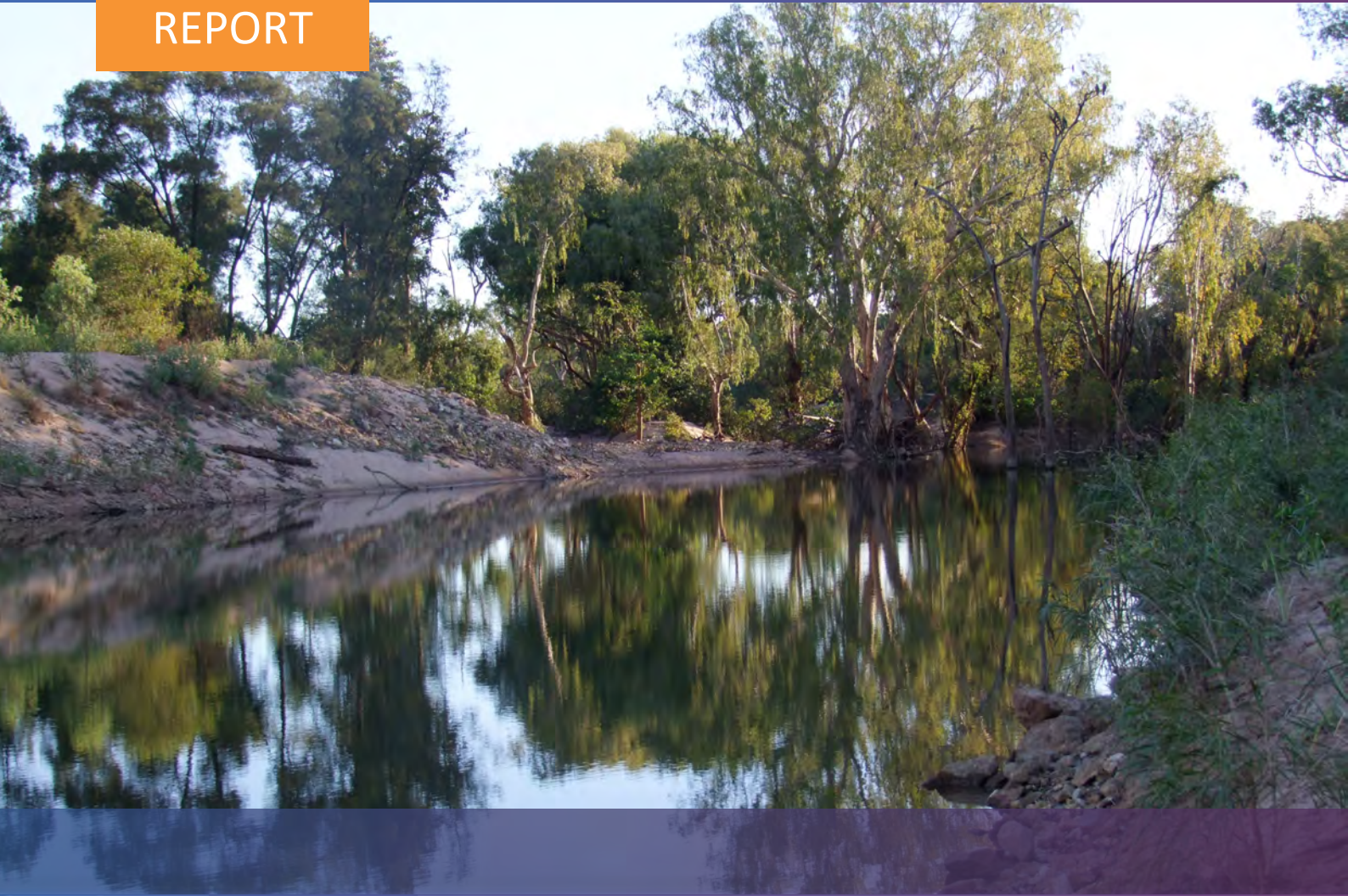


REPORT



Water Resources Cumulative Impact Assessment – Vulcan South

for Vitrinite Pty Ltd

22/09/2023

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1 Introduction

Vulcan South (the Project) is a new small-scale coal-mining operation proposed by Vitrinite Pty Ltd owner of Qld Coal Aust No.1 Pty Ltd and Queensland Coking Coal Pty Ltd (Vitrinite). A site-specific Environmental Authority (EA) and Progressive Rehabilitation and Closure Plan (PRCP) application (A-EA-NEW-100265025) was lodged on 6 June 2022 with the Department of Environment and Science (DES). DES has requested Vitrinite provide additional information regarding groundwater drawdown impacts (including cumulative impacts) on Quaternary alluvium, and cumulative impacts on groundwater quality. Further information regarding cumulative impacts on surface water quality was also requested for the Project.

This water resources cumulative impact assessment discusses ways in which the proposed Project will contribute or add to levels of impact already experienced at both local and regional scales for both groundwater and surface water resources.

2 Groundwater

Cumulative impacts have been assessed by representing historical and proposed mining for the Vulcan Coal Mine (VCM), Saraji Mine and Peak Downs Mine, the latter active since the 1970s. The impacts of these approved mines have been predicted in isolation of the Project and in a cumulative sense through the development of the ‘mine’ vs ‘no mine’ model scenarios.

For the purposes of this assessment, the cumulative impact on groundwater is represented in **Figure 1**. The graph shows the long-term model predicted inflows to the Saraji Mine and Peak Downs Mine with recent and proposed average annual inflow rates in the order of 3,000 m³/day to 5,000 m³/day. The proposed mining inflow rates correlate with AECOM (2016). The minimal inflow rates predicted for the Project (maximum inflow rate of 43 m³/d) represent less than a 1% increase in groundwater seepage within the model domain.

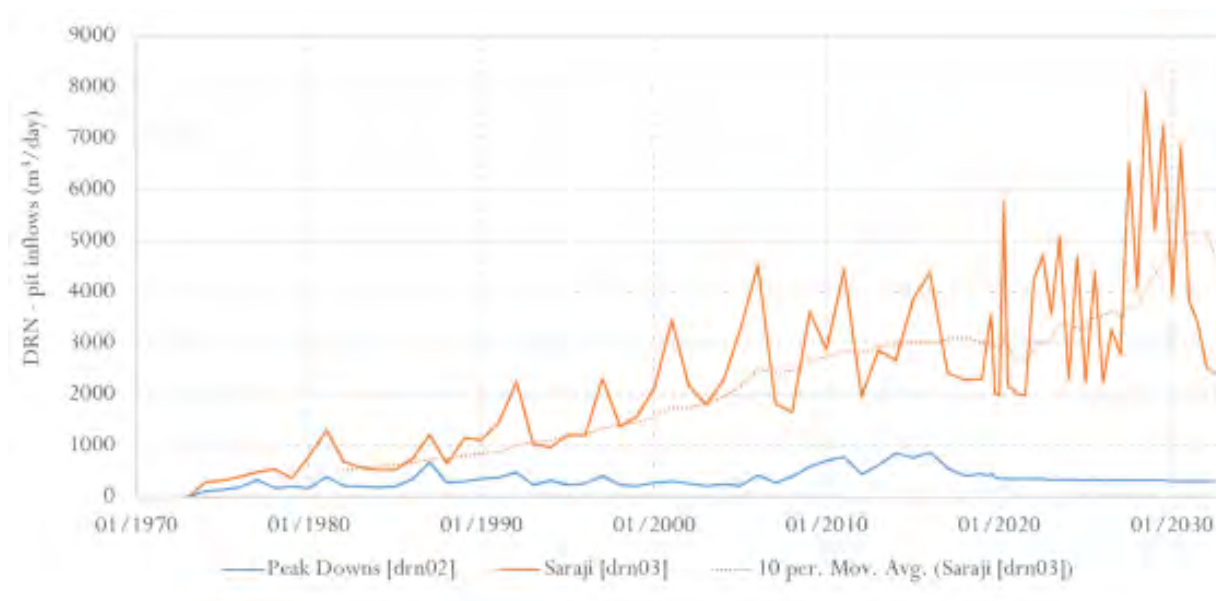


Figure 1 Predicted inflow rates for Saraji and Peak Downs Mines

During mining, the proposed pits and the Saraji Mine pits will act as sinks for surrounding groundwater. Any local contamination of the groundwater regime will report to the mine pit and will be contained during operations. The ex-pit and in-pit waste rock emplacement areas will be progressively rehabilitated during mine development and therefore no final voids or evaporative sinks will remain in the Project area. Groundwater is predicted to recover towards the pre-mining groundwater levels, subject to mining plans that include the adjacent Saraji and Peak Downs Mines.

It is assumed that the pit voids at Saraji Mine and Peak Downs Mine will likely remain into perpetuity and will behave as regional evaporative sinks on the groundwater system hence minimising any eastward migration of potential contaminants.

The evaluation of groundwater environmental values in the Project area (Section 5.8.3 of the Groundwater Impact Assessment) indicated that groundwater is of no, or limited value for most uses because of the high salinity. Local groundwater was found to be brackish to highly saline and even an unprecedented 50% increase in salinity would not impact on the beneficial uses identified (livestock beef cattle watering (limited), and industrial purposes limited to dust suppression in mining). This is because the salinity of local groundwater is well in excess of the Water Quality Objectives for aquatic ecosystems and drinking water suitability.

Therefore, the risk of groundwaters within the backfilled pit impacting on surrounding groundwater quality is highly unlikely.

All new mine infrastructure areas including workshops, fuel and chemical storage areas will include spill containment measures, for example bunding and/or spill kits. These structural and administrative controls will assist in preventing groundwater contamination. Impacts on groundwater quality, associated with local contamination from mine activities are considered highly unlikely.

The groundwater impact assessment concluded that there is no Quaternary alluvium present at Vulcan South (however it remains an important regional hydro-stratigraphic unit). Modelling indicated limited groundwater drawdown due to the Project's activities, with impacts on existing third-party users unlikely. Impacts on surface waters and groundwater dependent ecosystems are also considered unlikely. Overall, due to the lack of Quaternary alluvium at the site, and the limited drawdown impacts modelled for the Project, it can be concluded that local drawdown impacts on Quaternary alluvium are also likely to be minimal.

Overall, the cumulative impacts associated with the proposed Project on groundwater values are expected to be negligible.

3 Surface Water

The surface water assessment discussed cumulative impacts at local and regional levels. This considered the impacts of existing and proposed mining operations near the Project and broader impacts to the Bowen Basin region.

The objective of the assessment was to identify the potential for impacts from the Project to have compounding interactions with similar impacts from other projects, including activities proposed, under development or already in operation within a suitable region of influence of the Project.

There were two levels at which cumulative impacts have been assessed:

- Localised cumulative impacts – These are the impacts that may result from multiple existing or proposed mining operations in the immediate vicinity of the Project. Localised cumulative impacts include the effect from concurrent operations that are close enough to potentially cause additive effect on the receiving waters. For the purposes of the assessment, all existing and proposed projects located within the Isaac River catchment have been included.
- Regional cumulative impacts – These include the Project's contribution to impacts that are caused by mining operations throughout the Bowen Basin region or at a catchment level. Each coal mining operation in itself may not represent a substantial impact at a regional level; however, the cumulative effect on the receiving waters may warrant consideration.

3.1 Existing Projects

Projects which are currently operating within the Isaac River catchment upstream of the Deverill gauging station and have been included in the cumulative impacts assessment for the project are listed in **Table 1**.

Table 1 Existing projects considered in the cumulative impact assessment

Project-Proponent	Description	Operational Status	Relationship to the Project Mining Lease	
			Timing	Location
Burton Mine (Peabody Energy Australia)	Open cut coal mine	Ceased production indefinitely	May have overlapping operational phases with the construction and operations of the project, although unlikely given the current operational status.	Located 75 km to the north of the Project area. Located within the Isaac River catchment (upstream).
Eaglefield Mine (Peabody Energy Australia)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 75 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
North Goonyella Mine (Peabody Energy Australia)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 75 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Goonyella Riverside Mine (BMA)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 60 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Moranbah North Mine (Anglo American)	Underground coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 50 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Grosvenor Mine (Anglo American)	Underground coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 40 km to the north of the Project area. Located within the Isaac River catchment (upstream).
Broadlea Mine (Fitzroy Australia Resources)	Open cut coal mine	Care and maintenance	May have overlapping operational phases with the construction and operations of the project.	Located 40 km to the north of the Project area. Located within the headwaters of Smoky Creek, within the Isaac River catchment.
Carborough Downs Mine (Fitzroy Australia Resources)	Underground coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 35 km to the northeast of the Project area. Located within the headwaters of Billy's Gully, within the Isaac River catchment.
Isaac Plains Mine (Stanmore Coal)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 35 km to the north of the Project area. Located within the headwaters of Billy's Gully, within the Isaac River catchment.

Project-Proponent	Description	Operational Status	Relationship to the Project Mining Lease	
			Timing	Location
Millennium Mine (Peabody Energy Australia)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 30 km to the northeast of the Project area. Located within the headwaters of Southern Gully, within the Isaac River catchment.
Daunia Mine (BMA)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 25 km to the northeast of the Project area. Located within the Isaac River catchment (upstream).
Poitrel Mine (BMA)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 20 km to the northeast of the Project area. Located within the Isaac River catchment (upstream).
Caval Ridge Mine (BMA)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 10 km to the north of the Project area. Located within the Isaac River catchment (upstream).
Peak Downs Mine (BMA)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located directly adjacent (i.e., less than 1 km to the north and east of the Project area. Located within the Isaac River catchment.
Moorvale Mine (Peabody Energy Australia)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 35 km to the northeast of the Project area. Located within the headwaters of North Creek, within the Isaac River catchment.
Saraji Mine (BMA)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 10 km to the southeast of the Project area. Located within the Isaac River catchment.
Norwich Park Mine (BMA)	Open cut coal mine	Ceased production indefinitely	May have overlapping operational phases with the construction and operations of the project, although unlikely given the current operational status.	Located 45 km to the southeast of the Project area. Located within the Isaac River catchment (downstream).
Lake Vermont Mine (Jellinbah Group)	Open cut coal mine	Operating	May have overlapping operational phases with the construction and operations of the project.	Located 30 km to the southeast of the Project area. Located within the Isaac River catchment (downstream).

3.2 New or Developing Projects

Relevant projects that have been considered include:

- Projects within the predicted sphere of influence of the Project, as listed on the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) website that are undergoing assessment under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for which an Initial Advice Statement (IAS) or an EIS are available.

- Projects within the predicted sphere of influence of the Project, which are listed on the website of the Department of Environment and Science (DES) that are undergoing assessment under the *Environmental Protection Act 1994* (EP Act) for which an IAS or an EIS are available.
- Projects within the predicted sphere of influence of the Project, which are listed on the website of the Department of Infrastructure, Local Government and Planning (DILGP) that are undergoing assessment under the *Regional Planning Interests Act 2014* (RPI Act) for which an Assessment Application is available.

Projects currently undergoing assessment or having recently completed assessment under these processes and included in the cumulative impact assessment for the Project are listed in **Table 2**.

Table 2 Proposed projects considered in the cumulative impact assessment

Project-Proponent	Description	Operational Status	Relationship to the Project Mining Lease	
			Timing	Location
Moranbah South Project (Anglo American)	Underground coal mine	Approved project	May have overlapping operational phases with the construction and operations of the project.	Located 30 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Moorvale South Project (Peabody Energy Australia)	Open cut coal mine	Approved project	May have overlapping operational phases with the construction and operations of the project.	Located 25 km to the northeast of the Project area. Located within the Isaac River catchment (upstream).
Eagle Downs Mine (Bowen Central Coal Joint Venture)	Underground coal mine	Construction on hold – site on care and maintenance	May have overlapping operational phases with the construction and operations of the project.	Located 10 km to the north of the Project area. Located within the Isaac River catchment (upstream).
Winchester South Project (Whitehaven Coal)	Open cut coal mine	EIS active	May have overlapping operational phases with the construction and operations of the project.	Located 15 km to the northwest of the Project area. Located within the Isaac River catchment (upstream).
Olive Downs Coking Coal Project (Pembroke Olive Downs Pty Ltd)	Open cut coal mine	Approved with conditions	May have overlapping operational phases with the construction and operations of the project.	Located 10 km to the west of the Project area. Located within the Isaac River catchment (downstream).
Saraji East Mine (BMA)	Open cut coal mine	EIS active	May have overlapping operational phases with the construction and operations of the project.	Located 15 km to the southwest of the Project area. Located within the Isaac River catchment (downstream).
Dysart East Coal Mine (Bengal Coal)	Underground coal mine	ML granted	May have overlapping operational phases with the construction and operations of the project.	Located 35 km to the southwest of the Project area. Located within the Isaac River catchment (downstream).
Red Hill (BMA)	Underground coal mine	Approved with conditions	May have overlapping operational phases with the construction and operations of the project.	Located 60 km to the northeast of the Project area. Located within the Isaac River catchment (upstream).

Project-Proponent	Description	Operational Status	Relationship to the Project Mining Lease	
			Timing	Location
Isaac Downs Project (Stanmore IP South Pty Ltd)	Open cut coal mine	EIS active	May have overlapping operational phases with the construction and operations of the project.	Located 30 km to the north of the Project area. Located within the Isaac River catchment (upstream).

3.3 Cumulative Impacts on Surface Water Resources

3.3.1 Water Quality

The Project is located in the Isaac River catchment, which is a major tributary within the Fitzroy basin. The Fitzroy basin is the largest catchment in Queensland draining into the Pacific Ocean. It is also the largest catchment that drains to the Great Barrier Reef, although it does not contribute significant freshwater flows to the coastal environment when compared to river systems further north.

In 2008, the Queensland Government undertook an investigation into the cumulative effects of coal mining in the Fitzroy River basin on water quality (EPA, 2009). The investigation found that:

- There were inconsistencies in discharge quality limits and operating requirements for coal mine water discharges as imposed through environmental authorities.
- In some cases, discharge limits and operating conditions of coal mines were not adequately protecting downstream environmental values.

These conclusions led to a number of inter-related actions by Queensland Government and other stakeholders:

- Water quality objectives were developed for the Fitzroy Basin and added to Schedule 1 of the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP (Water)) in October 2011.
- Model water conditions were developed for coal mines in the Fitzroy basin (DERM February 2012). These model water conditions are designed to manage water discharges to meet the water quality objectives set out in the EPP (Water) and to provide consistency between mining operations in the Fitzroy basin.
- Environmental authorities for a number of mining operations were amended to introduce conditions consistent with the model water conditions.
- A number of mining operations entered into Transitional Environmental Programs (TEP) under the EP Act. These TEPs were focussed on actions that would allow mines to achieve compliance with new environmental authority conditions and upgrade operating conditions.

With these measures in place, a strong strategic and policy framework is now in place for management of cumulative water quality impacts from mining activities. This framework allows for management of individual mining activities in such a way that overarching water quality objectives can be achieved.

Mine affected water from the proposed Project will be managed through a mine water management system which is designed to operate in accordance with proposed EA conditions that are based on Model Mining Conditions and incorporated into the release criteria used in modelling the mine water management system in this report.

It is noted that the Project is located within the Boomerang Creek catchment, which has already been significantly disturbed by existing mining operations in the Project vicinity.

In addition, given that the proposed project water releases will be managed within an existing overarching strategic framework for management of cumulative impacts of mining activities, the proposed management approach for mine water from the project is expected to have negligible cumulative impact on surface water quality and associated environmental values.

Over-arching water quality objectives can be achieved due to the network of strategic policy initiatives aimed at managing cumulative water quality impacts from mining activities described above. It is argued that the Project will have negligible cumulative impacts on surface water quality and associated environmental values, given these initiatives and the disturbed nature of the catchment.

The Project will reduce the catchment area draining to receiving waters due to capture of runoff from disturbed catchment areas within the water management system. The Project catchment area represents approximately 0.2% of the total catchment area of the Isaac River to its confluence with Phillip Creek. Of this, approximately 40% will be managed through the Project ESC and released back to receiving waters. The combined total catchment area of the existing mines (including the Project) represents around 7.3% of the total catchment area of the Isaac River to the Phillips Creek confluence.

The site water management system has been designed such that the risk of offsite release of mine affected water is very low (with no mine affected dam uncontrolled releases predicted under any modelled climatic conditions).

3.3.2 Loss of Catchment and Stream Flows in the Isaac River

The Project will result in a loss of catchment to the Isaac River during operations and post-mining. The surface runoff volume lost from the catchment will generally be in proportion to the loss of catchment area. The Project area is less than 0.2% of the catchment area of the Isaac River to the confluence of Phillips Creek. Of this, around 40% of this area is managed through the ESCP and then released to the downstream environment. An additional 50% would be collected and diverted around the Project through diversion drains or dam DD2.

There are approximately 18 existing coal mines in the vicinity of the Project that also capture runoff from the Isaac River catchment (**Figure 2**). The total estimated captured area of all these projects (including the Project) combined represents around 7.3% of the Isaac River catchment to the Phillips Creek confluence.

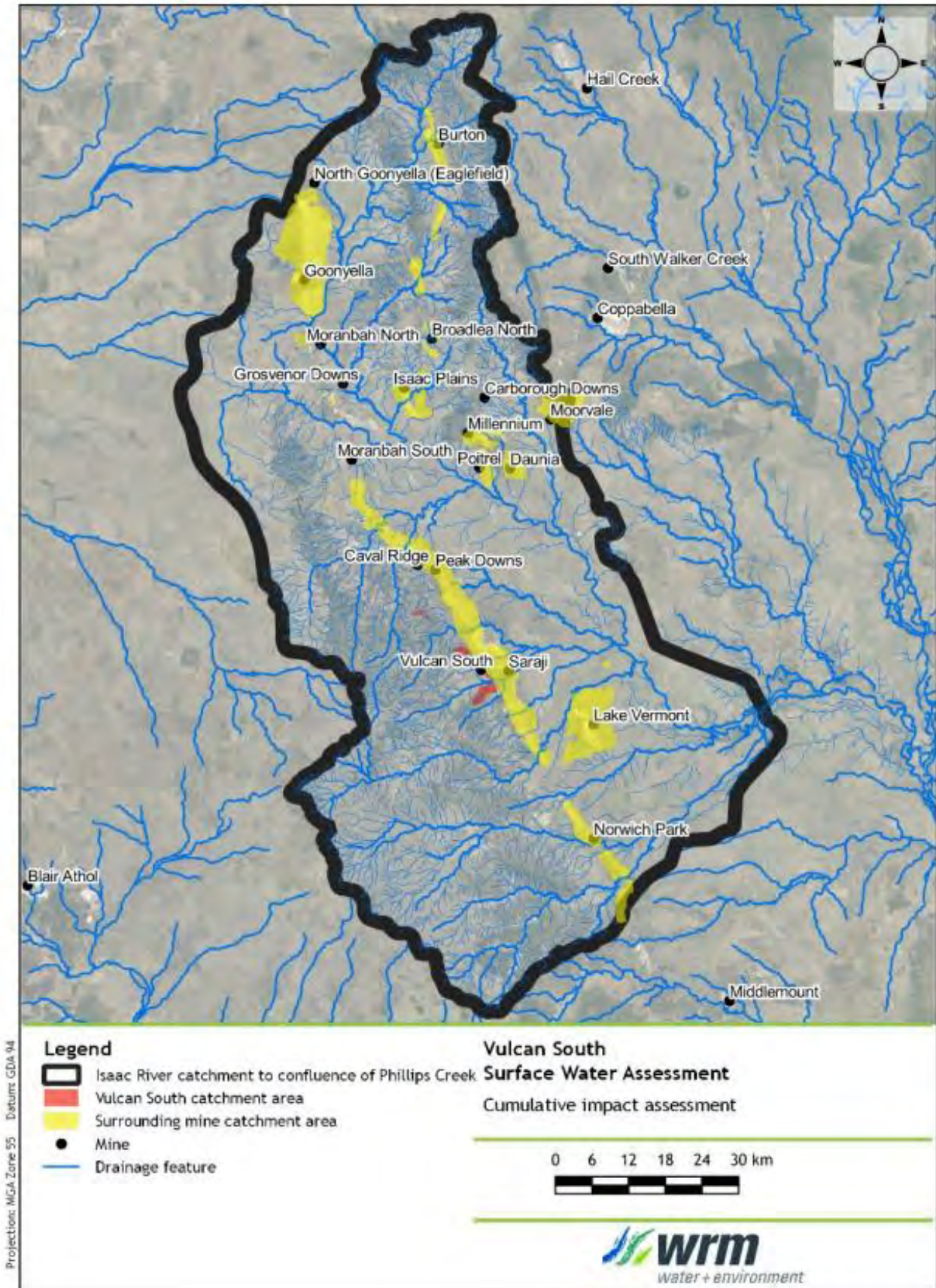


Figure 2 Location of nearby mines in the Project’s vicinity that also capture runoff from Isaac River catchment

A comparison of the captured catchment areas of the existing mining projects considered in the cumulative impact assessment with the Isaac River catchment to the Phillips Creek confluence is provided in **Table 3**, which indicates the following:

- The combined total catchment area of the existing mines (including the Project) represents around 7.3% of the total catchment area of the Isaac River to the Phillips Creek confluence.
- The combined mine affected catchment area (estimated) represents less than 2.5% of the total Isaac River catchment area to the Phillips Creek confluence.

When taking into account potential discharges from the operating mines in accordance with their current approved release rules, the overall loss of catchment area and associated stream flow is relatively small. In practical terms, impacts on the volume of water flow in the Isaac River would be negligible.

Table 3 Catchment area of existing projects considered in the cumulative impact assessment

Catchment	Total Catchment Area (km ²)	Estimated mine affected catchment area (km ²)
Vulcan South (the Project)	15.3	4.8
Other mines	551	182
Combined	566	187
Isaac River (to the Phillips Creeks confluence)	7,731	-

4 References

AECOM (2016). Groundwater Technical Report, Saraji Open Cut Extension Project prepared for BMA Alliance Coal Operations Pty Ltd.



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