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18 October 2017

Clay Preshaw  
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Department of Planning and Environment  
GPO Box 39  
SYDNEY NSW 2001

Dear Clay

**Re: DRAFT Response to issues raised by EPA in letter dated 13 September 2017**

The following details are provided to respond to issues raised by the EPA in their letter dated 13 September 2017. These issues can be broadly split into four areas:

- Water Balance Issues
- Concerns about the uncertainty in underground storage volume predictions
- Interactions with Baal Bone and
- Restrictions on Discharges

In this letter, the EPA's comments are identified in *bold italics* with our response following.

It is noted that previous responses have been provided to DP&E addressing the previous issues raised in EPA correspondence dated 15 November 2016 and 21 March 2017, through the Response to Submissions Report dated March 2017, and further additional responses requested by DP&E dated 10 May 2017.

**1.0 Water Balance Issues**

***Water Balance doesn't accurately predict what will occur when mining starts***

As detailed in the EA, the Water Balance Model was developed to understand what the worst case discharge requirements would be in the event that the Invincible underground workings are completely full with no capacity to capture any additional water captured as part of the Southern Extension Project. This approach was undertaken to provide a comprehensive assessment of a potential worse case discharge scenario for the Southern Extension Project. As detailed further in **Section 2.0**, this assumption is considered to be overly conservative as there is significant space available within the former Invincible underground workings to enable effective management of water within the Invincible water management system.

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Until water levels in the Invincible underground workings reach 995m AHD, discharges from the site (other than spills from sediments dams) can be avoided through management of water levels in the Main Storage Dam. These management measures are discussed further in **Section 4.0** below.

As there is excess capacity in the Invincible Underground Workings to store the water currently stored in the Ivanhoe No. 2 workings (refer to **Section 2.0**) the worst case scenarios for discharges will not apply when mining commences. Accordingly, the water balance model used for assessing discharge requirements did not model the Stage 1 mining scenario. Additionally, the Stage 2 Mine Plan used in the water balance model represents a worst case scenario for the water balance model as there is a larger area of mining related disturbed land and accordingly a larger area of disturbed catchment.

In addition to assuming additional underground storage is not available the model also adopted the following conservative assumptions in assessing potential discharge volumes:

- annual seepage from Invincible Workings into the seam and towards Baal Bone was assumed to be the low estimate of seepage (105ML/year in a predicted range of 105ML-315ML/year) and
- run-off from areas upslope from disturbed areas were also treated as being disturbed for the purposes simulating potential inflows to the underground via subsidence cracking (see further details on this approach below).

The absence of modelling of the first year of operations therefore does not affect the assessment of potential worst case discharge impacts associated with the Southern Extension Project. Further to this, as detailed in **Section 4.0**, additional management measures will be incorporated into the management of the Main Water Dam in the initial stages of the Southern Extension Project to capture and store water within the water management system. These management measures will be detailed in a Water Management Plan to be developed for the Southern Extension Project.

#### ***No assessment or estimate of catchment runoff flowing to sinkholes or underground workings***

There is no specific estimate of catchment flowing to sinkholes or underground workings as not all cracks and sinkholes can be accurately mapped. As water being intercepted by sinkholes is effectively stored in the Invincible water management system (the Invincible underground workings and connected areas of open cut), surface water being intercepted by surface cracking and sinkholes has been modelled through applying increased rainfall runoff assumptions in areas where the sinkholes and cracks may occur.

This effect has been simulated in the Water Balance Model in Appendix B to the Response to Submissions Report B through the treatment of upslope areas as disturbed where there is potential for surface to workings connective cracking. This approach effectively models inflows to the water balance model from subsidence related cracking as being similar to run-off rates from disturbed areas. The volumes of water modelled as being intercepted in this way are treated as part of the broad 'run-off' prediction in the model outputs and there is no differentiation between subsidence related interception and run-off from mining project related disturbance. This treatment is appropriate given the heavily interconnected nature of the Southern Extension Project related disturbance areas and the underground workings. In reality, the volume of water intercepted via subsidence cracking and sinkholes in areas upslope from actual mine disturbance areas will be significantly lower than modelled as these areas are vegetated and will have lower run-off rates. In addition, uptake of soil moisture from vegetation will also in reality further minimise direct losses through the soil profile into subsurface cracking. Accordingly, as discussed in Appendix B to the Response to Submissions Part B, the predicted 'run-off' in the model overstates the inflows to the system from rainfall that may occur from sinkholes and surface cracking from former unground workings within the catchment.

## 2.0 Volume of Water in Ivanhoe No. 2 Workings

### *Predicted volumes of Ivanhoe No. 2 is based on limited data*

As is discussed in detail in the AGE Report attached to the Response to Submissions Report Part B, two bores were installed in December 2016:

- BHTH-12 was installed to intersect the Ivanhoe No 2 Workings.
- BH2 was installed in the coal barrier between the Ivanhoe No 2 Workings and the Invincible underground workings.

The purpose of BHTH-12 was to measure the head of water in the Ivanhoe No. 2 workings and, through this measurement, calculate the likely volume of water to be dewatered to enable mining of the Southern Extension Area. BH2 was installed to assess whether there was movement of water from Ivanhoe No 2 towards Invincible underground workings. A single bore in the Invincible underground workings in the area selected is considered to provide a highly accurate direct measure of water levels in the entire workings due to their connectedness through the old workings. **Figure 1** provides a stylised cross section of a bore into flooded workings demonstrating how workings are flooded and why a single bore can be an accurate source of data for water levels in interconnected workings.

The measured water levels used to calculate water levels in the Response to Submissions Part B were based on two monthly recorded measurements. The observed maximum level used for these calculations was 900.8m AHD and a conservative estimate of 901m AHD was used for volume calculations. Using the Lithgow seam floor data used for the previous Coalpac assessments and the measured water level data, it was calculated that there was approximately 367 ML of water in the underground workings. This was well below the calculated 1,585 ML of available storage in the Invincible underground workings and, based on these calculations, there was no requirement to discharge water removed from the Ivanhoe No. 2 workings to surface water system downstream from Invincible. Accordingly, as outlined in the Response to Submissions Part B report the initially proposed discharge of water from the former Ivanhoe No 2 workings prior to mining within the Southern Extension Area was removed from the Project as this water would be stored within the former Invincible underground workings.

Moreover, in previous assessment of water levels and volumes in the former Ivanhoe No 2 workings in the Response to Submissions Part B report, the inherent conservativeness of the water volume predictions has been detailed. Coupled with this Castlereaugh Coal have maintained a commitment for ongoing monitoring of water levels within the established bores to provide for further detailed mine planning and review prior to the commencement of mining in the Southern Extension Area.

It should be noted that a further detailed review process would always have been undertaken prior to any dewatering of Ivanhoe No. 2 workings due to the safety risks associated with working with stored water in old workings. This is a requirement for safely operating the mine and would be completed in consultation with the Resources Regulator, and is outlined in detail in **Section 2.8** below.

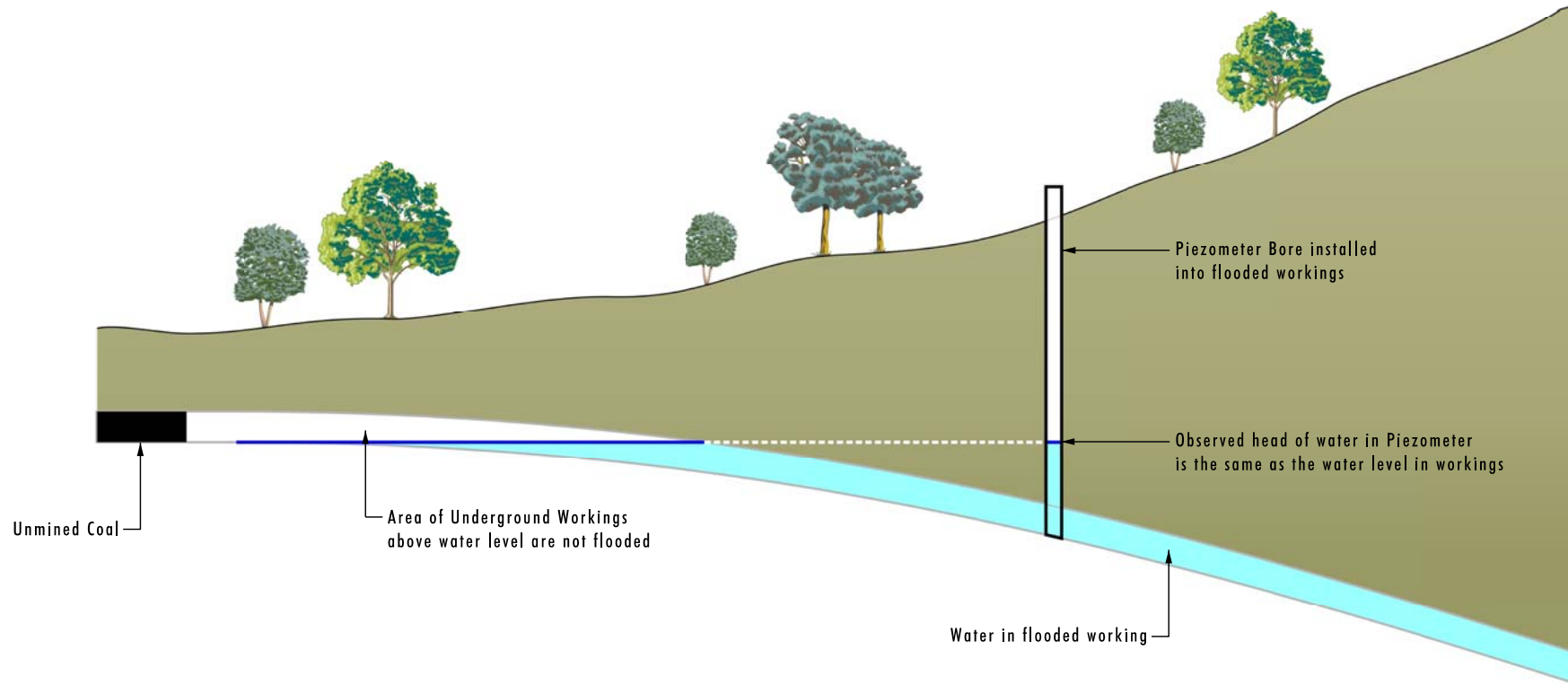


FIGURE 1  
Measurement of Water in  
Underground Working

Following the EPA letter dated 13 September 2017, the data used to assess the stored water in the Ivanhoe No. 2 workings has been further reviewed and updated to provide further certainty to the calculation of water volume in these workings that would require dewatering for the Southern Extension Project. In addition, the assessment of the volume of available storage in the former Invincible underground workings has also been reviewed.

This review considered:

- additional monthly monitoring data from BHTH-2 and BH1 to September 2017 (additional 10 months of monthly monitoring data) including data corrections based on review of sampling methodologies
- seam floor height data from Coalpac data held by Castlereagh Coal
- Record Tracings of both Invincible (held by Castlereagh Coal) and Ivanhoe No 2 workings (held by the Resources Regulator)
- Bore data from previous exploration drilling
- Lidar data for ground levels where previous drilling had occurred.

As part of this review the following was identified:

- were irregularities in the methods used by contractors in measuring water levels in BHTH-12 and BH2 which have been corrected
- there were differences between seam data used for the previous Coalpac groundwater assessments and surveyed seam floor levels in Record Tracings. These differences extended to both the Ivanhoe No. 2 workings and the Invincible underground workings.

The outcomes of the above review are:

- The measured water level in the bores was approximately 0.35m higher than was considered in the Response to Submissions Report B and
- There is more stored water in the Ivanhoe No. 2 workings than was calculated in the Response to Submissions Report B (in the order of 701 ML relative to 367 ML reported in the Response to Submissions Part B report – this volume is still significantly lower than the conservative estimate calculated in the Environmental Assessment and well within the available storage within Invincible underground workings)
- There is more storage available in the Invincible underground workings than had previously been calculated (in the order of 2,048 ML relative to 1,585 ML reported in the Environmental Assessment (Appendix 5) and the Response to Submissions Part B report (Appendix A)).

Overall, while the review has identified additional water in the Ivanhoe No. 2 workings, it does not alter the conclusions regarding potential surface and groundwater impacts or water management in the Response to Submissions Part B report. That is, there is sufficient space within the Invincible underground workings to store water to be dewatered from the Ivanhoe No 2 workings to enable mining of the Southern Extension Area.

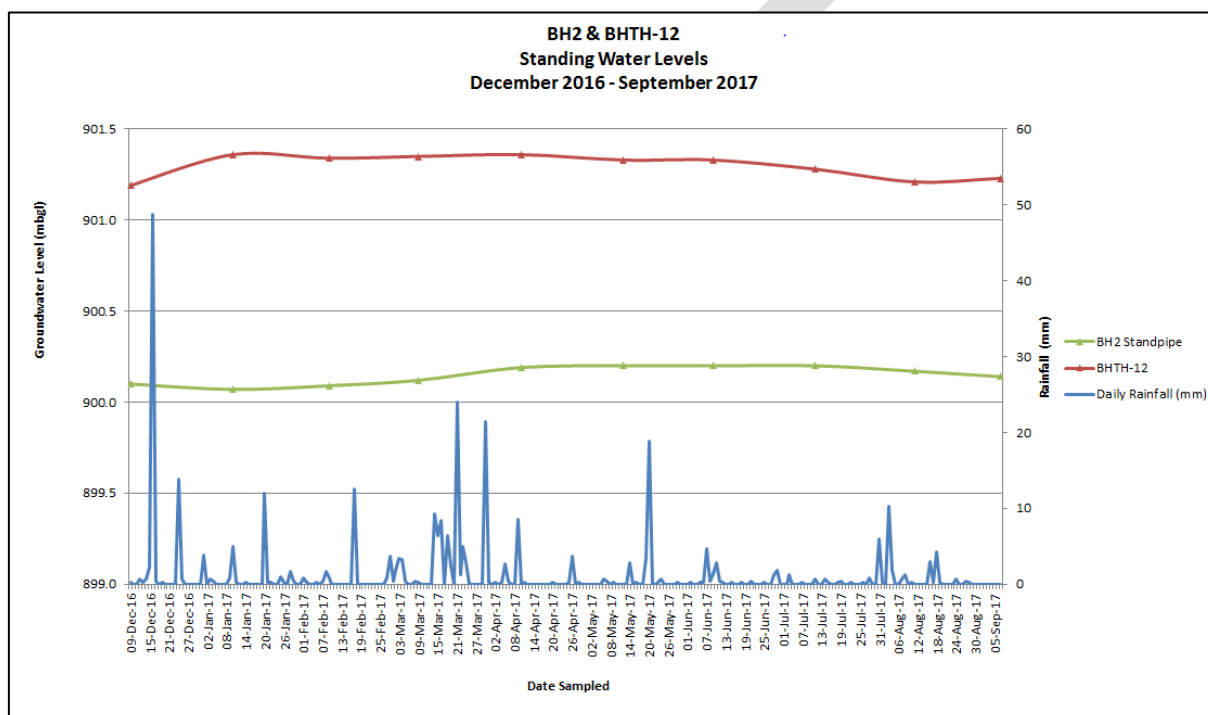
This is detailed further in the following sections.

## 2.1 Monitored Water Levels in BHTH-12

As shown on **Chart 1**, the monitoring data has indicated that water levels in the Ivanhoe workings had remained relatively static over the 10 month monitoring period to within the range 901.19m AHD to 901.36m AHD.

A check against rainfall data (refer to **Chart 1**) indicated no correlation between the minor observed fluctuations and water levels. This indicates that any inflows to the system are effectively balanced by seepage from the system towards the Invincible and Wallerawang workings.

The observed water levels in BH2 similarly showed little movement and, as discussed in the Response to Submission Report B Appendix A, indicate seepage from the Ivanhoe No. 2 workings towards Invincible.



**Chart 1 – Standing Water Levels observed in BH1 and BHTH-12**

These longer term measurements provide a high degree of confidence in the level of water in the Ivanhoe No. 2 Workings. As shown in **Chart 1**, the maximum observed level over the 10 month monitoring period was 901.36m AHD. The most recent reading (7 September 2017) was 901.23m AHD. For the purpose of conservatively estimating storage volumes in the Ivanhoe No 2 workings, a water level of 901.5m AHD has been assumed. This is 0.5m above the inferred water level height in the calculations outlined in the Response to Submissions Part B assessment and 0.14m above the highest water level observed in the Ivanhoe No. 2 workings.

## 2.2 Accuracy of seam level data

The accuracy of water volume predictions is heavily dependent upon the floor seam data and mine workings data used in calculations. Record Tracings have previously been used to assess the extent of workings and the data previously used was considered to have sufficient coverage to calculate water volumes at a conceptual level. As noted above, the Record Tracings for the Ivanhoe No. 2 workings have been obtained to review previous assumptions.

The Record Tracings for Ivanhoe No. 2 obtained from the Resources Regulator contain not only the surveyed extent of mine workings but also surveyed seam floor levels. An extract from the northern section of the RT for the Southern Extension Area is shown in **Figure 2**. As Record Tracings are survey accurate, this seam floor data was digitised and compared to previous seam floor data held for the area. The surveyed seam floor levels were also checked against bore log data to verify the seam floor level data accuracy. This comparison identified discrepancies between the Coalpac Data previously used and that contained in the Record Tracings.



**Figure 2 - Extract from RT34 Ivanhoe No. 2 Workings**

Given the accuracy of the Record Tracings, updated estimates of the extent of water in the Ivanhoe No. 2 workings have been completed. This process has identified that the area of workings flooded is larger than previously understood with the extent of flooding extending to the southern extent of the workings and not just the north eastern corner as had previously been understood. The extent of inferred flooding is shown in **Figure 3**.

### **2.3 Adjustments to Mine Plan as a result of record tracings data**

On the basis of the additional data obtained through the Record Tracings, a remnant barrier of coal in the south-eastern corner of the Southern Extension Area operates as a dam for water stored below RL 898m AHD, south of this barrier (refer to **Figure 3**). Based on this information, this barrier will be retained and not be mined as part of the Southern Extension Project, subject to further detailed mine planning and approval process with the Resources Regulator (refer to **Section 2.8**). The retention of the barrier to the south east will reduce the volume of water to be removed and ensure that the outcomes of the assessment are met (i.e. water from Ivanhoe No 2 workings is captured and stored within the former Invincible underground workings). It is noted that this will result in some Lithgow and Lidsdale seam coal in this area being sterilised.

## 2.4 Revised calculation of water stored in Ivanhoe No. 2 to be removed for Southern Extension Project

As with previous calculations, conservative estimates have been used to calculate the volume of stored water. The following assumptions have been used for the revised calculations:

- Workings are flooded to RL 901.5m AHD (refer to **Figure 3**). That is, the ‘beach’ level in the underground workings will occur at a seam floor depth of 901.5m AHD (maximum observed water levels in the past 10 months of monitoring was 901.36m AHD).
- Dewatering will be required to a ‘beach’ level of 892.5 m AHD.
- Conservative void space assumptions in the Ivanhoe No 2 workings including:
  - 2 metre working height in Ivanhoe No. 2 workings (anecdotal evidence suggests the working height may only have been 1.7m)
  - There has been 64% recovery of coal in the mined areas of Ivanhoe No. 2 workings.
  - All workings in area of flooding below 899.5 and above 892.5 m are assumed to be flooded floor to ceiling. 50% of the total void space in the areas where seam floor levels are between 899.5 and 901.5m AHD are partly flooded and the voids in these areas are assumed to hold 50% of the volume that is held in the fully flooded sections. Following dewatering, up to 50% of the total void space in the areas where seam floor levels are between 890.5 and 892.5 (refer to **Figures 3 and 4**) will contain water which will also be removed.
- The existing coal barrier in the Ivanhoe No 2) workings (as shown in **Figure 3**) will initially be retained, meaning water below 898m AHD to the south of the barrier will not need to be dewatered (refer to discussion in **Section 2.5**). For the purposes of calculations, water above a head of 898m AHD in the areas south of the Barrier (i.e. areas with a seam floor level of between 896AHD and 898m AHD) will be removed as part of the dewatering process. Following dewatering, approximately 50% of the water currently in the void space in the areas where seam floor levels south of the Barrier are between 896m AHD and 898m AHD (refer to **Figures 3 and 4**) will be removed.

In areas of the Ivanhoe No. 2 workings where the Lithgow seam floor is below 899.5m, goaf areas may have water levels extending above the historical working height into the goaf up to 901.5m AHD. For the purposes of the calculations, there is no allowance for higher flooding depths in goaf areas on the basis that any voids or cracks above the 2m assumed ceiling height where water may penetrate would have a corresponding reduction in available storage area in the workings below as a result of the roof material which has collapsed into the void. **Table 1** summarises the calculations of water stored in the Ivanhoe No 2 workings that will need to be dewatered to enable the areas of Southern Extension Area to be mined:

**Table 1 Calculation of water to be removed from Ivanhoe No. 2 workings**

Area	Area (ha)	Area (m <sup>2</sup> )	Assumed void space	Void Space requiring dewatering	Assumed working height (m)	Volume to be removed (ML)
Area A	19.2664	192664	64%	50%	2.00	123.31
Area B	31.7526	317526	64%	100%	2.00	406.43
Area C	11.089	110890	64%	50%	2.00	70.97
Area D	15.6537	156537	64%	50%	2.00	100.18
<b>Total</b>						<b>700.9</b>

Based on these conservative assumptions, the volume of water required to be removed from the Ivanhoe No. 2 workings to enable extraction of the proposed Southern Extension Area is 701 ML.

## **2.5 Retention of Barrier in South Eastern corner of Southern Extension Project**

As noted above, the review of the RTs has identified an internal barrier in the Ivanhoe No. 2 workings (refer to **Figure 3**). As also noted above, this process of further detailed mine planning and removal of old workings would be subject to the approval processes of the Resources Regulator (refer to **Section 2.8**). The original mine plan for the Southern Extension Project would have resulted in the partial removal of this barrier however, if retained, the barrier would limit the amount of water needing to be removed from the Ivanhoe No 2 workings. It is proposed to retain a 50m barrier in this area in both the Lithgow and Lidsdale Seams (refer to **Figure 3**). The effect of the retention of the barrier is that water in the Ivanhoe No.2 workings will have a static head at RL 898m AHD to the south of the barrier; and as such water stored below RL 898mAHD to the south of the barrier will be retained in the workings.

## **2.6 Accounting for groundwater inflows to Ivanhoe No. 2 workings**

Any future inflows to the workings south of the barrier in excess of seepage from the workings will report as pit inflows (i.e. the water will 'overflow' the barrier and flow north towards the workings in the Southern Extension Area). However, as discussed in the response to the additional issues raised by DPI Water in the letter dated 10 May 2017, the natural infiltration rate into the Lithgow Seam is extremely low and is unlikely to result in any material inflows into the Invincible water management system.

In addition, inflows to the Ivanhoe No. 2 workings from subsidence cracking and sinkholes are limited to areas with shallow depth of cover. For the Ivanhoe No 2 workings, these areas are largely confined to the proposed Southern Extension Area. As these areas will be mined, there will be no contribution to stored water levels in the Ivanhoe No. 2 workings from subsidence cracking. All other inflows are accounted for in the site water balance.

It is also noted that the water levels monitored at BHTH-12 have remained relatively static in the 10 months of monitoring. This would indicate that any inflows are currently in balance with seepage outflows. This suggests that any inflows to the Ivanhoe No.2 workings south of the Southern Extension Area will not result in any material additional inflows to the Invincible workings beyond that associated with the initial dewatering.

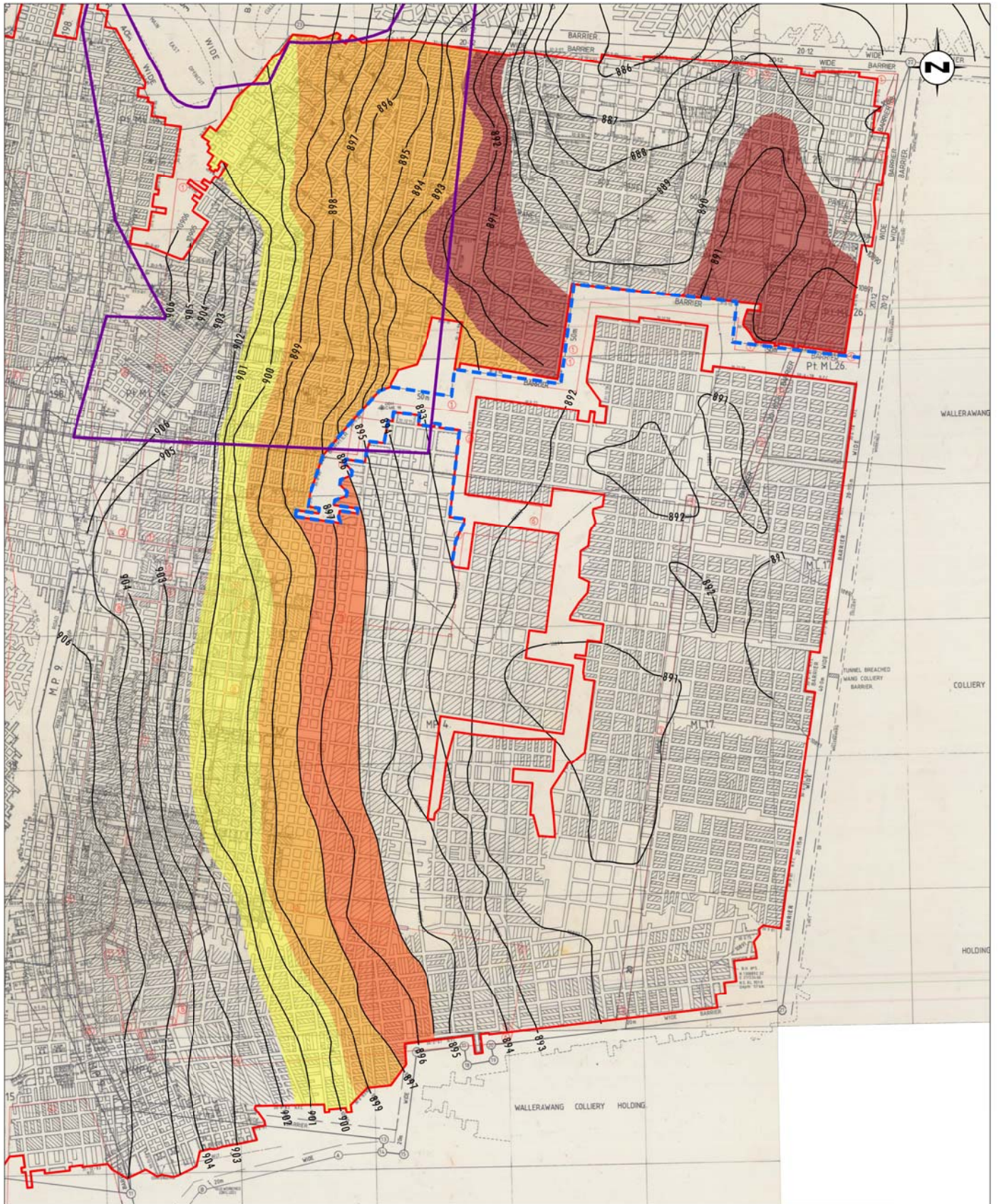


Image Source: Resources Regulator (2017)  
 Note: Contour interval 1m (AHD)

0 100 250 500m  
 1:10 000

**Legend**

- Ivanhoe No.2 Extent of Underground Workings
- Proposed Southern Extension Area
- Area A - Partially Flooded
- Area B - Full Dewatering
- Area C - Partial Dewatering
- Area D - Partial Dewatering
- Coal Barrier to be Retained
- Lithgow Seam Floor Contour

**FIGURE 3**  
**Ivanhoe No.2**  
**Dewatering Areas**

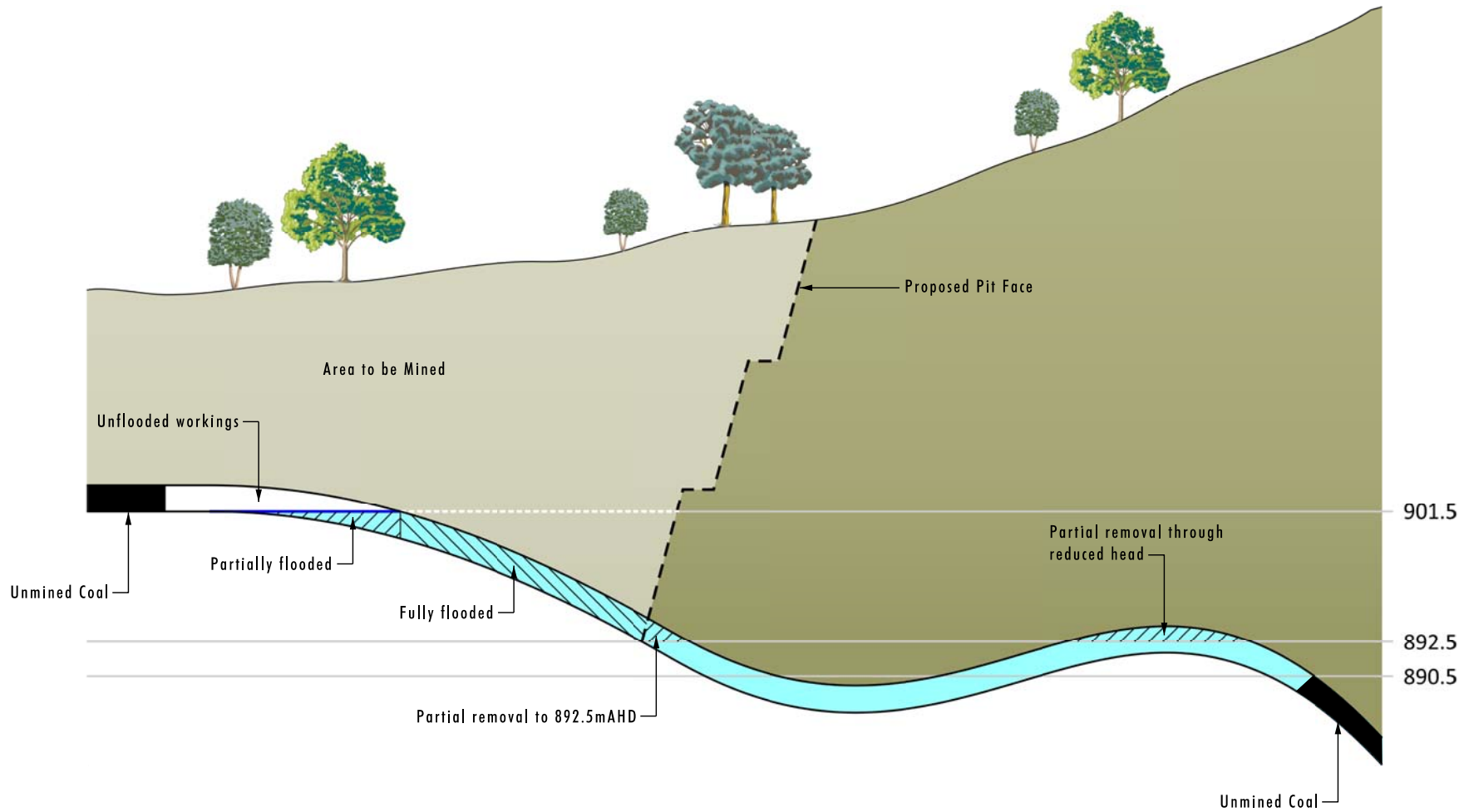


FIGURE 4  
Calculation of Water to be Removed

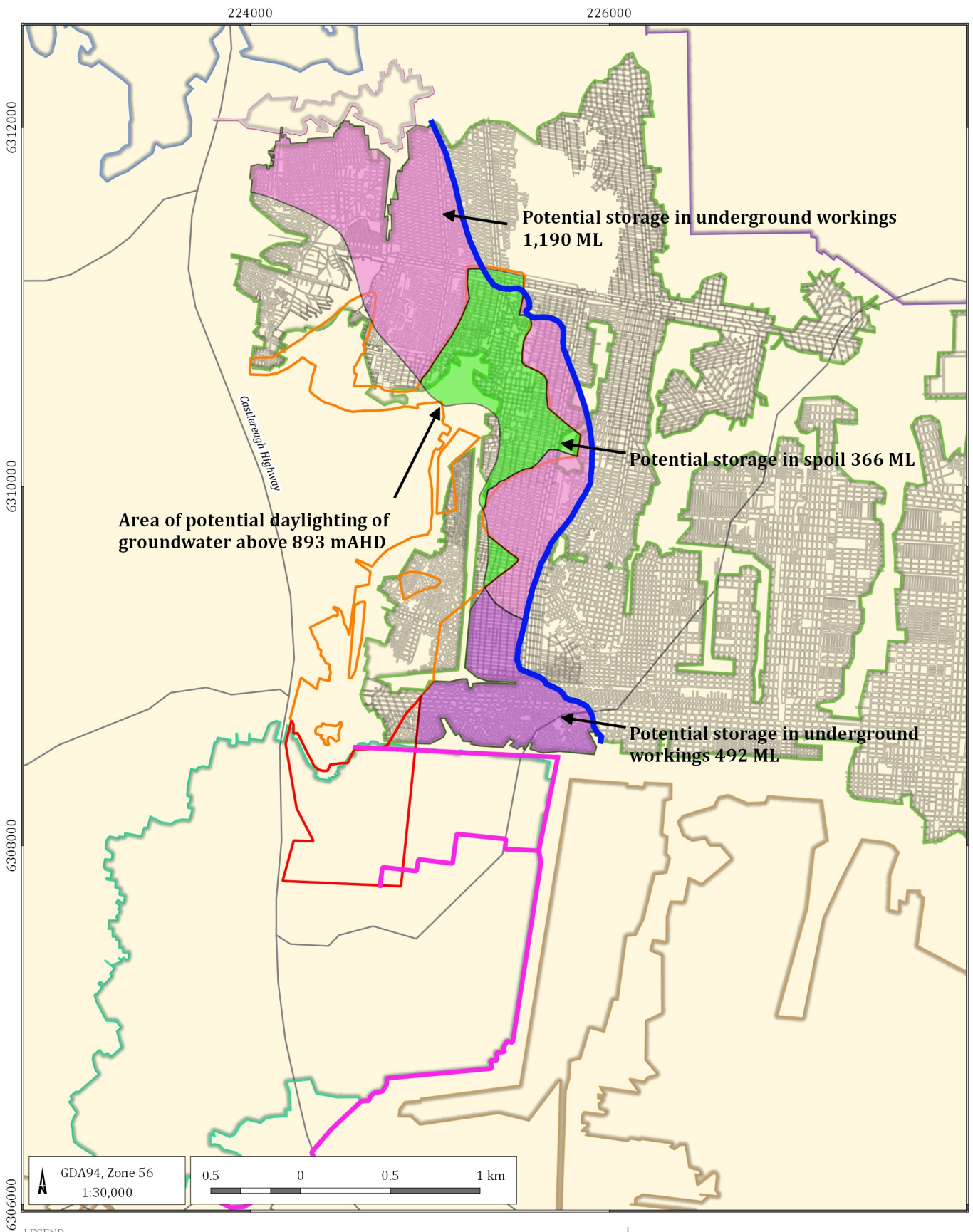
## 2.7 Revised calculation of available storage in Invincible underground workings

The review of the Record Tracings for the former Invincible underground workings also identified discrepancies in the seam floor data previously used to assess available storage in these workings. The seam floor data in the Invincible Record Tracings also explains the discrepancy between the observed tide mark and the floor seam data discussed in Appendix 5 of the Environmental Assessment.

Based on the surveyed seam floor data in the record tracings, there is a larger volume of available storage in the Invincible underground workings than had previously been calculated. The maximum long term storage level remains as previously assessed at 893m AHD. This level is the point at which water stored in the Invincible underground workings (and spoil within the rehabilitated Invincible open cut workings) would 'daylight' as a spring in the catchment of Cullen Creek.

Revised conservative calculations of available storage in Invincible indicate that there is approximately 2048 ML of storage available (refer to **Figure 5**). These storage volumes assume overburden is emplaced in all void areas meaning the operational storage levels are conservative as the Northern Void will remain open until the completion of mining.

DRAFT



LEGEND

- Invincible UG water level 2014
- Coal barrier RT0034
- Proposed southern extension
- Invincible Colliery Open Cut - existing mine disturbance area
- Open cut area (366 ML)
- Potential storage (492 ML)
- Potential storage area (1,190 ML)

Colliery locations

- Baal Bone Colliery
- Invincible Colliery
- Ivanhoe Colliery
- RT108 Colliery
- Tyldesley Colliery
- Unknown

Invincible Southern Extension Project (G1817B)

**Potential storage available using 2014 Invincible Colliery water level**



DATE  
17/10/2017

FIGURE No:  
**5**

## 2.8 Summary of reviewed Water Storage Balance

At the commencement of operations there will be 2048 ML available for the transfer of water from Ivanhoe No.2 workings to the Invincible underground workings without impeding future mining operations in the Southern Extension Area. This is approximately 1347 ML more than is required based on the conservative calculation of water stored in Ivanhoe No. 2.

As noted earlier, the changes in calculated storage levels in the each of Ivanhoe No. 2 and Invincible do not alter the conclusions regarding potential surface and groundwater impacts or water management in the Response to Submissions Part B report. That is, there is sufficient capacity in the Invincible Underground workings to store water within the Ivanhoe No 2 workings to enable mining to occur in the Southern Extension Area.

## 2.9 Management of risk that storage calculations underestimate volume of stored water in Ivanhoe No. 2 workings

Barriers are required between underground mine workings and other underground and open cut operations to manage risks associated with inrush from flooded workings. The risk of inrush is a specific matter that must be managed in a Principal Hazard Management Plan required under the *Workplace Health and Safety (Mines and Petroleum Sites) Regulation 2014* (WH&S Mines Regulation).

The removal of barriers is also declared to be a high risk activity that is regulated by clause 33 of the WH&S Mines Regulation (see clause 29 of Schedule 3). Prior to the removal of any barriers, the Operator of the mine must provide a notice to the Resources Regulator at least 3 months prior to the removal of the barrier. The notice must include (clause 33(2):

- the nature of the proposed high risk activity, including particulars of how the activity is to be carried out,
- the proposed commencement date for the activity,
- the location of the activity,
- any information or documents required by Schedule 3 in relation to the activity,
- the hazards identified as having the potential to arise from the activity,
- an assessment of the risks associated with the activity,
- the relevant parts of the safety management system for the mine or petroleum site that describe the systems, procedures, plans and other control measures that will be used to control risks to health and safety associated with the carrying out of the activity.

The specific matters required by and Schedule 3 clause 29(2) are:

- details of how risks from the activity will be managed,
- survey plans certified by an individual nominated to exercise the statutory function of mining surveyor at the mine.

The removal of the barrier between the Invincible open cut and the Ivanhoe No 2 workings will trigger these requirements. The information used to inform these management measures are the Record Tracings reviewed for the purposes of the calculations in this letter.

The risk of inrush will be mitigated through the commencement of mining in the area to the west of the flooded extent of workings (i.e. the north western part of the Southern Extension Area). By mining down to the workings which are identified as having a seam floor height above the measured water level on BHTH-12, rather than simply removing the barrier, the risk of inrush is avoided. Mining can then progress eastwards towards the workings known to contain water with the barrier between the workings progressively removed until the extent of flooding is reached. Once mining reaches the monitored extent of flooding (currently below the 901.5m AHD seam floor level) dewatering will be required to progress mining in an easterly direction.

With this approach to mining adopted, there is no risk of inrush. The only risks are therefore the potential for there to be more water in the Ivanhoe No. 2 workings to be dewatered than there is storage available (i.e. it is possible, though considered remote, that there are inaccuracies in the Record Tracings or assumptions that mean there could be more water in the underground workings than has been calculated or there is less storage available than has been calculated). The use of conservative assumptions mitigates against this risk however additional management measures will be implemented to manage the risk of there being insufficient storage in Invincible underground workings. These measures include the following:

- Prior to any mining of areas which would require the removal of the coal barrier between Ivanhoe No 2 and Invincible below a RL of 901.5m AHD (or such higher level as identified through the monitoring of BHTH-12), approximately 200ML will be transferred from the Ivanhoe No. 2 workings to the Invincible workings.
- The water levels in BHTH-12 and the Northern Void will be monitored during and following the transfer.
- A revised calculation of stored water and available storage will be undertaken at the completion of the transfer to confirm storage levels in both Ivanhoe No 2 and Invincible are behaving as predicted. This volume of water is well within the calculated available storage in Invincible and will not pose a risk of Invincible discharging this water to the downstream surface water system.
- Should the monitoring indicate that the volumes of water in Ivanhoe No. 2 are greater than can be stored in Invincible, the mine plan will need to be revised to reduce the volume of water to be dewatered.

As noted above, the conservativeness in assumptions used and the increased accuracy of the seam floor data used in the calculations mean the risk of the above scenarios eventuating are considered to be low. The proposed approach to managing risks around the volume of stored water is effective in managing any environmental risks associated with an under-prediction of stored water volume.

In the unlikely circumstance that a modification of the mine plan may be required, this represents an operational/ production risk to Castlereaugh Coal rather than a risk to the environment.

Accordingly these measures will further ensure that the water removed from the Ivanhoe No. 2 workings will not be directly discharged from the site and will be managed as part of the overall stored water volume in Invincible.

These measures will be further detailed in a Water Management Plan to be developed for the Southern Extension Project.

### 3.0 Predicted seepage to Baal Bone

The EPA incorrectly states that inflows to Baal Bone are predicted to increase by 315 ML/year. As detailed in Appendix A of the Response to Submissions Report B, there is an existing level of seepage from Invincible towards Baal Bone and the predicted seepage rate would increase by between 5 ML/year and 15 ML/year to between 105 ML/Year and 315ML/year on the basis of the increased storage of water in the former Invincible workings. This increase of seepage toward Baal Bone of between 5 to 15 ML/year represents less than 1% of annual dewatering volumes from Baal Bone and is well within the approved volume of licences held by Baal Bone.

### 4.0 Discharges

The EPA has identified that any discharges from the site would be required to meet the default ANZECC criteria.

As previously noted in the Response to Submissions Part B, and subsequent responses to DP&E in relation to previous matters raised by the EPA, the background concentrations of several analytes in receiving waters downstream from the site are higher than default criteria. Monitoring during currently approved wet weather discharge events has not demonstrated any observable impact on downstream water quality.

Approximately 12 months of monitoring data from receiving waters is now available and, when sufficient data has been obtained, a variation to the EPL to reflect site specific criteria will be sought. In the interim, operations will be managed to avoid discharges from the Main Water Storage Dam that would be in breach of s.120 of the *Protection of the Environment Operations Act 1997* and would be managed to meet the default ANZECC criteria as specified in the EPA letter. We note however that the EC in receiving environment currently exceeds the upland river criteria and any limits imposed on the EC levels in discharge waters should be based on the EC levels of the receiving waters rather than the arbitrary upland rivers criteria.

The following management measures are proposed to manage these risks of discharges being in breach of licence conditions:

- Water levels in the Main Water Storage Dam will be managed to ensure sufficient freeboard is available to mitigate the risk of spill in high rainfall events. This can be done by pumping from the Main Water Storage Dam to the Northern Void when water levels in the Dam exceed the permitted freeboard. This free board would be managed based on weather forecasts and predicted usage demand from the Coal Preparation Plant.
- The Main Water Storage Dam will only receive water from the Northern Void when storage levels drop below the volume necessary for the CHPP and other operational purposes. This will be managed on a daily basis with additional freeboard maintained when water in the Main Water Storage Dam is sourced from the Northern Void.

The above measures (and freeboard and pump rules developed for the Main Water Storage Dam) will be documented in the Water Management Plan to be developed for the site and would remain in place prior to the agreement on discharge criteria on the EPL for Invincible. These rules will be informed by the Site water balance which will also be documented in the Water Management Plan.

As detailed in the Environmental Assessment for the Southern Extension Area, sediment dams are designed to operate in accordance with the principles set out in the Blue Book (Landcom, 2004 and DECC 2008). These dams will manage run-off from disturbed areas and are designed to manage risks to the downstream environment associated with runoff from such areas. Consistent with the Blue Book design principles, these dams are designed to spill during large rainfall events which exceed the design criteria for the dams.

Following rainfall events, these dams are pumped dry by transferring the water to the Northern Void or the Invincible Underground Workings. The existing sediment dam system at Invincible has been successfully managed water quality risks to the environment.

#### **5.0 References:**

*Landcom, 2004. Managing Urban Stormwater – Soils and Construction, Volume 1, 4th Edition.*

*Department of Environment and Climate Change (DECC), 2008. Managing Urban Stormwater – Soils and Construction, Volume 2E – Mines and Quarries.*

Yours sincerely

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