water recovery and water quality o changes to final landform and downstream catchments from changes to flow regimes and flooding o reduced baseflow in creeks associated with impacts on groundwater systems in the region. **Groundwater:** • The Project's groundwater system comprises the alluvium associated with the watercourses within and surrounding the Project Area and the underlying Permian strata comprising the regolith, the non-coal interburden aquitards and the permeable coal seams. • The Project's Permian groundwater system is within the Sydney Basin – North Coast Groundwater Source under the North Coast Fractured and Porous Rock Groundwater Sources WSP.

	• The Yorks Creek and Swamp Creek alluvial aquifers would be directly intercepted by mining operations. • The main causal pathway for potential impacts from the proposed mining in the Project on the water dependent assets has been identified as the depressurisation of the Permian Strata resulting in the drawdown within Bowmans Creek alluvium adjacent to, and to the west, of Glendell Mine. • A detailed numerical groundwater flow model for the region using a 3D MODFLOW-USG code was developed to understand the impact of the Project in the context of impacts associated with the historical and approved mining operations. The model incorporates data from existing and approved operations in the surrounding locality, including the Mount Owen Mine, the Rix's Creek Complex, the Integra Underground Mine, Liddell Coal Operations and Ravenworth Operations. • Groundwater inflows associated with the Project are predicted to peak at 249 megalitres per year (ML/year) in Year 17 of mining, with an average of 111 ML/year over the life of the Project. This predicted groundwater take from the Sydney Basin – North Coast Groundwater Source (Permian coal measures) would fall within Glencore's total entitlement for the Mount Owen Complex Operations (1160 ML/year). • Permian groundwater resources in the locality have been extensively depressurised by historic mining activity. Groundwater drawdowns in the Middle Liddell Seam of the Permian Strata are provided, as this seam has been subject to active mining, including underground mining, at nearby mines and is therefore considered to represent worst-case cumulative impacts. The maximum predicted drawdown in the Middle Liddell Seam as a result of the Project is 50 m. The zone of depressurisation in the Middle Liddell Seam attributable to the Project is predicted to extend up to 2.5 km from the extended Glendell Pit. • Predicted cumulative drawdown in Bowmans Creek alluvium is up to 2 m in isolated areas with much of this predicted drawdown occurring due to the existing approved and historical operations. The maximum drawdown due to the Project is less than 1 m, and the Project's predicted contribution to cumulative impacts is limited to localised areas adjacent to the point of intersection of the Glendell Pit Extension with Yorks Creek and Swamp Creek alluvial aquifers. • The only potential highly productive aquifer in the Project Area is Bowmans Creek alluvium. The EIS has assessed the Project's impacts on this aquifer system and states the impacts to this alluvium would not exceed the relevant minimum harm criteria defined in the Aquifer Interference Policy (AIP). • Maximum drawdown predictions in two potentially impacted groundwater bores sourcing water from the regolith strata below the Quaternary alluvium (located on the west of Glendell Mine) as a result of the Project are less than the 2 m minimal threshold cumulative impact specified in the AIP. • No potentially impacted high priority groundwater dependent ecosystems have been identified in the relevant WSPs and the Project would not exceed the minimal impact thresholds ('less than or equal to 10% cumulative variation in the water table') of the AIP. • The water level in the final void is predicted to stabilise at approximately -60 mAHD 450 years post-mining. • Water levels in the final void lake are predicted to be about 130 m below pre-mining groundwater levels.

	• The maximum zone of drawdown and the water table (depth of saturation) within the Quaternary alluvium is predicted to occur during the post mining recovery phase.
Relevant water management policies, regulations or information	**Commonwealth** • *Environment Protection and Biodiversity Conservation Act 1999* • *IESC Information Guidelines for Proponents preparing coal seam gas and large coal mining development proposals* (Information Guidelines) • *Information Guidelines Explanatory Note: Assessing Groundwater Dependent Ecosystems* • Publicly available information from the Sydney Basin Bioregional Assessment • National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ) • ANZG (2018), Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia **New South Wales** • *Water Management Act 2000* • *Protection of the Environment Operation Act 1997* • *Aquifer Interference Policy* (DPI, 2012), which sets the threshold for acceptable impacts of proposed developments • *Using the ANZECC Guideline and Water Quality Objectives in NSW* (EPA, 2006) • *NSW Water Quality and River Flow Objectives* (DECCW, 2006) • Water Sharing Plans (WSPs): o North Coast Fractured and Porous Rock Groundwater Sources WSP o Hunter Unregulated and Alluvial Water Sources WSP o Hunter Regulated WSP.
Key issues	a. Impacts of the proposed diversion of Yorks Creek and impact of changed hydraulic path and flow velocities on sediment transport processes, impacts on water quality, and the resulting loss of riparian habitat and aquatic biota in Yorks Creek and downstream in Bowmans Creek. b. Impacts on change in flow regimes and water quality and flooding potential during and after mining due to changes in the landform (including the proposed realignments of Yorks Creek and Hebden Road, direct interceptions of Swamp Creek and Yorks Creek sections within the mining area) and resulting changes in the catchment areas. c. Impacts on the groundwater resources (drawdown, baseflow reductions) due to the Project and environmental consequences on aquatic ecosystems and registered bores. d. Management of groundwater and surface water impacts in the post-mining phase, including predicted water levels and quality within the final void. e. Short and long-term cumulative impacts (surface water hydrology, water quality, aquatic and riparian biota, groundwater levels and quality, groundwater dependent ecosystems) of the Project in combination with other mining operations in the locality

Request for advice

General

1. Do the groundwater and surface water assessments in the EIS provide adequate mapping and delineation of surface and groundwater resources?

Surface water

2. To what extent can decision makers have confidence in the predictions of potential impacts on surface water resources provided in the EIS, including in regard to potential steam flow losses, water quality, uncontrolled discharges and flooding?
3. Are the assumptions used in the surface water models reasonable and justifiable, and have the respective models been validated with sufficient monitoring data to provide meaningful predictions, including worst-case impacts on surface water resources?

Flooding

4. Has the flood assessment undertaken in the EIS adequately assessed the flood risk profile of the Project and the impacts on the extent of flooding (flood depths and changes in velocity) and stability of downstream watercourses through changes in the landform (including the proposed realignments of Yorks Creek and Hebden Road) and the resulting changes to the catchment area?

Groundwater

5. Is the conceptual regional groundwater model developed based on a sound understanding of the altered hydrogeological environment of the area due to historical open cut and underground mining, including the alluvial aquifers within the Project's zone of influence?
6. Has the numerical groundwater model been calibrated with sufficient monitoring data to provide meaningful model outputs, including worst-case impacts on groundwater resources?
7. To what extent can decision makers have confidence in the predictions of potential impacts on groundwater resources provided in the EIS, with regard to groundwater inflows, drawdowns in aquifers and potential impacts on private bores and groundwater dependent ecosystems?

Final void and pit lake

8. Has the EIS adequately analysed the evolution of change in water quality and level in the Glendell Mine final void pit lake in the proposed final landform, any potential risk of spills or leaching on downstream environments, and cumulative impacts due to multiple voids across the Mount Owen Complex due to groundwater flowpath interactions?

Cumulative impacts

9. Does the EIS provide an adequate assessment of cumulative impacts to surface and groundwater resources during the mining operations and during the recovery phase post mining, including changes in catchment areas, the rate of recovery of groundwater levels and saturation of alluvial aquifers? Do these assessments adequately differentiate impacts due to the Project, historical mining already undertaken and currently approved operations (ie mining yet to occur)?

Water-dependent ecosystems

10. Have the surface and groundwater impacts of the Project on the local and regional aquatic ecological values (aquatic biota and riparian habitat) and groundwater dependent ecosystems (including stygofauna) been adequately described and assessed?

Avoidance, Mitigation and Monitoring

11. Does the EIS provide reasonable strategies to effectively avoid, mitigate or minimise the likelihood, extent and significance of impacts, including cumulative impacts to significant water-related resources?
12. Are the proposed updates to the surface water and groundwater monitoring proposed in the Mount Owen Complex WMS appropriate and adequate to capture the potential impacts of the Project on the significant water resources?
13. Are there any additional mitigation, monitoring, management or offsetting measures that should be considered by decision makers to address the residual impacts of the Project on water resources?

Contact information			
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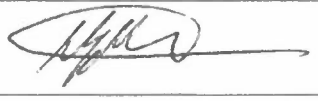
Approval			
Agency Delegate	Matthew Sprott, Director – Resource Assessments, NSW DPIE		
Signature		**Date**	17/01/2020
Agency Delegate	Dane Roberts / A/g Assistant Secretary – Environment Approvals and Wildlife Trade Branch, Commonwealth DoEE		
Signature		**Date**	17/1/2020