

METROPOLITAN COAL MINE LONGWALLS 305-307 EXTRACTION PLAN Reasons for Approval

In granting a conditional approval of the Extraction Plan application for Longwalls 305-307, I have carefully considered the following matters.

1. PROJECT APPROVAL STATUS AND PREVIOUS APPROVALS

- The Metropolitan Coal Mine, operated by Metropolitan Collieries Pty Ltd (the company), was approved by the Minister for Planning in June 2009.
- The project approval has since been modified on three occasions and allows the extraction of up to 3.2 million tonnes of run-of-mine coal per year for 23 years using longwall mining methods.
- The approval contains an approved longwall panel layout which permits the extraction of coal, including extraction beneath the Woronora Reservoir, subject to preparation and approval by the Department's Secretary (or nominee) of an Extraction Plan which sets out the manner in which mining would be undertaken and resulting mine subsidence and related impacts are managed, monitored, reported and remediated.
- The approval also contains a number of performance measures, some of which are particularly applicable to the mining now proposed by the company.
- In June 2016, the Secretary's nominee approved a first workings variation for Longwalls 301-303 based on 163 metre panel widths, 45 metre chain pillars and shortened extraction lengths.
- On 11 May 2017, the Secretary's nominee granted conditional approval for the extraction of Longwalls 301 and 302.
- On 8 November 2018, the Secretary's nominee granted conditional approval for the extraction of Longwall 303.
- In November 2018, the Secretary's nominee approved a first workings variation for Longwall 304 at these same dimensions and shortened extraction lengths. On 16 July 2019, the Secretary's nominee granted conditional approval for the extraction of Longwall 304.
- On 31 January 2020, the Secretary's nominee approved a first workings variation for Longwalls 305 and 306 based on 138 metre panel widths, 70 metre chain pillars and shortened extraction lengths.

2. EXTRACTION PLAN APPLICATION

- On 9 October 2019, the Department's Planning & Assessment Group (the Department) received the company's Extraction Plan application and associated sub-management plans and assessment documentation seeking approval to extract Longwalls 305-307 at the Metropolitan Coal Mine.
- The Extraction Plan outlines the proposed management, mitigation, monitoring and reporting of potential subsidence impacts and environmental consequences during future extraction of Longwalls 305-307 at Metropolitan Coal Mine.
- The Extraction Plan was revised on 30 January 2020 following the company's decision to make minor changes to the proposed panel lengths of Longwalls 305 and 306 (a shortening of both panels by 49 metres at the starting ends, based on coal quality and seam thickness issues), and on 14 February 2020 and 11 March 2020 to finalise the adaptive management measures in the Water Management Plan.

3. AGENCY AND OTHER CONSULTATION

- The Department sought advice from relevant State agencies on the application and received comments from its Biodiversity Conservation Division and Division of Resources and Geoscience, WaterNSW, the NSW Resources Regulator, the Natural Resource Access Regulator and the Dams Safety Committee.

- As part of its approval for extraction of Longwalls 301-302, the Department required the company to establish a Woronora Reservoir Impact Strategy Panel (the WRIS Panel). The WRIS Panel completed its Woronora Reservoir Impact Strategy Stage 2 Report in June 2019. The WRIS Panel also provided the Department with a summary of its two reports, dated 9 December 2019, and commentary on the proposed Extraction Plan, dated 10 December 2019.
- On 20 December 2019, the Department asked the company to respond to:
 - agency advice;
 - matters relevant to the Extraction Plan application in the final report of the Independent Expert Panel for Mining in the Catchment; and
 - the recommendations of the Woronora Reservoir Impact Strategy Stage 2 Report.
- On 30 January 2020 the company provided its responses to the above matters. The company's responses contained a number of revisions to the Extraction Plan as a result of considering agency comments. The Extraction Plan was further revised by the submission of a revised Water Management Plan dated 14 February 2020 and final comments on adaptive management dated 11 March 2020.
- WaterNSW made a supplementary submission dated 14 February 2020 and the company provided a response to this submission on 17 February 2020.

4. INDEPENDENT EXPERT PANEL FOR MINING IN THE CATCHMENT

- In early 2018, the NSW Government established an Independent Expert Panel on Mining in the Catchment (the Catchment Panel) to review the impacts and regulation of underground coal mining in Sydney's Drinking Water Catchment. The Panel's terms of reference were to:
 - undertake an initial review of current mining in the catchment;
 - review and update the findings of the 2008 Southern Coalfield Inquiry; and
 - strengthen the assessment of the ongoing operation of approved mines and any applications for new mining within the Special Areas of the catchment by providing advice.
- The Catchment Panel provided an initial report in December 2018 and a final report in October 2019. The initial report focussed on the impacts of mining at the Dendrobium and Metropolitan Coal Mines, whereas the final report examined the impacts and regulation of mining more broadly and updated the findings of the Southern Coalfield Inquiry.
- The Catchment Panel was also empowered to provide advice concerning individual mining applications.
- In July 2019 the Catchment Panel provided its advice on the Extraction Plan for Longwall 304 at the Metropolitan Coal Mine.
- The Department wrote to the Catchment Panel on 5 March 2020 seeking its advice on the proposed Extraction Plan for Longwalls 305-307.
- The Catchment Panel provided its advice on the Longwalls 305-307 Extraction Plan on 6 March 2020. Its advice endorsed the Department assessment approach, commented on the feasibility of undertaking a Water Balance Study for the Woronora Reservoir, and recommended that the adaptive management regime is extended to cover Longwall 307 and the Waratah Rivulet. The Catchment Panel's advice is attached to this document, and is considered further below.

5. KEY MINING PARAMETERS

- The final proposed longwall dimensions are set out in Table 1 below. The final proposed length of Longwalls 305 and 306 is 49 m shorter than in the October version of the Extraction Plan. Extraction height will be up to 3.2 m.

Table 1: Summary of Longwall Dimensions for Longwalls 305-307

Longwall	Longwall Length (m)	Total Void Width (m)	Tailgate Chain Pillar Width (m)
305	1,547	138	45
306	1,907	138	70
307	1,956	138	70

6. KEY ISSUES

Potential Leakage from Woronora Reservoir

- Longwalls 305-307 are the first longwall panels to be extracted beneath the Woronora Reservoir. The reservoir is a significant storage in Sydney's drinking water catchment, and the integrity of the storage and the prevention of leakages as a result of mining was a key issue in the assessment of the Metropolitan Coal Project in 2009. This remains an issue of significant concern to sections of the community.
- The consent therefore contains a number of key performance measures to control the potential for such impacts, which are replicated in Table 2:

Table 2: Performance measures for Woronora Reservoir

Water Resources	Performance Measure
Catchment yield to Woronora Reservoir	Negligible reduction to the quality or quantity of water resources reaching the Woronora Reservoir No connective cracking between the surface and the mine
Woronora Reservoir	Negligible leakage from the Woronora Reservoir Negligible reduction in the water quality of Woronora Reservoir

- Sections of the Woronora Reservoir full supply level (FSL, ie the shore of the impounded waters when the reservoir is full) are located directly above Longwalls 306 and 307. A much longer section of the FSL is within the 35° angle of draw and/or predicted 20 millimetre subsidence contour of Longwalls 305-307.
- However, the WRIS Panel's advice dated 9 December 2019 reports that groundwater monitoring bores constructed above Longwalls 302 and 303 indicate that the height of cracking above the longwall workings is around 174 metres, whereas the height from seam to surface is over 500 metres. There is limited groundwater pressure head loss above this fracture zone, and very little pressure head loss above 150 metres from the surface. These pressure head losses are considered by the WRIS Panel to be recovering through lateral groundwater flow. Seam-to-surface fracturing, which would be the principal risk for loss of the reservoir's stored waters, is therefore most unlikely.
- The Department is confident that the 25 metre reduction in longwall panel width proposed for Longwalls 305-307 and the 25 metre increase in pillar widths proposed for Longwalls 306-307 would result in lesser subsidence effects and reduced subsidence impacts when compared to Longwalls 302 303 and 304 and the much wider panels (305 metre void width) extracted at the Dendrobium Coal Mine.
- This position is reflected in the findings of the Catchment Panel's Final Report and the WRIS Panel's Stage 2 report, and is accepted by WaterNSW.
- The Department considers that there is a very low and therefore acceptable risk of leakage from the Woronora Reservoir to the mine. Monitoring of potential subsidence impacts on the reservoir is further addressed under Monitoring and Adaptive Management, below.

Woronora Reservoir Water Balance

- In its Stage 1 report, the WRIS Panel recommended a water balance study for the Woronora Reservoir, to assess whether there is a loss of water due to mining in the Longwall 300 series. The WRIS Panel outlined the relative complexity of undertaking a water balance study and recommended a two-stage approach to the study, whereby the first stage would involve a preliminary water balance analysis for the reservoir to ascertain potential uncertainties in each component of the water balance. The second stage would involve measuring inputs to the reservoir, which mostly comprise inflows and rainfall. However, the WRIS Panel noted that only 70% of the reservoir catchment is monitored.
- In its Stage 2 report, the WRIS Panel noted that:

Water balance modelling of inputs to and outputs from the Woronora Reservoir indicates that the combined average loss from groundwater outflow under the dam wall and loss through the bed of the Woronora Reservoir is 2.9 ML/day with a 95% uncertainty band between 0.4 ML/day to 5.4 ML/day, in which ungauged

inflows to the reservoir and reservoir evaporation are the major contributors to the uncertainty. The 2.9 ML/day equates to 3.6% of the total outputs modelled from the Woronora Reservoir. Taking into account the facts that groundwater outflow under than dam wall could not be adequately modelled, that there are problems in stream gauging a large proportion of the current ungauged area, and there are difficulties in estimating reservoir evaporation, it is recommended that a Stage 2 water balance study be not undertaken.

- However, in its correspondence dated 14 February 2020, WaterNSW recommended that a more detailed water balance study for the Woronora Reservoir is undertaken by the company by the end of

2020, to ensure that achievement of the performance measure requiring negligible leakage from the reservoir can be measured.

- In its advice dated 6 March 2020, the Catchment Panel agreed with the WRIS Panel that the water balance study for the Woronora Reservoir was not warranted, stating:

The Panel agrees with the WRIS Stage 2 report recommendation that a more detailed study of Woronora Reservoir water balance not be undertaken due to difficulties in achieving the accuracy required to detect water losses from the reservoir due to mining. The Panel notes the view of WaterNSW that a detailed water balance study would still have merit as it would be one of the only ways to determine compliance with the Woronora Reservoir performance measure. However, the Panel considers that the variability in the recession behaviour of the reservoir, due primarily to evaporation and inflow uncertainties, would make it difficult to isolate leakage due to mining unless it was the same order of magnitude as the variability. The Panel accepts the view of Metropolitan Mine (Peabody) that a superior method of assessment against a performance measure of negligible leakage from Woronora Reservoir is the mine water balance, albeit that this assumes that any water leakage from the reservoir due to mining will report to the mine workings. The mine water balance approach needs to be continued to be supported by groundwater modelling.

- The Department agrees with the Catchment Panel and WRIS Panel that the level of uncertainty associated with detailed water balance modelling indicates that there would be very limited value in undertaking the task. Firstly, a detailed model of all inputs and outputs to the reservoir would need to be developed, tested and agreed on. The WRIS Panel stated that its assessment of outflow beneath the dam wall and existing losses through the entire bed of the reservoir are a) small (2.9 ML/day) and b) subject to an uncertainty greater than an order of magnitude. Only 70% of inflows to the reservoir are metered, and there would be errors associated with this flow monitoring, particularly at high levels of flow during and following large rain events. Modelling of evaporation would require monitoring of a number of variables (such as temperature, humidity, wind speed and wind direction/s) over a large geographic area and further assumptions which would introduce additional uncertainty.
- Mine inflows at Metropolitan are agreed by all parties as being very low (averaging 0.01 ML/day over 10 years to April 2019). Therefore, the only potential avenue for loss from the reservoir would be to a newly-initiated surface cracking network in the arms of the reservoir above and adjacent to the proposed longwalls (rather than to the mine itself). Losses to these new cracks would be one-off, since there is no significant downward hydraulic gradient to sustain them. The volume of any such cracking is expected to be very low and is likely to be substantially exceeded by a potential increase in storage volume resulting from overall subsidence of the floor of the reservoir. This volume would also require to be carefully modelled. Against this background, potential losses caused by the mine would then need to be modelled and/or monitored.
- The task in essence is to model a very large and imperfectly known system where there are a large number of imprecisely defined variables, and then to compare this to another model of a much smaller system with its own variables and imprecisions and where direct measurement is not possible. The levels of uncertainty associated with modelling the larger system are considered to be likely to be at least one or two orders of magnitude greater than any actual loss which might be attributed to mining through either modelling or monitoring.
- The Department therefore accepts the Catchment Panel's and WRIS Panel's advice that the most appropriate way to measure whether the performance measure for leakage from the Woronora Reservoir would be regularly monitoring the mine water balance, supported by groundwater modelling.

Eastern Tributary

- The Department notes that the adaptive management regime implemented for Longwall 303 and Longwall 304 in order to prevent further cracking in the streambed of the Eastern Tributary resulted in Longwall 304 finishing 130 metres short of its anticipated distance.
- This decision was taken following close consultation with the Eastern Tributary Technical Committee established under the Extraction Plan approval for Longwall 303 and after review of regular valley closure monitoring data.
- Longwalls 305 and 306 are the last longwalls that would potentially cause any additional direct impact on the Eastern Tributary. Longwall 306 would be about 250 metres from this watercourse (immediately upstream of the Reservoir's FSL) at its closest point. The Department considers that the Eastern

Tributary Technical Committee should continue to meet during extraction of Longwalls 305 and 306 to ensure that the existing limits on further impacts on the Eastern Tributary are not exceeded.

Waratah Rivulet

- The project approval includes negligible environmental consequences performance measure for the Waratah Rivulet '*between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)*'.
- This section of the Waratah Rivulet includes pool W, located to the south of Longwalls 305-307.
- To date, restricting valley closure to 200 mm has been a successful design tool for the Waratah Rivulet, with no impacts to pools and rock bars.
- The company therefore considers it appropriate to continue to use this limit as a design tool to achieve compliance with the performance measure for Longwalls 305-307.
- While this design limit was found to be less appropriate when applied to the Eastern Tributary, where impacts were recorded at levels below this limit, this was apparently due to the differences in geological features identified along the Eastern Tributary which make it more likely to be susceptible to subsidence movements.
- WaterNSW asked the Catchment Panel to comment on whether the adaptive management strategy proposed for the Eastern Tributary should be extended to include Longwall 307 and the Waratah Rivulet.
- The Catchment Panel commented in its advice that WaterNSW's views have merit and that consideration should be given to extending the adaptive management regime to Longwall 307 and the Waratah Rivulet. The Department has considered this issue further in the Monitoring and Adaptive Management section below.

Monitoring and Adaptive Management

- The Department, the Panel, WaterNSW and the WRIS Panel acknowledge that the mine has been generally designed to limit impacts on natural and built features at the surface, principally through the use of relatively narrow longwall panel widths of either 138 m or 163 m.
- Nevertheless, the Department considers it essential that an appropriate adaptive management and monitoring framework is in place to ensure that the water performance measures in the project approval are met. The Department has adopted a precautionary approach in the assessment and approval of recent Extraction Plans, which places an emphasis on installing additional monitoring and improving technical understanding of the potential impacts of mining in the catchment. The Department recognises the high priority that must be given to measuring or modelling potential mining-related leakages from the Reservoir.
- The company has in place a detailed reservoir monitoring program, which includes a number of piezometers, extensometers and flow gauges in key locations near the reservoir, from which it could ascertain whether it is complying with its performance measures. It also records the amount of water which is reporting to the mine and reports this information to the Dams Safety Committee on a monthly basis in accordance with its approvals.
- In February 2020, The Department approved a proposal to install additional precision closure monitoring across the Woronora Reservoir along the 300XL subsidence monitoring line and at the surface lineament in proximity to a seam fault identified as F0027. To supplement the precision closure monitoring, 13 new GNSS survey stations would also be installed to provide greater clarity of valley movements at both high and low elevations.

- This monitoring program will provide valuable data on whether the performance measures for the Woronora Reservoir are being met.
- The Department also has a role under the Environmental Planning and Assessment Act 1979 to ensure compliance with the existing project approval and subsequent approvals granted by the Secretary (including this and previous Extraction Plan approvals).
- In undertaking this role, the Department has a range of enforcement powers available to it if it considers that there may have been or may potentially be a breach of the project approval or subsequent Extraction Plan approvals, including the cessation of mining operations if it is considered necessary to protect key features, including the Woronora Reservoir.
- The watercourse monitoring network at the mine is also well established and sophisticated, with a range of regular monitoring undertaken to measure surface water flow, pool levels, shallow groundwater levels, water quality and mine water make.
- As was implemented for the Extraction Plans for Longwall 303 and Longwall 304, the Extraction Plan's Trigger Action Response Plan (see Table 29 in the Water Management Plan) has been designed to identify whether the performance measure relating to water loss from the Woronora Reservoir is likely to be breached.
- The Department notes that the Trigger Action Response Plan for Eastern Tributary has been designed (similar to the one implemented for Longwall 304) to include higher frequency monitoring as the finishing lines of the panels are approached, as requested by WaterNSW and as recommended by the Catchment Panel and WRIS Panel. The zones in which the higher frequency monitoring would be undertaken are shown in Figure 1, which is attached to this document.
- It is also proposed by the company that the Eastern Tributary Technical Committee continue to meet and review monitoring data within 24 hours of each monitoring event, with increased monitoring frequency at similar distances from the finishing ends of Longwalls 305-307 as was successfully implemented at Longwall 304.
- Reports outlining the key outcomes would then be submitted to the Department and WaterNSW within 24 hours, and the recommendations would be used by the company to make informed decisions as to whether the longwall lengths need to be modified to avoid impacts on the Eastern Tributary.
- The Department considers that the adaptive management regime applied to Longwalls 303 and 304 is valuable and should be applied to Longwalls 305-307, informed by continued regular technical oversight by the Eastern Tributary Technical Committee.
- However, as for previous longwall panels, the Department considers that higher frequency monitoring should be required as Longwalls 305 and 306 are within 200 m of the Catchment Panel's previously recommended 450 m radius from the Eastern Tributary, and within 345 m of the finish line of Longwall 307 (as shown in Figure 1 attached to this document).
- While the 200 millimetre valley closure limit remains an appropriate measurement tool for the Waratah Rivulet based on local geological factors and distance of pools with controlling rockbars from proposed mining, the Department agrees with the Catchment Panel and WaterNSW that the adaptive management regime for the Eastern Tributary should also be extended to cover the Waratah Rivulet, with appropriate increased frequency of monitoring as Longwall 307 approaches its intended finish line.

7. SOCIO-ECONOMIC ISSUES

- The Department estimates that the remaining coal in the northern domain at the mine would provide about \$122 million in State Government revenue through royalties over the next 10 years.
- The mine provides for 415 direct jobs (employees and contractors) and is a significant contributor to regional employment.
- The mine produces metallurgical coking coal, which is transported by rail to Port Kembla Coal Terminal (employing 120 persons) for shipping to domestic and overseas markets.
- In the 2018/19 financial year, the mine contributed \$12.5 million in royalties to the NSW economy and injected \$122 million in wages and business to the local economy.

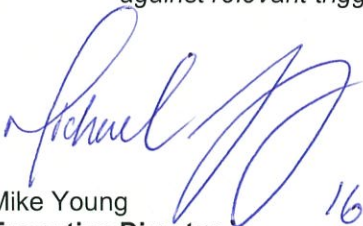
8. CONCLUSION

- Based on its consideration of agency advice, including that received from WaterNSW, and the advice of the Catchment Panel and the WRIS Panel, the Department considers that the Extraction Plan for Longwalls 305-307 (dated October 2019, as amended in correspondence dated 30 January 2020, 14 February 2020 and 11 March 2020) should be approved, subject to conditions, as detailed below.

9. RECOMMENDED CONDITIONS

The following conditions are proposed to be attached to the Extraction Plan approval for Longwalls 305-307:

- That the Eastern Tributary Technical Committee completes a review of all monitoring data from Longwalls 303, 304 and 305 within 4 months of the completion of Longwall 305 and continues to operate during extraction of Longwall 306 and Longwall 307.*
- That the Woronora Reservoir Impact Strategy Panel continues to:*
 - a. review impacts on the Woronora Reservoir during extraction of Longwalls 305-307;*
 - b. advise on appropriate amendments to the monitoring program; and*
 - c. recommend any appropriate changes to the mine plan required to continue to achieve the development consent's performance measures relevant to the Woronora Reservoir.*
- That the Extraction Plan's adaptive management regime for the Eastern Tributary is extended to cover the Waratah Rivulet, with appropriate updates made to the Trigger Action Response Plan (Table 29, version received on 11 March 2020) prior to the extraction of Longwall 307.*
- That Metropolitan Coal provides a Woronora Reservoir monitoring status report to the Department and WaterNSW on a monthly basis (unless otherwise agreed by the Secretary), which includes:*
 - a. an update on mine development;*
 - b. findings of inspections of mine workings;*
 - c. results of surveys of subsidence and valley closure;*
 - d. an updated register of geological structures;*
 - e. a detailed Mine Water Balance with particular consideration of potential losses from the Woronora Reservoir; and*
 - f. results of groundwater monitoring and surface water monitoring, including assessment against relevant triggers in the Trigger Action Response Plan.*


Mike Young
Executive Director
Energy, Resources and Compliance
as nominee of the Secretary

16/3/20

Attachments:

- Advice of the Independent Expert Panel for Mining in the Catchment dated 6 March 2020
- Figure 1 – Zones within which higher frequency monitoring is proposed

Attachment 1

Mr Mike Young
Executive Director
Energy, Resources and Compliance
Department of Planning, Industry and Environment
320 Pitt Street
SYDNEY NSW 2000

Dear Mr Young,

**Re: Advice to the Department of Planning, Industry and Environment
IEPMC 2020-01: Metropolitan Coal Mine Longwalls 305-307 Extraction Plan**

I write on behalf of Professor Neil McIntyre and myself as the sub-committee of the Independent Expert Panel for Mining in the Catchment (the Panel) responding to your request of 5 March 2020 to:

- review the Department's reasons for approval and the proposed conditions, and
- provide advice as to whether there are additional matters and/or any additional conditions that should be assessed by the Department prior to granting approval for the extraction of the longwalls.

As you are aware, the Panel has had considerable input into the approval of Extraction Plans for longwalls (LWs) 303 and 304 that includes a field inspection, review, analysis and assessment of Trigger Action Response Plans (TARPs) to support an adaptive management approach to extraction. The Panel has been kept informed of outcomes and acknowledges the success to date of modifications to mine design and adaptive management approaches. Subsequently, it has been made aware of the publication of the Stage 2 Report of Woronora Reservoir Impact Strategy (WRIS) Expert Panel and notes that its principal findings are not inconsistent with those contained in the Panel's Part 2 Report.

Against this background, I do not propose to go into detail as to the reasons why the Panel generally endorses the Department's reasons for approving the LWs 305-307 Extraction Plan. Effectively, the Panel's endorsement is based on the success to date of the adaptive management approach of Metropolitan Mine supported by the TARP system and its associated management responses.

Notwithstanding this, the Panel advises that consideration be given to the following points when finalising conditions of approval for the extraction of LWs 305-307:

- The Panel considers there is merit in the view expressed by WaterNSW that the proposed adaptive management strategy should be extended to LW 307 and Waratah Rivulet.
- The Panel agrees with the WRIS Stage 2 report recommendation that a more detailed study of Woronora Reservoir water balance not be undertaken due to difficulties in achieving the accuracy required to detect water losses from the reservoir due to mining. The Panel notes the view of WaterNSW that a detailed water balance study would still have merit as it would be one of the only ways to determine compliance with the Woronora Reservoir performance measure. However, the Panel considers that the variability in the recessional behaviour of the reservoir, due primarily to evaporation and inflow uncertainties, would make it difficult to isolate leakage due to mining unless it was the same order of magnitude as the variability. The Panel accepts the view of Metropolitan Mine (Peabody) that a superior method of assessment against a performance measure of negligible leakage from Woronora Reservoir is the mine water balance, albeit that this assumes that any water leakage

from the reservoir due to mining will report to the mine workings. The mine water balance approach needs to be continued to be supported by groundwater modelling.

- In respect of impacts on tributary inflows, the Panel recommends that the proposed condition (f) should be amended to include results of surface water monitoring. The WRIS Stage 1 Report led to the installation of two new flow gauges on west-flowing Woronora tributaries (Catchments I and K). Catchment I has been or will be undermined by LWs 301-305 and catchment K by LWs 305-307. The WRIS Stage 2 Report analysed these data up to January 2019 and concluded that there were no observable impacts from mining. These conclusions are made again in the February 2020 Water Management Plan based on data up to July 2019. The Panel considers that these are reasonable conclusions based on visual analysis of the available data. The Water Management Plan includes continued monitoring at these gauges, which the Panel supports.

Should you have any queries in respect of this advice, please do not hesitate to contact me or Professor McIntyre.

Yours sincerely



Emeritus Professor Jim Galvin
Chair, Independent Expert Panel for Mining in the Catchment
6 March 2020

Cc: Matthew Sprott, Director Resource Assessments
Paul Freeman, Team Leader Resource Assessments

Attachment 2

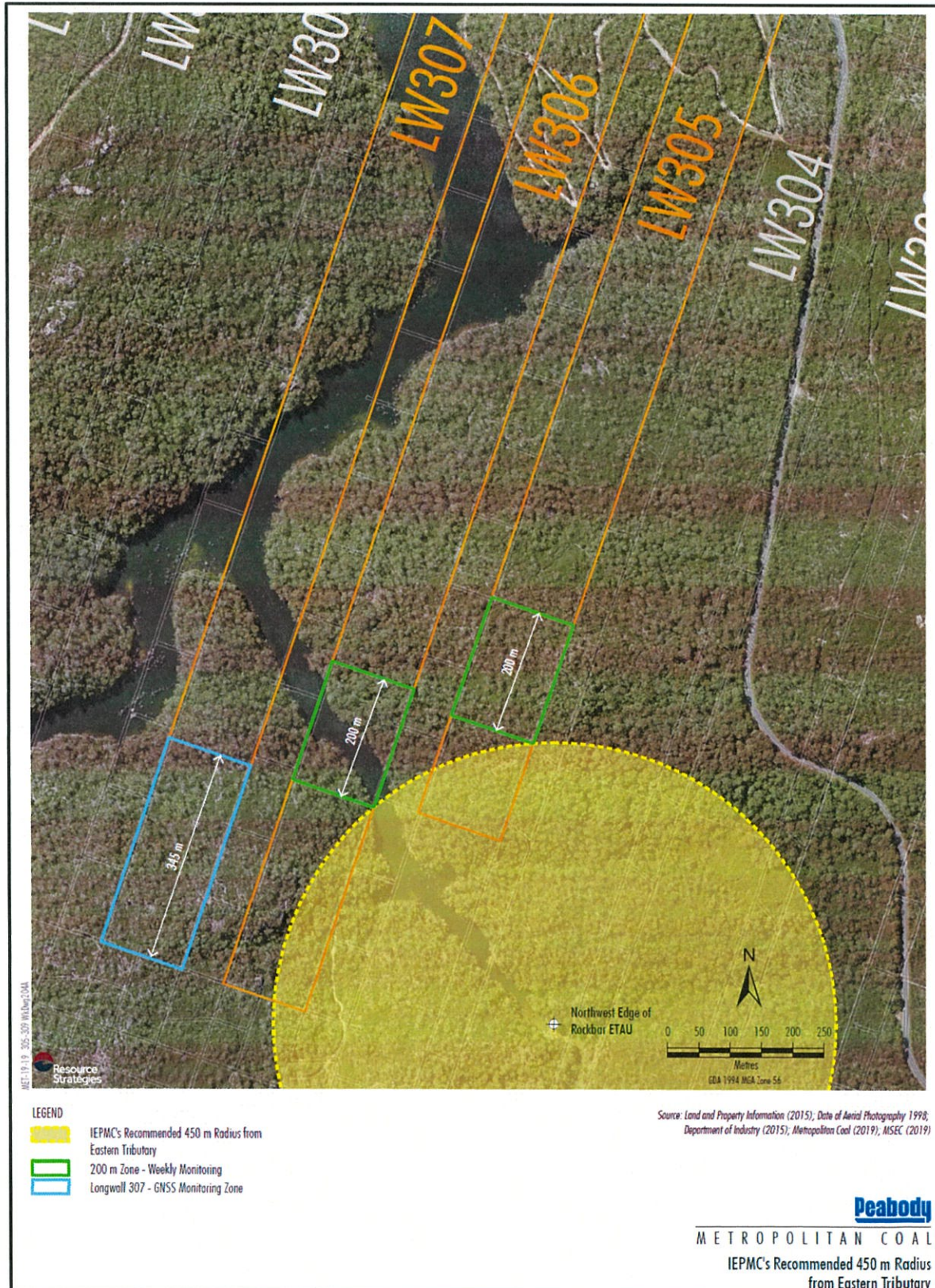


Figure 1: Zones within which higher frequency monitoring is proposed