Runge Pincock Minarco

Expert Review of Drayton South Open Cut Coal Project

NSW Department of Planning and Infrastructure

Report No: ADV-SY-04075

Date: July 2013

Document Control Sheet

Client	
NSW Department of Planning and Infrastructure	
Report Name	**Date**
Expert Review of Drayton South Open Cut Coal Project	July 2013
Report No.	**Revision No.**
ADV-SY-04075	3

Authorisations				
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Executive Summary

New South Wales Department of Planning and Infrastructure (DoP) requested RungePincockMinarco Limited ("RPM") to provide an Expert Report in relation to the Drayton South Coal Project held by Anglo American Metallurgical Coal Pty Ltd (Anglo).

RPM understands that the Minister for Planning and Infrastructure has requested that the Planning and Assessment Commission (PAC) defer its review of the Drayton South project until the DoP undertakes further review addressing issues raised in public submissions.

The Drayton South Project is located in the upper Hunter Valley of New South Wales approximately 13km south of Muswellbrook and 2.3km from the southern lease limit of the Drayton Mine. The project will utilise the existing infrastructure located at the Drayton Mine and will be connected by a 10km haul road. The Golden Highway crosses the Drayton South Lease and is located to the south of the proposed mining operation. The Hunter River is located to the south of the mining lease as are the Coolmore and Darley horse studs and the Arrowfield Winery.

Drayton is an open-cut thermal coal mine producing around 5 Mt of thermal coal per annum for sale on export and domestic markets. The mine began production in 1983 and has approvals in place to extend the mine life to 2017. Anglo is considering options for the early closure of the Drayton Mine which could see the mine closed in early 2015. Anglo is seeking Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* for the continuation of the existing Drayton Mine through the extraction of coal by both open cut and highwall mining operations in the Drayton South area. The Project will maintain ongoing use of the Antiene Rail Spur, for the transport of coal to the Port at Newcastle.

Five seams from the Whitingham coal measures are planned to be mined at Drayton South. The seams in descending stratigraphic order are named:

- Whybrow Seam
- Redbank Creek Seam
- Wambo Seam
- Whynot Seam
- Blakefield Seam

Four pits have been defined at Drayton South known as the Blakefield, Whynot, Redbank and Houston Pits. The Blakefield, Whynot and Houston pits are to be mined by a dragline with truck and shovel pre-strip. The Redbank Pit is to be mined as a truck and shovel operation.

RPM attended a project initiation meeting with the DoP to discuss the scope of work. In addition to this RPM representatives attended site visit and follow up meetings with Anglo and their consultants. The key documents reviewed were the Drayton South Coal Project Environmental Assessment, public submissions, Response to Submissions and mine planning data provided by Anglo. RPM had three weeks to complete the review and presented findings to the DoP on July 1, 2013.

The scope of work is based on answering specific questions relating to three broad topics; Impact of the project on horse studs, rehabilitation at Drayton South and Rehabilitation at Drayton. The following summarises the key findings of this review:

- The mine development strategy for Drayton South is based on maximising production and throughput at the coal processing plant with the existing Drayton equipment fleet whilst operating within environmental guidelines. To keep the dragline utilised, two dragline pits are required at any time to provide sufficient strike length for efficient operation. The development sequence for the dragline switches between the Whynot and Blakefield Pits up until year 14 followed by the Whynot and the Houston Pit from year 15. The Redbank pit is a low strip ratio truck and shovel pit which adds production to the first 19 years of the project.

- Removing or reducing the size of the Houston Pit does not impact on the project's ability to comply with environmental guidelines and does not remove the visual impact as a portion of the Whynot pit extends to the south of the ridge. RPM completed an assessment of a case that aims to remove the visual impact by keeping it behind the ridgeline. The impacts are a loss of 24Mt of ROM coal from the schedule, reduced dragline utilisation and annual ROM coal production. The combined impact would have a material impact on the project economics.
- Removing or reducing the size of the Redbank Pit does not impact on the project's ability to comply with environmental regulations. Doing so would underutilise the coal processing plant and the truck and shovel fleet, thereby removing low strip ratio coal from the first 19 years of the project. This would have a material impact on the project economics.
- A number of options have been considered for the visual bund and presented in the EA. Coolmore have suggested an alternative bund design (Option 4) which has been adopted by Anglo for future planning.
- The reduced size and construction time for the Option 4 bund means that the visual bund could be delayed until year 4. There is potential to further delay the construction of the visual bund but detailed planning is required to understand the technical and economic feasibility.
- To assess the impact of a less intensive mining operation, RPM modelled a scenario whereby a maximum of two pits were actively mined at any one time. The dragline requires two pits to operate simultaneously to maintain full utilisation. This means that the low strip ratio, truck and shovel Redbank Pit is deferred until late in the project. This results in a significant reduction in ROM coal produced in the first 19 years of the project. RPM concludes that there is little scope to reduce the intensity of the operation without having a material impact on the project economics.
- There appears to be no economic or environmental advantages in hauling waste material from Drayton South to the Drayton final voids. RPM believe that this would result in increased capital and operating cost and increased environmental impacts as a result of operating a larger truck fleet.
- RPM estimate that the size of the central ramp can be significantly reduced through periodic re-grading of the ramp at a steeper grade. Assuming a 10% ramp grade, the volume of the ramp void can be reduced from 38Mcu.m as per the EA final landform to 11Mcu.m.
- Anglo has completed preliminary work on an alternate mining sequence in the final years of operation with the aim of reducing the size and depth of the final void. The outcome is a substantially smaller final void, reducing from 220Mcu.m in the EA final Landform to 95Mcu.m in the revised final landform.
- Anglo is committed to completing detailed final landform designs for Drayton South including the updated Option 4 visual bund.
- The Drayton mine is at an advanced stage of mine life and as such there is little that can be done to reduce the size of the final voids. There is currently uncertainty around the final landform at Drayton due to the timing of approvals for Drayton South and potential use of voids by Macquarie Generation. Anglo has commissioned Hansen Bailey to complete a detailed mine closure plan for the Drayton mine which is due for completion at the end of Q3 2013. The detailed closure plan will cover the issue of material balance at the Drayton Mine including topsoil and the long term management of spontaneous combustion management at the site.

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1. Introduction

1.1 Background

New South Wales Department of Planning and Infrastructure (DoP) require RungePincockMinarco Limited ("RPM") to provide an Expert Report in relation to the Drayton South Coal Project held by Anglo American Metallurgical Coal Pty Ltd.

RPM understands that the Minister for Planning and Infrastructure has requested that the Planning and Assessment Commission (PAC) defer its review of the Drayton South project until the DoP undertakes further review addressing issues raised in public submissions.

1.2 Scope of Work

The scope of work was provided by the DoP and includes a series of questions covering three broad topics of:

- Impact on Horse Studs to the South of the Project
- Rehabilitation and Final Landform at Drayton South
- Drayton North Mine Closure

The following outlines the specific questions covered in this review.

Impacts on Horse Studs

1. What are the technical and financial implications for the project of:
   a. Removing and/or substantially reducing the size of the Houston and Redbank Pits?
   b. Ensuring that the project is not visible from the Coolmore property?
   c. Delaying the Visual Bund and/or Houston Pit until the end of the mine life?
2. Are there any alternative designs (other than Option 4) for the proposed Visual Bund which provide a better balance between cost, duration of construction and rehabilitation, and limiting the visual impacts on the Coolmore property?
3. What is the likely construction duration for the Visual Bund (Option 4) with and without night-time operations?
4. Are there any major design considerations that should be incorporated into the design of the Visual Bund to enhance rapid rehabilitation and revegetation as well as long term stability and drainage?
5. What measures should be implemented to minimise dust emissions from the Houston Pit if it is not actively mined for a number of years?

Rehabilitation and Final Landform

6. What options exist for limiting the intensity of operations and/or the area of disturbance at the mine (i.e. is it necessary to undertake operations in multiple pits simultaneously)? Are there additional measures that can be applied to reduce the area of disturbance and improve progressive rehabilitation at the mine to minimise dust emissions?
7. Is there any convincing justification for using overburden from Drayton South for rehabilitation of the existing operations at the Drayton Mine to the north? If so, how much material would be required, what are the benefits of such a proposal for the final landform at both Drayton North and South, and what are the implications for the project?
8. Is it feasible to fill the central haul road in the Whynot Pit, and use an alternative haul road to the east? If so, are there any significant implications for the project?

9. Is there any justification for requiring a greater setback of the overburden emplacement areas from Saddlers Creek in terms of drainage and flow velocities into the creek?
10. What options exist for reducing the size and depth of the final void at Drayton South? What are the implications of these options for the project?
11. What options exist for creating a more natural final landform in terms of final slopes, micro-relief, and drainage? What are the key performance objectives that should be applied in any conditions of approval to ensure these outcomes are met?
12. Will there be sufficient topsoil material for achieving the rehabilitation outcomes presented in the EA? Are there any specific measures for managing materials handling that should be implemented to ensure the rehabilitation objectives can be achieved?

Drayton Mine Closure

13. Is there sufficient material available at Drayton North to achieve the proposed final landform? If not, are there measures that need to be implemented to address the shortfall?
14. Are there any feasible options exist for reducing the number, size and depth of final voids? What are the implications of these alternatives for the project?
15. Are there any risks of hydraulic interaction between final voids, overburden/tailings emplacement areas, and/or Macquarie Generation's ash dam?
16. Are there any additional measures that should be implemented to reduce spontaneous combustion?
17. Are there any key elements of the rehabilitation of the site that should be altered to achieve best practice?

1.3 Capability and Independence

RPM operates as an independent technical consultant providing resource evaluation, mining engineering and mine valuation services to the resources and financial services industry. RPM has carried out assignments for Anglo American Metallurgical Coal and the Drayton Mine in the past. RPM believes its independence has in no way been compromised.

RPM has been paid, and has agreed to be paid, professional fees for preparation of this report.

1.4 Limitations and Exclusions

This Technical Review has been prepared in accordance with instructions received for and on behalf of the NSW Department of Planning and Infrastructure and is for the Department's sole and exclusive use. RPM does not agree to any other party relying upon the content and/or findings of this Technical Review unless RPM has first given its express written consent.

The RPM scope for the Technical Review did not include the following aspects:

- Production of geological or mine planning models; and
- First principles build-up of mine planning options;

This review specifically excludes all aspects of legal issues, land titles and agreements, excepting such aspects as may directly influence technical, operational or cost issues. RPM has not undertaken an evaluation of marketing or coal pricing forecasts. This review does not consider financial or commercial matters, including without limitation loan funding aspects, cash flows, profit and loss, balance sheet, non-cash items, commodity prices, exchange rates, economic viability or the valuation of the Project. RPM reserves the right to change its view of any of the conclusions set out in this review should any of the fundamental information provided to RPM materially change.

RPM has not appointed any specialist sub-consultants, in areas such as, hydrology, visual impacts and rehabilitation. Thus, the review is based on our professional opinions and industry experience.

1.5 Inherent Mining Risks

Coal mining is carried out in an environment where not all events are predictable.

Whilst an effective management team can identify the known risks and take measures to manage and mitigate those risks, there is still the possibility for unexpected and unpredictable events to occur. It is not possible therefore to totally remove all risks or state with certainty that an event that may have a material impact on the operation of a coal mine, will not occur.

1.6 Materiality

RPM has adopted the Australian Accounting Standards Board standard AASB 1031 which proposes that the materiality of information or data can be assessed in terms of the extent to which its omission or inclusion could lead to changes in total value:

- equal to or less than five percent – immaterial;
- between five and ten percent – discretionary; and
- equal to or greater than ten percent – material.

These guidelines were used as a general guide. RPM has not in all cases been able to determine the value impact of an issue when determining the materiality of an item.

1.7 Information Sources

The primary information source for this review was the Drayton South Coal Project Environmental Assessment. **Table 1.1** lists the sources of information received for review.

Table 1.1 – Sources of Information

Document / Title	Format
Drayton South Coal Project Environmental Assessment - Main Report	PDF
Drayton South Coal Project Environmental Assessment - Appendices	PDF
Public Submissions (Coolmore)	PDF
Public Submissions (Darley)	PDF
Public Submissions (United Pastoral)	PDF
Response to Submissions – Main Report	PDF
Response to Submissions – Appendices	PDF
Drayton Mine Closure Plan - Draft	PDF
Drayton Void Management Plan - Draft	PDF
MSC Approved Arrowfield DA	PDF
Drayton Extension Revised EA	PDF
Drayton Extension EA – Appendix G – Groundwater Impact Assessment	PDF
Drayton South Visual Bund Design_Option 4A	DXF

Drayton South Visual Bund Design_Option 4A	XLXS
EA Schedule Physicals	XLXS
Output Modified EA schedule for ridgeline limited Whynot and no Houston	XLXS
Mine Stage Plans	DXF
Long Sections	PNG
DS presentation to RPM - June 2013	PPT
Dragline Simulation Productivity Analysis	PPT
Drayton South PFS - Excerpt	PDF
Drayton Final Landform Designs - Draft	DXF
Drayton South Economic Ratio Plot	PPT
Drayton Mine Spontaneous Combustion Management Plan	PDF
EA Schedule Data by Pit	XLXS

In the time frame and budget allowed for the Technical Review not all documents could be read in full. Key documents were read so that the plans and issues associated with the projects could be understood. Less important documents were overviewed and some documents that were considered of lower value were not read at all.

1.8 Review Process

RPM attended a project initiation meeting with the DoP to discuss details of the scope of work, project timing and deliverables. A digital copy of the Drayton South Coal Project Environmental Assessment was provided by the DoP.

RPM representatives attended site visit to the Drayton Mine and the Drayton South project area on the 13th of June 2013. The site visit was attended by Anglo American employees and a representative from Hansen Bailey. RPM met with GPPH and Hansen Bailey consultants on the 13th and 14th of June 2013.

RPM had three weeks to complete the review and presented findings to the DoP on July 1, 2013.

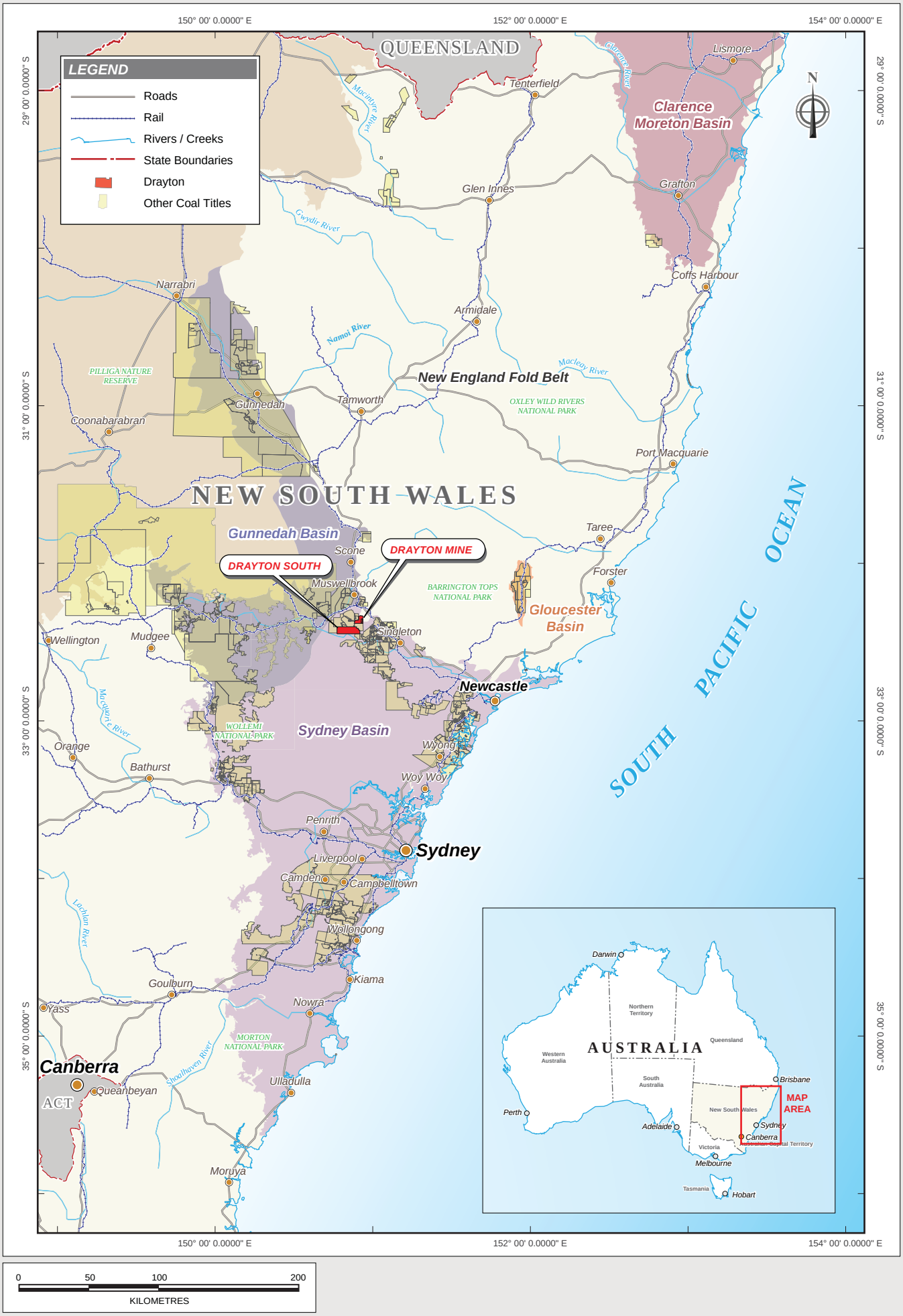

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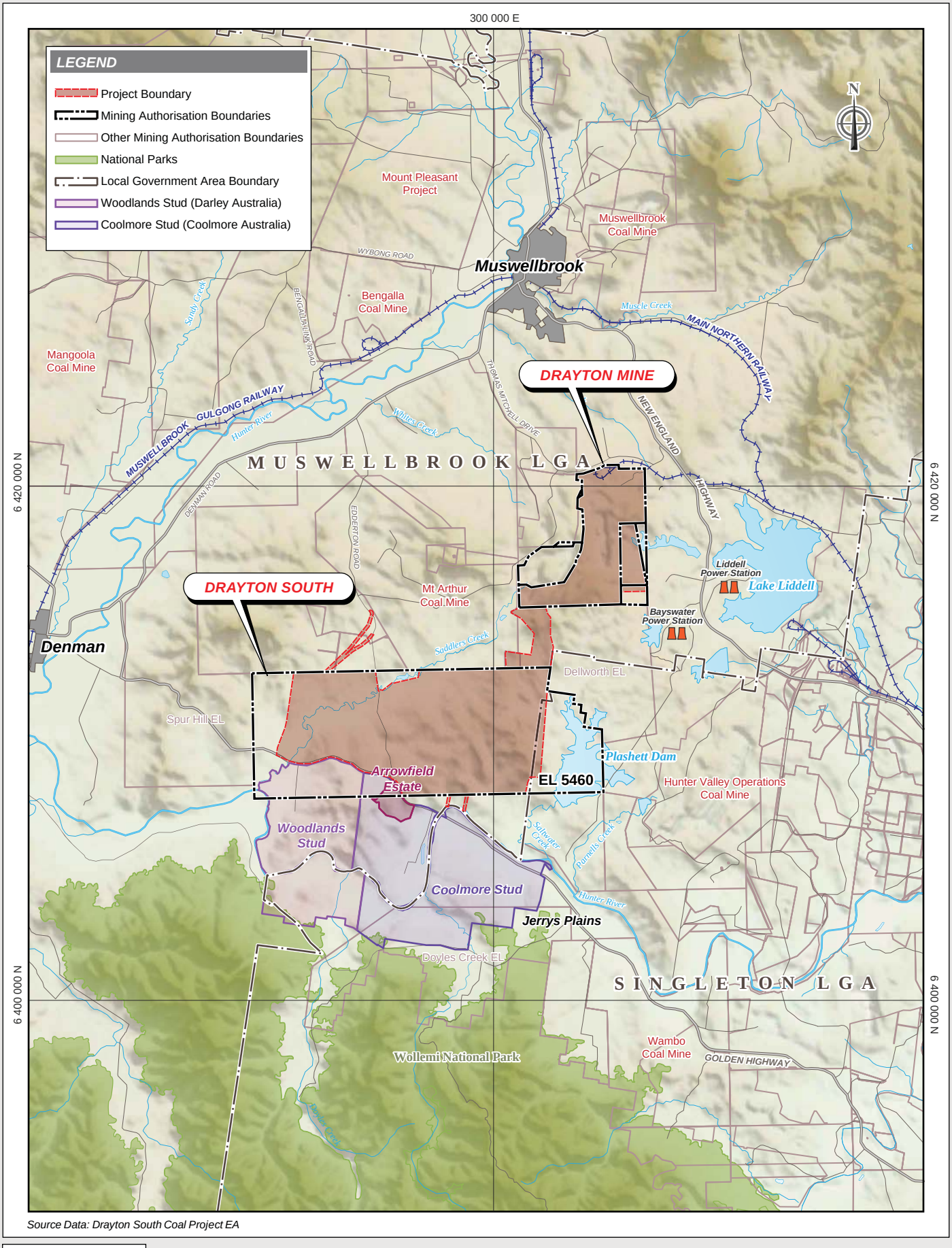
	Figure : **GENERAL LOCATION PLAN**	FIGURE No.1.1



Source Data: Drayton South Coal Project EA

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	Project : **EXPERT REVIEW OF DRAYTON SOUTH OPEN CUT COAL PROJECT**	Date : July 2013
	Figure : **REGIONAL LOCATION PLAN**	FIGURE No.1.2

2. Project Overview

2.1 Location and Background

The Drayton South Project is located in the upper Hunter Valley of New South Wales approximately 13km south of Muswellbrook and 2.3km from the southern lease limit of the Drayton Mine. The project will utilise the existing infrastructure located at the Drayton Mine, coal will be transported via a proposed 10km haul road to the Drayton Coal Handling and Preparation Plant (CHPP).

The Golden Highway crosses the Drayton South Lease and is located to the south of the proposed mining operation. The Hunter River is located to the south of the mining lease as are the Coolmore and Darley horse studs and the Arrowfield Winery.

2.2 Drayton Operations

Drayton is an open-cut thermal coal mine producing around 5 Mt of thermal coal per annum for sale on export and domestic markets. The mine began production in 1983 and has approvals in place to extend the mine life to 2017. Anglo is considering options for the early closure of the Drayton Mine which could see the mine closed in early 2015, due to economics.

The mine uses one dragline, two large hydraulic excavators, truck fleet and associated supporting ancillary equipment. ROM coal is hauled to the ROM pad where the majority of coal is processed in the coal preparation plant. Product coal is transported by rail to local customers and the Port of Newcastle.

Drayton is owned by Anglo American (88%) and joint venture partners NCE Anglo American, Mitsui Coal Anglo American, Daesung Anglo American and Hyundai Anglo American. The mine is operated and managed by Anglo American.

2.3 Proposed Drayton South Operations

2.3.1 Project Description

The following project description for Drayton South is from the Drayton South Coal Project Environmental Assessment.

Anglo American is seeking Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* for the continuation of the existing Drayton Mine through the extraction of coal by both open cut and highwall mining operations in the Drayton South area. The Project will maintain ongoing use of the Antiene Rail Spur, for the transport of coal to the Port at Newcastle.

The Project involves:

- The continuation of operations at Drayton Mine as presently approved with minor additional mining areas within the East, North and South Pits;
- The development of an open cut and highwall mining operation extracting up to 7 Million tonnes per annum of Run of Mine coal over a period of 27 years within the Drayton South area;
- The utilisation of the existing Drayton Mine equipment fleet with the addition of a highwall miner and coal haulage fleet;
- The continuation of the existing workforce of up to 530 employees and contractors;
- The use of Drayton Mine's final landform voids for rejects and tailings disposal and water storage;
- The utilisation of the existing Drayton Mine infrastructure including the Coal Handling and Preparation Plant, rail loop and associated loading infrastructure, workshops, bath houses and administration offices;

- The construction of a transport corridor between the Drayton South mining area and the existing Drayton Mine;
- The continued utilisation of the Antiene Rail Spur off the Main Northern Railway to transport product coal to the Port of Newcastle for export;
- The realignment of a section of Edderton Road; and
- The installation of further water management and power reticulation infrastructure to support mining in the Drayton South area.

2.3.2 Drayton South Site Layout

Five seams from the Whitingham coal measures are planned to be mined at Drayton South. The seams in descending stratigraphic order are named:

- Whybrow Seam
- Redbank Creek Seam
- Wambo Seam
- Whynot Seam
- Blakefield Seam

Four pits have been defined at Drayton South known as the Blakefield, Whynot, Redbank and Houston Pits and are shown in **Figure 2.1**.

The Blakefield Pit limits are defined by the Blakefield Seam subcrop to the north, a volcanic intrusion to the east, economic limits to the south and environmental considerations limit the western extent of the pit. The Blakefield pit targets the Blakefield seam only, the proposed mining method is by dragline with truck and shovel prestrip as required. Highwall coal will be extracted at stages throughout the project from the Blakefield Pit highwall. The Blakefield Pit contains approximately 6Mt at an average ROM strip ratio of 10.5:1.

The Whynot Pit limits are defined by the Whynot Seam subcrop to the north and east and economic limits to the south and west. The Whybrow, Redbank Creek, Wambo and Whynot seams are present in the Whynot Pit. The proposed mining method is by dragline with truck and shovel prestrip as required and contains approximately 73Mt at an average ROM strip ratio of 7.7:1. Highwall coal will be extracted at stages throughout the project from the Whynot Pit highwall.

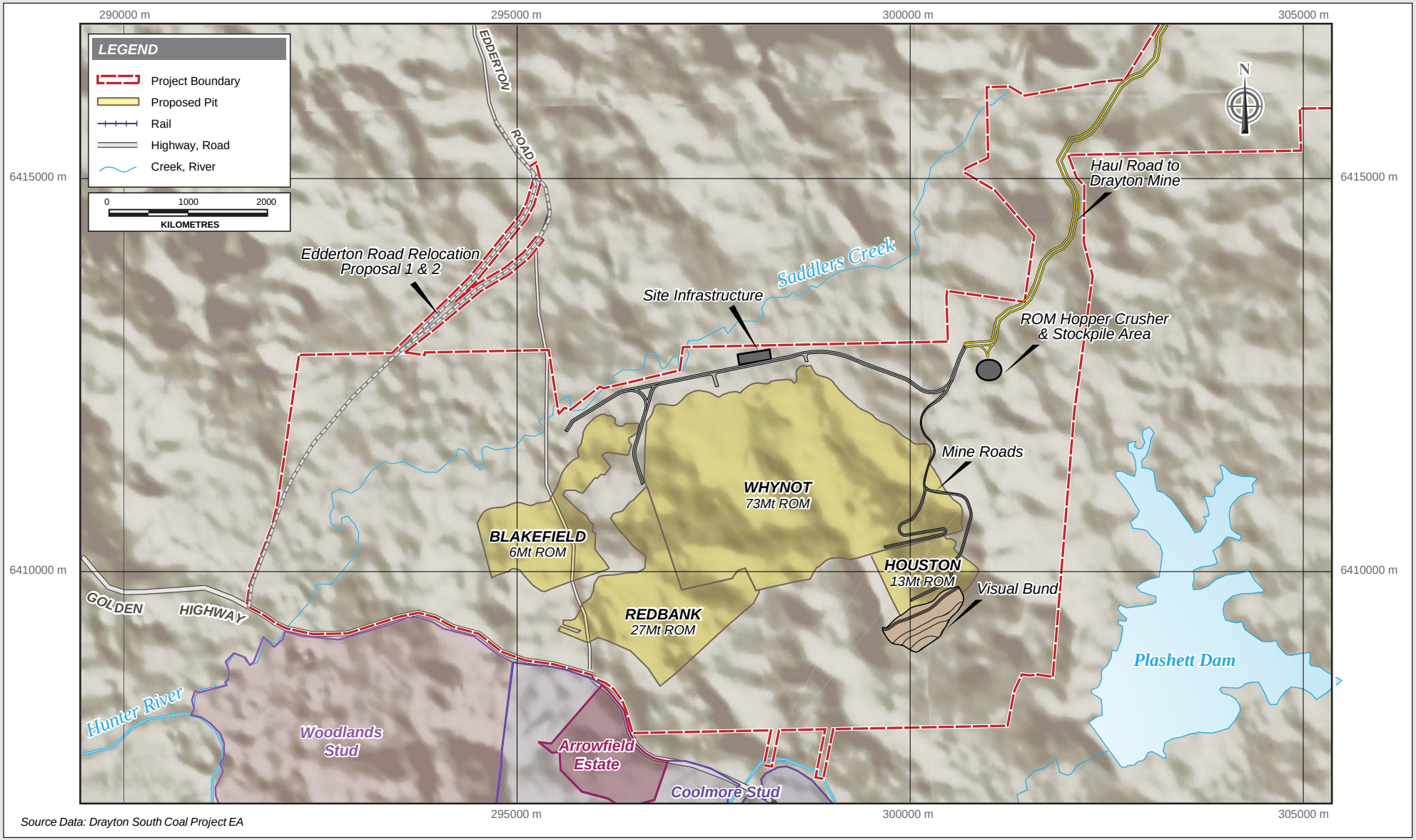
The Houston Pit limits are defined by the Redbank Seam subcrop to the east and environmental considerations to the south and west. The Redbank Creek, Wambo and Whynot seams are present in the Houston Pit. The proposed mining method is by dragline with truck and shovel prestrip and contains approximately 13Mt at an average ROM strip ratio of 4.9:1. Highwall coal will be extracted at stages throughout the project from the Houston Pit highwall.

The Redbank Pit limits are defined by the Redbank Creek Seam subcrop to the north, volcanic intrusion to the east and environmental considerations to the south and west. The proposed mining method in the Redbank Pit is truck and shovel strip mining broadly progressing from the north to the south. Highwall coal will be extracted at stages throughout the project from the Redbank Pit highwall. The Redbank Pit contains 27 Mt of ROM Coal at an average ROM strip ratio of 5.2:1.

The Drayton South project is to be connected to the Drayton Mine CHP by a 10km haul road to transport ROM coal to the CHPP and train loading facility.

2.3.3 Mine Development Strategy

The mine development strategy for Drayton South is based on maximising production with the existing Drayton equipment fleet whilst operating within environmental guidelines. To keep the dragline utilised, two dragline pits are required to provide sufficient strike length. The development sequence for the dragline switches between the Whynot and Blakefield Pits up until year 14 followed by the Whynot and the Houston Pit from year 15. The Redbank pit is a low strip ratio truck and shovel pit which adds production to the first 19 years of the project.



Source Data: Drayton South Coal Project EA

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	Figure : **DRAYTON SOUTH SITE LAYOUT**	FIGURE No.2.1

3. Review

3.1 Impact on Equine CIC areas

Question 1: What are the technical and financial implications for the project of:

a) Removing and/or substantially reducing the size of the Houston and Redbank Pits?
b) Ensuring that the project is not visible from the Coolmore property?
c) Delaying the Visual Bund and/or Houston Pit until the end of the mine life?

Answer 1a
Removing or reducing the size of the Houston Pit does not impact on the projects ability to comply with environmental guidelines and does not remove the visual impact as a portion of the Whynot pit extends to the south of the ridge. RPM completed an assessment of a case that aims to remove the visual impact by keeping it behind the ridgeline. The impacts are a loss of 24Mt of ROM coal from the schedule, reduced dragline utilisation and annual ROM coal production. The combined impact would have a material impact on the project economics.

RPM note that the project would comply with noise and air quality regulations irrespective of the size of Houston and Redbank Pits.

The following points are in relation to the removal or reduction in the size of the Houston Pit.

- Removing the Houston pit on its own does not remove the visual impact. A portion of the Whynot Pit would need to be excluded to remove the visual impact at a total loss of 24Mt ROM Coal
  - RPM did not received a geological model but have completed a high level estimate using reported average strip ratios for pits and impacted areas broadly confirm the 24Mt coal loss
- Removing the Houston Pit would reduce the overall dragline strike which is required to maintain continuous operation of the Dragline from year 15 when Blakefield Pit finishes.
  - From the EA schedule, the DL working pit length is approximately 4km pa, removing Houston decreases the DL working pit length by 20%.
  - RPM estimate that the Dragline utilisation would be significantly reduced
  - Impact is a 1-1.5Mt reduction in annual ROM coal Production from year 15
  - Reduced total revenue estimated between A$1.6 – 1.8B (24Mt at 76% recovery and A$90 - 100/t)
  - Material impact to the project economics
- Reducing the size of the Houston pit would:
  - Decrease available ROM coal from the pit,
  - make dragline operation inefficient, and
  - have little impact on project's compliance with noise and air quality regulations.

Removing or reducing the size of the Redbank Pit does not impact on the project's ability to comply with environmental regulations. Doing so would underutilise the CHPP capacity and the truck and shovel fleet, thereby removing low strip ratio coal from the first 19 years of the project. This would have a material impact on the project economics.

- Anglo plan to put controls in place to keep the pit within environmental guidelines.
- Modeling for the EA Response to Submissions assumed shutdown of the excavator during adverse weather conditions to keep the project within noise and air quality guidelines.
- Redbank Pit provides low ratio coal to the project production schedule. Reduction in size would remove a portion of this low ratio coal from the schedule.

- Removing / Reducing the Redbank Pit would have a significant impact on project economics (refer to 2 Pit Strategy)

Answer 1b
The impact of ensuring that the project is not visible from the Coolmore property has been discussed in Question 1a.

Answer 1c
The reduced size and construction time for the Option 4 bund means that the visual bund could be delayed until year 4. There is potential to further delay the construction of the visual bund but detailed planning is required to understand the technical and economic feasibility.

- Initially the bund is required to shield the eastern extents of the Whynot pit from year 5 onwards. The Option 4 bund construction time is estimated to be 8 months, hence the build could be delayed until year 4.
    - If the visual bund and Houston are delayed then the Whynot strip length would need to be reduced to keep the Whynot pit behind the ridgeline.
- The Houston Pit provides additional strike length for efficient dragline operation from year 15
    - If the Houston Pit is not available at this time then the dragline would be underutilised, resulting in reduced coal production.
- It may be possible to delay the visual bund by altering the pit boundary between Houston and Whynot Pits.
    - The Whynot / Houston pit boundary would be moved to the ridge line towards the east of Whynot Pit.
    - The option requires the strips in the Whynot Pit to be shortened to keep the operation behind the ridge. The Houston pit could be extended to the north to recover coal south of the ridge.
    - Anglo has confirmed that there are not geological structures such as faults or intrusions that would prevent the Houston pit strips extending to the north.
    - The Houston boxcut and Highwall mining operations would need to be completed prior to year 15 when the Blakefield Pit is completed and the dragline commences in the Houston Pit
    - Detailed planning is required to understand the practicality, timing and potential coal loss
    - Cannot be delayed until end of mine life

Question 2: Are there any alternative designs (other than Option 4) for the proposed Visual Bund which provide a better balance between cost, duration of construction and rehabilitation, and limiting the visual impacts on the Coolmore property.
A number of options have been considered for the visual bund and presented in the EA. Coolmore have suggested an alternative bund design (Option 4) which has been adopted by Anglo for future planning.

- The Option 4 visual bund proposed by Coolmore has been adopted by Anglo
- The design has been assessed and modified by Anglo to better achieve the objectives of shielding the Whynot and Houston Pit operations.
- The eastern limit of the Houston Pit has been moved to the west at a loss of approximately 0.5Mt of ROM coal.
- The height of the bund has been adjusted by Anglo to shield the Whynot operations
- Current design has a flat top at RL222, detailed final design will provide a more natural shape that ties into surrounding landscape; however
    - Additional fill to achieve a more natural landform is not likely to significantly change the construction time for the bund

Question 3: What is the likely construction duration for the Visual Bund (Option 4) with and without night-time operations?

Figure 3.1 shows a cross section through the Option 4 visual bund. Anglo plan to construct the bund during both daytime and nighttime operations with the exception of the initial lift. Restricting the construction of the visual bund to daytime operations would increase the build time by 7 months.

- There are three potential options for the construction of the Visual Bund;
  - Day and Night operation, within noise and air quality guidelines – 8 month construction
  - Day and Night operation, allow noise and air quality exceedances (night time operation only on the initial dump lift is predicted to exceed criteria) – 7.5 months
  - Daytime only operation, within noise and air quality guidelines – 15 months
- Restricting construction to daylight hours will increase the build time by 7 months
- Allowing noise and air quality exceedances only reduces the build time by 0.5 months as it only impact on the initial lift of the bund.
- Build times validated by RPM

Question 4: Are there any major design considerations that should be incorporated into the design of the Visual Bund to enhance rapid rehabilitation and revegetation as well as long term stability and drainage?

The construction method proposed for the visual bund will enable progressive rehabilitation during the construction phase. Anglo are committed to completing detailed design on the visual bund.

- Anglo plan for the bund construction to be completed in a series of 15m lifts.
- The construction sequence aims to develop the southern outer slope to a 10 degree final surface to enable rehabilitation work to commence. This sequence allows the bottom levels of the bund to be progressively rehabilitated while the upper levels are constructed. **Figure 3.1** shows a cross section through the visual bund.
- Anglo to ensure that the construction is timed with the optimum growing season to enable maximum take up of seeding and re-vegetation
- A commitment for Anglo to irrigate rehabilitation (as required) may be considered
- Anglo are committed to complete detailed design on the visual bund. The study should aim to produce a free draining, integrated and sustainable landform. (GeoFluv)

Question 5: What measures should be implemented to minimise dust emissions from the Houston Pit if it is not actively mined for a number of years?

Anglo nominated to implement the following measures to minimize dust emissions from the Houston Pit. RPM consider these to be reasonable.

- Pit to be swept to remove dust.
- Dust-a-Side to be used on roads, this is currently being trialed at Drayton.
- Interim void to be allowed to fill with water when not operating.
- Partial re-vegetation of site, aerial seeding.
- Full rehabilitation of the Visual Bund.

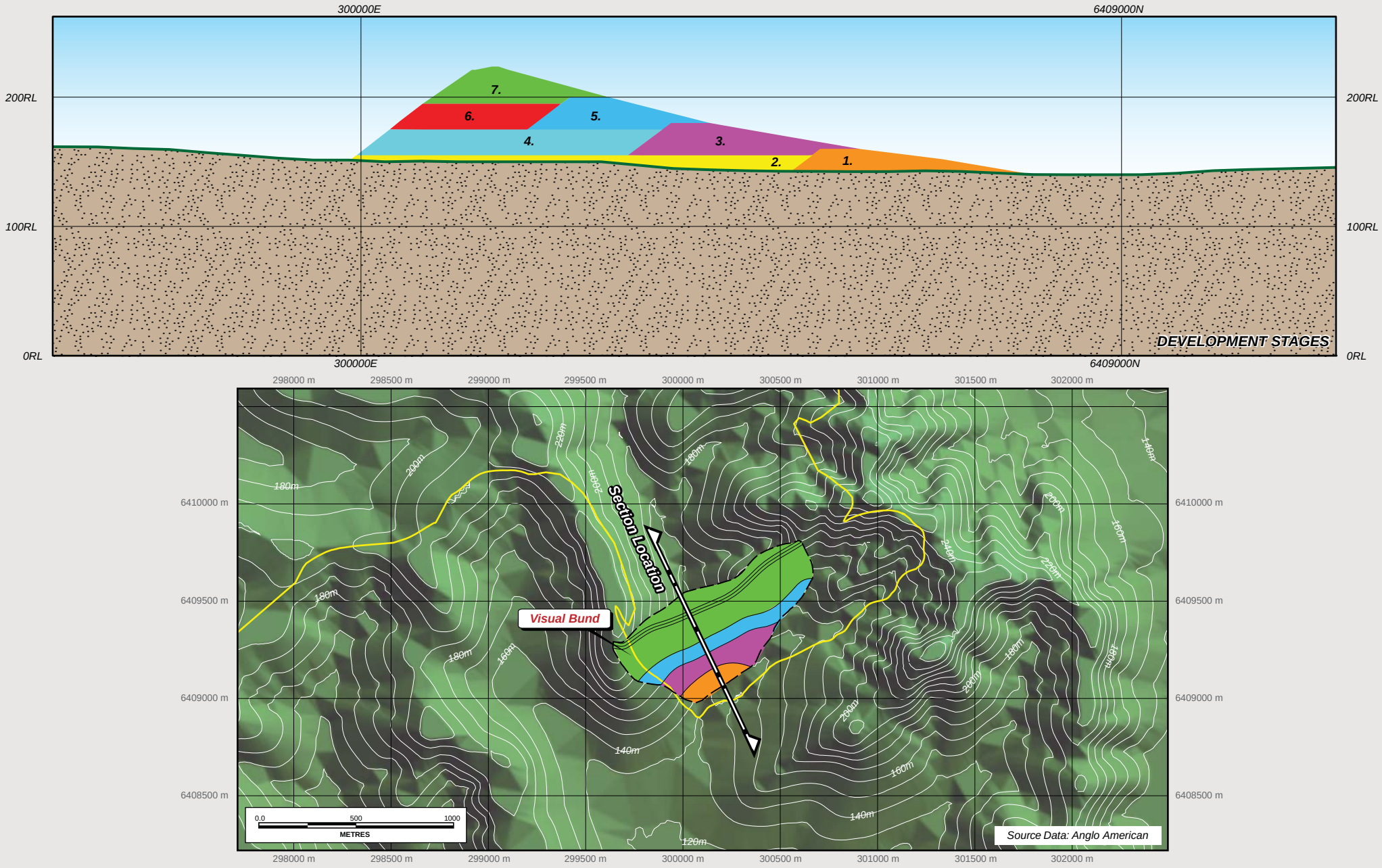

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	Figure : **VISUAL BUND CONSTRUCTION (PLAN VIEW AND SECTION)**	FIGURE No.3.1

3.2 Rehabilitation and Final Landform

Question 6: What options exist for limiting the intensity of operations and/or the area of disturbance at the mine (i.e. is it necessary to undertake operations in multiple pits simultaneously)? Are there additional measures that can be applied to reduce the area of disturbance and improve progressive rehabilitation at the mine to minimise dust emissions?

The current schedule is a 3 Active Pit strategy aimed at maximising the annual production within environmental constraints. To keep the dragline fully utilised, 2 dragline pits are required (Whynot/Blakefield and then Whynot/Houston) to provide adequate working room. In addition, Redbank is required as it is a low stripping ratio pit that keeps the truck and shovel fleet and CHPP utilised.

- RPM have modelled a 2 active pit case to assess the impact of reduced mining intensity on the project.
    - Targets a fully utilised dragline by operating Whynot/Blakefield then Whynot/Houston with appropriate TS pre-strip (i.e. pre-strip just in front of the dragline)
    - Redbank pit moved to the end of the mine life to avoid having 3 active pits in operation
    - Significant reduction in ROM production, approx. 2Mtpa until year 14
    - Mine life extended by 13 years
    - Material impact to project economics

Question 7: Is there any convincing justification for using overburden from Drayton South for rehabilitation of the existing operations at the Drayton Mine to the north? If so, how much material would be required, what are the benefits of such a proposal for the final landform at both Drayton North and South, and what are the implications for the project?

There appears to be no economic or environmental advantages in hauling waste material from Drayton South to the Drayton final voids. RPM believe that this would result in increased capital and operating cost and increased environmental impacts as a result of operating a larger truck fleet.

- Drayton has an approved final landform
- Macquarie Generation have an option to use the East (south) void
- Current plan is to use final voids for tailings and ash disposal
- Impact would be:
    - Increase the truck numbers to maintain proposed productivity, this may increase noise and dump impacts, increase operating costs and adversely impact on project economics
    - Truck numbers to increase from 5-6 per excavator to over 10 trucks per excavator
    - Waste haulage cost to increase by approx. $0.25/bcm/km ($2.5/bcm for a 10km haul). No allowance for TKPH (tyre heating)
    - Current road design is for 70t haul trucks, haul road would need to be upgrade to accommodate 230t haul trucks.
    - Potential impacts on spoil balance at Drayton South, unknown what the impact on the final void at Drayton South

Question 8: Is it feasible to fill the central haul road in the Whynot Pit, and use an alternative haul road to the east? If so, are there any significant implications for the project?

It is feasible to reduce the size of the central ramp through periodic re-grading at a steeper grade.

- The current ramp follows the coal floor at 2-3% grade.
- Options exist for reducing the size of the central ramp such as:
  - Periodic re-grading the central ramp to 10% with parting to the pit exit level of RL145m
- This would allow the crest of the central ramp void to close up, reducing the size of the void due to the ramp.
  - EA final central ramp volume is 38Mcu.m
  - Re-grading reduces final ramp void to 11Mcu.m
- A swell factor of 1.3 has been used in the EA dump and final landform planning. Anglo expect that this may be a conservative assumption and that actual compacted swell factors may be lower. A downward revision of the swell factor may enable additional material to be stacked adjacent to the crest of the ramp and below the line of visual impact. This material could be pushed into the ramp at the completion of mining to reduce the size of the void

Figure 3.2 shows plan and section views of the 10% re-graded central ramp.

Question 9: Is there any justification for requiring a greater setback of the overburden emplacement areas from Saddlers Creek in terms of drainage and flow velocities into the creek?

There is no convincing justification to enforce a greater setback from Saddlers Creek. RPM note that there is one section of haul road that encroached on the minimum 40m stand off from a Schedule 2 Stream.

- Project is outside the 100 year ARI flood limit, no impact on flood levels or velocities
- Saddlers Creek has been classified as a Schedule 2 Stream. The offset guideline is 40m from the creek to the footprint of mine workings, including pits/voids, infrastructure, haul roads and conveyors and nonextraction works.
- The mine footprint generally complies with this guideline, there is one area where the haul road appears to encroach on the 40m offset, refer to **Figure 3.3**. The impact of redesigning the haul road and reduction in spoil emplacement volume would be minimal.
- Anglo are completing LOX drilling to better define seam subcrops and the northern limits of the Whynot and Blakefield Pits. This may result in the pit limit moving further away from the creek but cannot move closer than the 40m offset.
- Drainage and flow velocities into the creek during operations have been considered in the surface water management studies.
- Drainage from the final landform will be a key outcome from the detailed landform design.

Question 10: What options exist for reducing the size and depth of the final void at Drayton South? What are the implications of these options for the project?

Anglo has developed a draft concept that has a material reduction of the final void at Drayton South.

- Anglo are currently assessing an option to reduce the size of the final.
- The option involves mining the pre-strip of the Whynot Pit from the south, placing the truck and shovel spoil on top of the insitu dragline system as his sterilises approximately 2.5Mt of ROM coal that would have been mined by the dragline. This would have immaterial impact to project economics.
- Advantages are that the dragline bench can be blasted down and the truck and shovel spoil can be dozed down to 10 degrees at completion of mining

- This in conjunction with a reduced central ramp should have a material impact on the size of the final void and final landform
- Measuring the final void between the original topo and the final landform the EA void measures 220M cu.m compared to 95M cu.m for the revised landform. This is substantial reduction.
- This would have no impact on the overall disturbed area footprint of the project

A preliminary draft of the revised final landform has been generated by Anglo and presented in **Figure 3.4**.

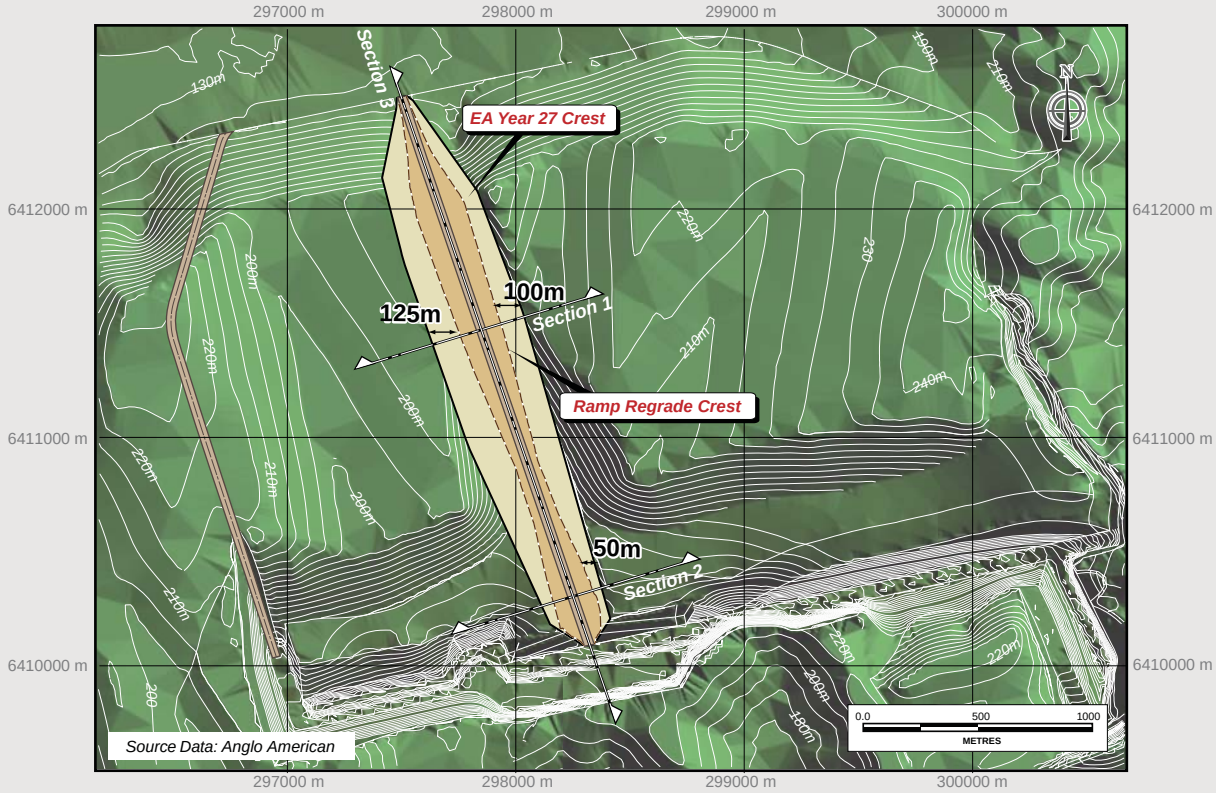
Question 11: What options exist for creating a more natural final landform in terms of final slopes, micro-relief, and drainage? What are the key performance objectives that should be applied in any conditions of approval to ensure these outcomes are met?

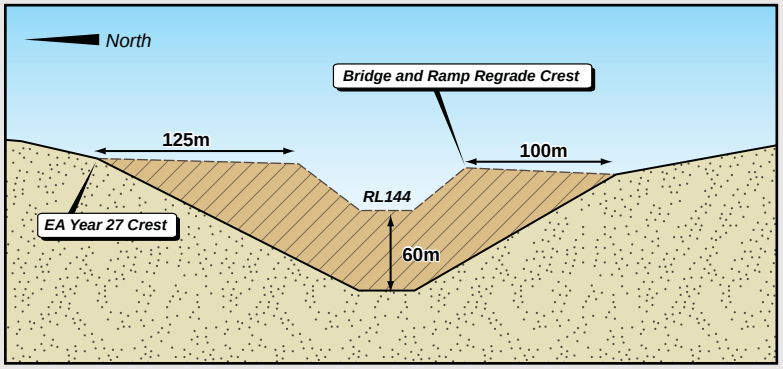
- The final Landform designs in the EA are conceptual
- Anglo are committed to producing a detailed final landform design that aims to produce a free draining, integrated and sustainable final landform that is stable against erosion.
- KPO's
    - Complete final landform designs that minimise the final void
    - Ensure that final landform is included in all Life of Mine Planning.
    - Complete detailed final landform design that specifically addresses
        - Mirco Relief
        - Free draining landform
        - Visual
        - Landuse purposes
    - Capture principles of the detailed design and incorporate into Rehabilitation Management Plan
    - Periodic review of the detailed final landform design

Question 12: Will there be sufficient topsoil material for achieving the rehabilitation outcomes presented in the EA? Are there any specific measures for managing materials handling that should be implemented to ensure the rehabilitation objectives can be achieved?

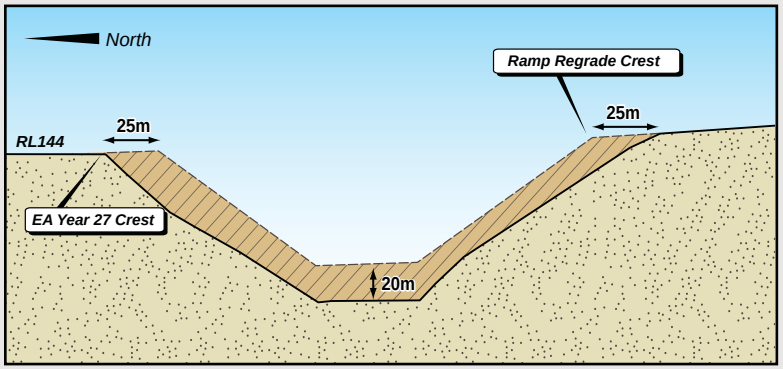
Yes there appears to be sufficient topsoil to achieve the rehabilitation outcomes of the project

- 10% loss applied to estimated topsoil volumes.
- Average thickness of topsoil placement will be approximately 0.18 to 0.20m
- A range of measures have been identified in the EA including:
    - When possible, topsoil to be placed directly onto final rehabilitation surface to minimise loss
    - Stockpiled to a maximum of 3m in height. When stored for more than 12 months then shape to be free draining, fertilised, seeded and treated for weeds
    - Maintain an inventory of designated topsoil areas to ensure adequate topsoil is available for planned rehabilitation
    - Seedbed preparation
- According to the EA stage plans, direct placement can occur on a large scale from year 5 (Areas shown in green). By year 5, 600Kbcm of topsoil needs to be stockpile. At stockpile height of 3m, this equates to 21 Ha.

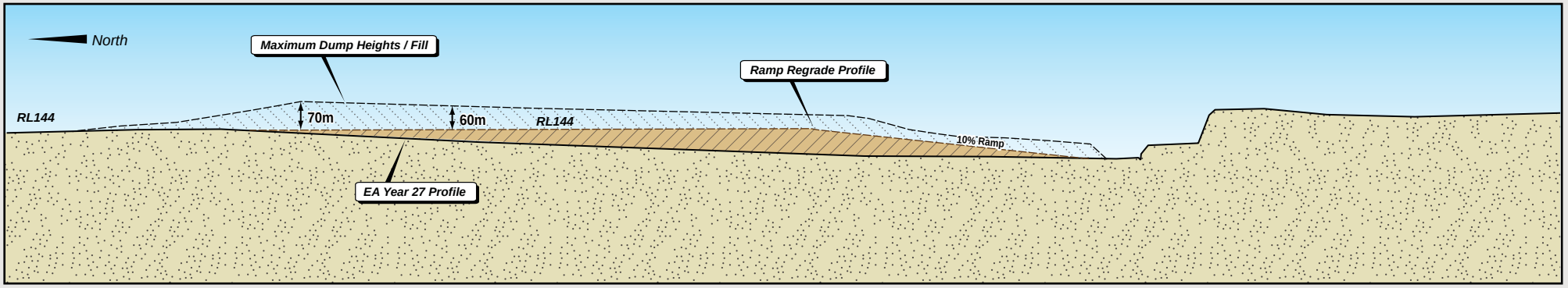




CROSS SECTION 01



CROSS SECTION 02



CROSS SECTION 03

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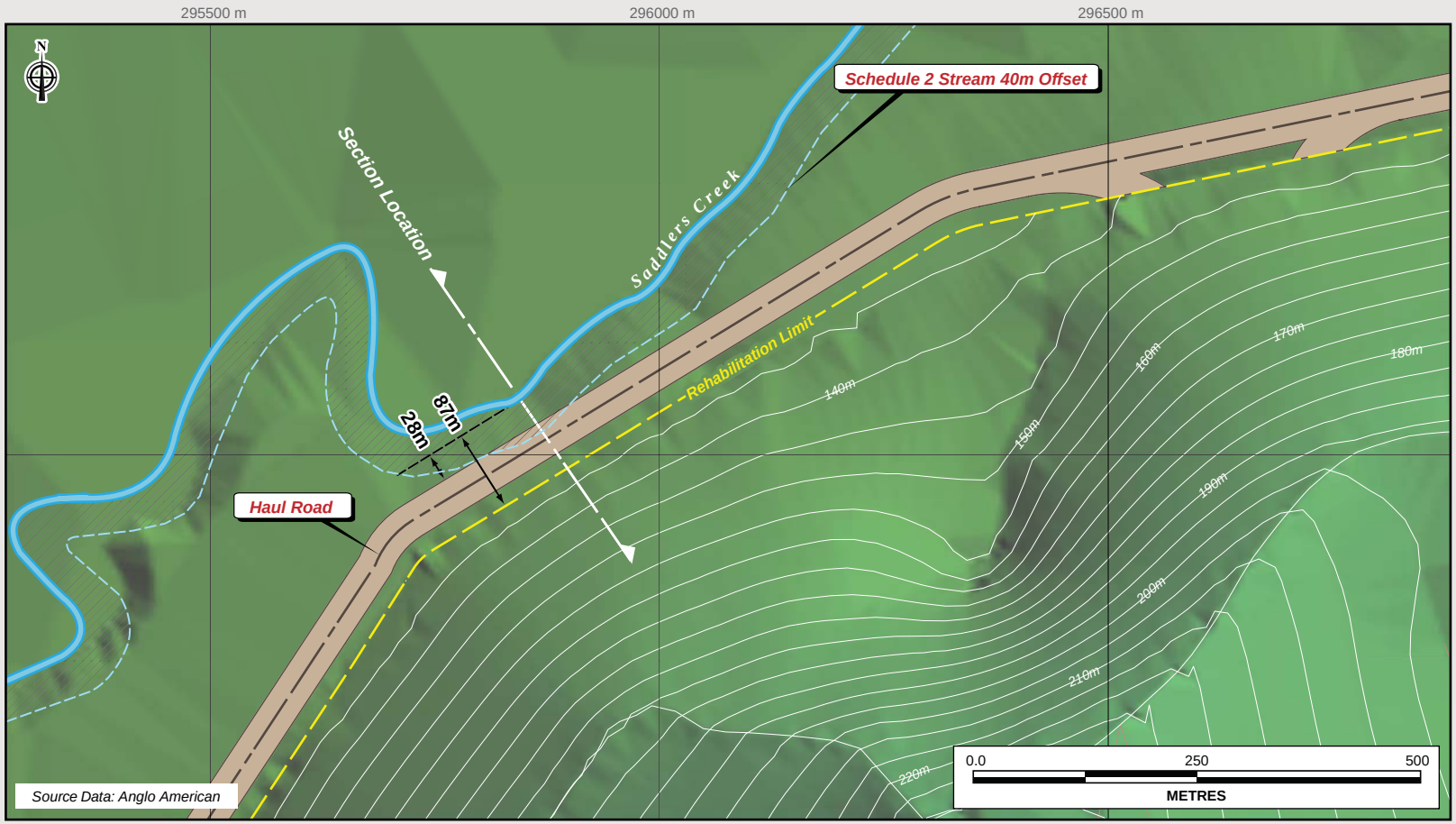
	Figure : **CENTRAL RAMP OPTIONS**	FIGURE No.3.2



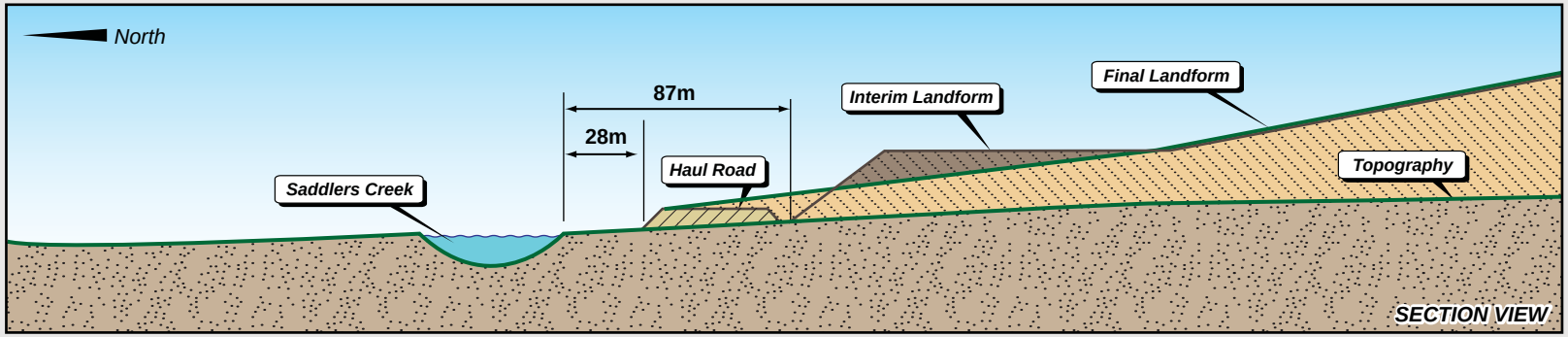


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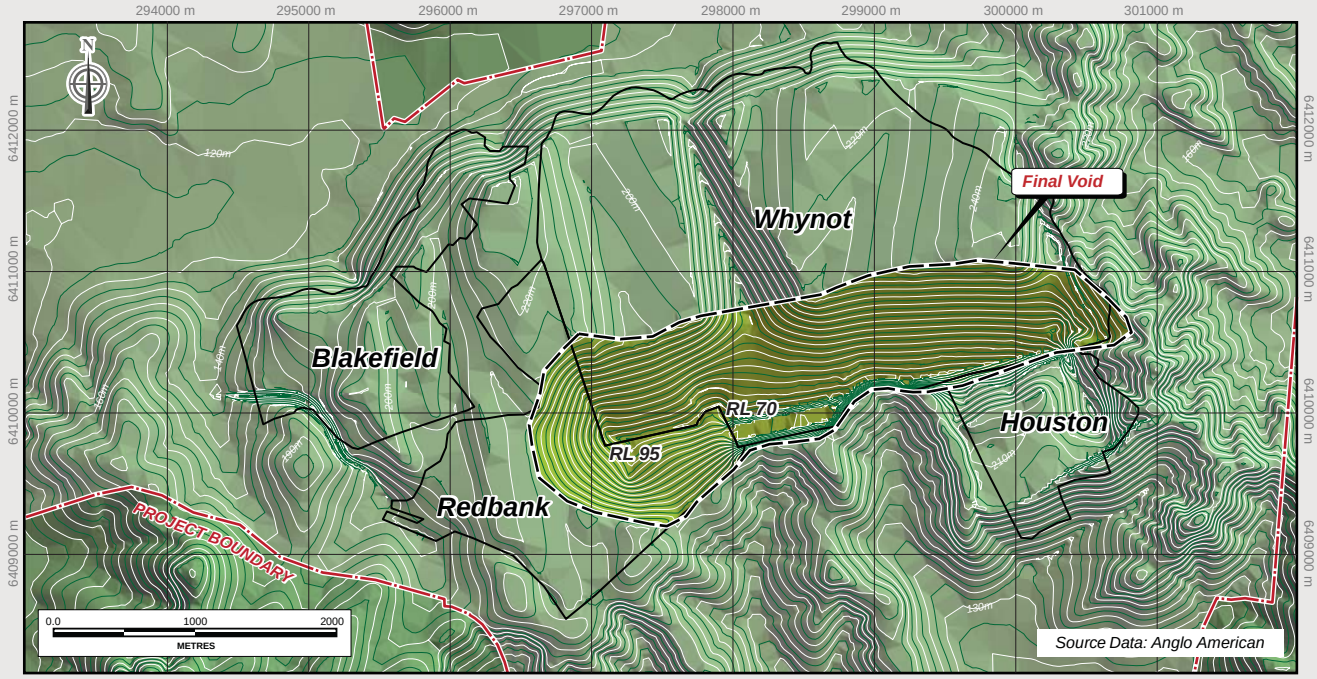
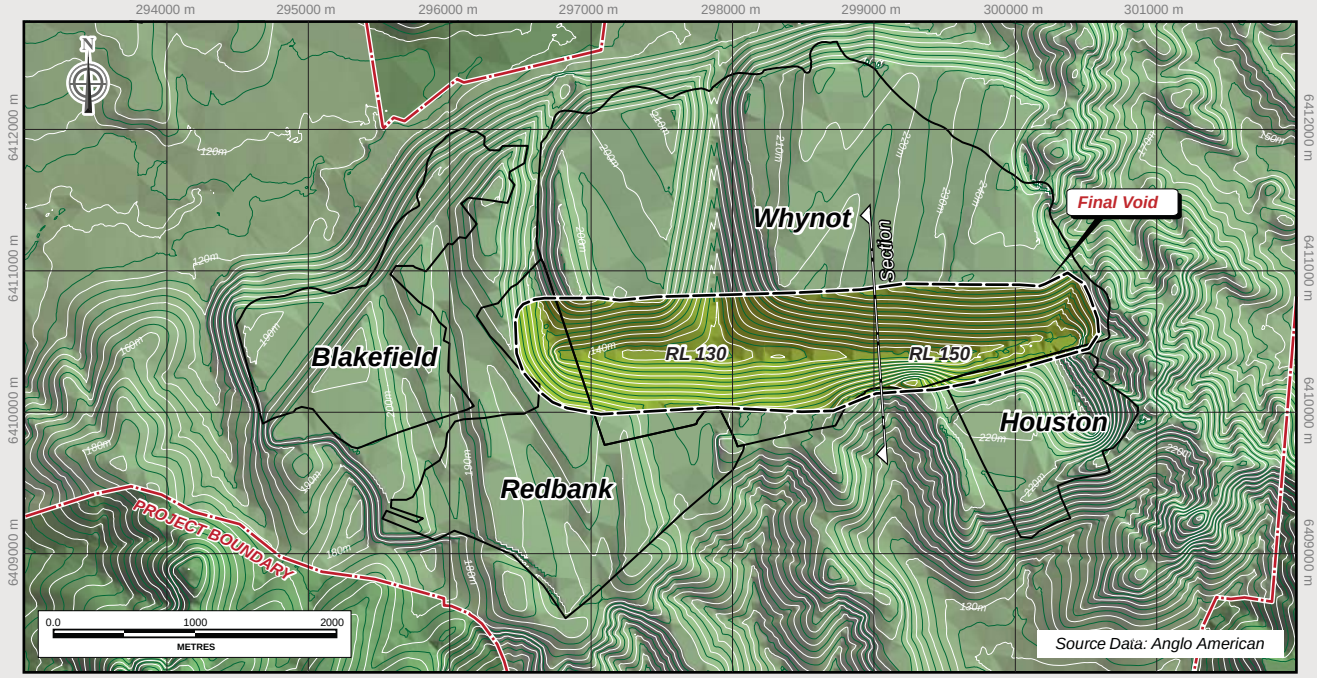
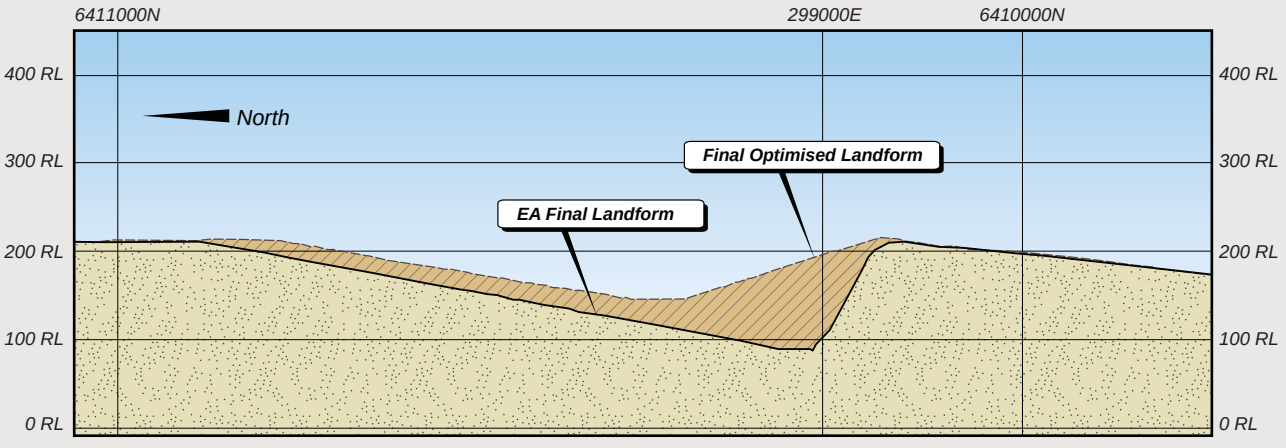
Figure : **SADDLERS CREEK OFFSET**	FIGURE No.3.3



EA FINAL LANDFORM



FINAL OPTIMISED LANDFORM



SECTION

Runge Pincock Minarco	Client : **NSW DEPARTMENT OF PLANNING AND INFRASTRUCTURE**	Job No. ADV-SY-04075
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	Figure : **DRAYTON SOUTH FINAL VOID OPTIONS**	FIGURE No.3.4

3.3 Drayton Mine Closure

Question 13: Is there sufficient material available at Drayton North to achieve the proposed final landform? If not, are there measures that need to be implemented to address the shortfall?
Anglo has commissioned Hansen Bailey to complete a detailed mine closure plan for the Drayton mine which is due for completion at the end of Q3 2013. The detailed closure plan will cover the issue of material balance at the Drayton Mine including topsoil.

There are a number of uncertainties in relation to the final mine closure plan for the Drayton mine that need to be worked through in detail. Contributing to the uncertainty include:

- Early mine closure due to unfavourable economics. As a result the current final landform for the project differs to the final landforms presented in the Drayton South EA.
- timing for approval of Drayton South
- Currently Anglo forecast a gap between Drayton closing and Drayton South commencing. Potential to continue mining at Drayton in uneconomic areas to minimise the loss during the transition period.
- Macquarie Generation has an option to use the East (south) Void and the South Void from 1 Jan 2023.

Question 14: Are there any feasible options for reducing the number, size and depth of final voids? What are the implications of these alternatives for the project?

No, the Drayton Mine is at an advanced stage of mine life. The project has been working towards an approved final landform which includes 3 final voids.

- Little can be done to reduce the number, size and depth of final voids at Drayton given the mine has a short remaining life.
- RPM note that the current final landform assumes a 2015 close compared to a 2017 close in the EA. The key difference is in the size of the East (North) Void.
- Three scenarios for the final landform at Drayton, contingent upon Macquarie Generation. These options need to be re-visited based on the 2015 Mine Closure landform.
- Placement of reject and tailings from Drayton South reduce the size of the final voids at Drayton

Question 15: Are there any risks of hydraulic interaction between final voids, overburden/tailings emplacement areas, and/or Macquarie Generation's ash dam?

RPM are not sufficiently qualified to provide a detailed review of this question, however note the following findings from the AGE groundwater study for the Drayton Mine Extension EA in 2006

- *Ash leachate will take 50 – 100 years to reach Lake Liddell from when the cone of depression from the mining operation has recovered.*
- *As long as the cone of depression has not recovered around the mine and the water table within the Eastern final void remains below the surrounding groundwater level, no outflow of leachate is expected.*
- *leachate generated by the wet tailings will have a similar flow path and travel time as the Ash leachate but is overall better quality*

Question 16: Are there any additional measures that should be implemented to reduce spontaneous combustion?

The Drayton Mine Spontaneous Combustion Management Plan appears to be reasonable and cover the key measure. The following points are taken from the existing management plan.

- For carbonaceous material placed into the spoil key factors include:
  - Depth of burial
  - Cover with inert material, ACARP research recommends 2-3m minimum
  - Compaction of spoil, can be achieved by dumping in smaller lifts
  - Dump stability, reduces airflow and oxygen intake
  - Not to be placed against highwalls
  - Regular inspections, early detection
- ROM coal management:
  - Minimise exposed ROM coal in the pit, Drayton suggest 6-8 weeks maximum
  - Stockpile management, reduce residence time “first in, first out”
  - Regular inspections
- Product coal management:
  - Stockpile management, reduce residence time “first in, first out”
  - Regular inspections
  - Drayton has identified inert material surplus to rehabilitation requirements specifically for the purpose of Spontaneous Combustion Management
- Drayton has been involved in a number of ACARP projects
- Drayton has an approved Spontaneous Combustion Management Plan

Question 17: Are there any key elements of the rehabilitation of the site that should be altered to achieve best practice?

Anglo have commissioned Hansen Bailey to complete a detailed mine closure plan for the Drayton Mine