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14 November 2012

Industry and Investment
PO Box 344
Hunter Regional Mail Centre NSW 2310
Attn: Paul Langley, Subsidence Executive Officer

Dear Paul

West Cliff Mine Area 5 Longwalls 34 – 6 SMP Variation Application to Reduce Longwall 35 Void

Pursuant to Condition 1 of the Subsidence Management Plan Approval for Longwalls 34-36 dated 6 August 2010, approval is sought to vary the area of extraction as shown on Approved Plan AS-2585.

Approval is sought to reduce the length of Longwall 35 (void) by 192m at the eastern end as shown on attached Approved Plan AS-2585. The variation is required to reduce the potential for mining related impacts to the Georges River.

The proposed shortening of Longwall 35 equates to approximately 207,000 tonnes of in-situ coal which will not be mined. The impact of the reduction in length of Longwall 35 has been assessed by Mine Subsidence Engineering Consultants (MSEC 598) as the same or less than the previous layout, depending on where the feature is located relative to the longwall.

Pursuant to Condition 1 of the SMP Approval, Illawarra Coal seeks Approval of the new Approved Plan, AS-2585. Should further information be required or if you would like to discuss this matter, please contact the undersigned.

Yours sincerely,

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mine subsidence
ENGINEERING CONSULTANTS

BHP BILLITON ILLAWARRA COAL:

West Cliff Colliery – Longwall 35

The Effects of the Proposed Modified Finishing End of Longwall 35 on Previous Subsidence Predictions and Impact Assessments

DOCUMENT REGISTER

Revision	Description	Author	Checker	Date
01	Draft Issue	JB	-	31st Oct 12
A	Final Issue	JB	DJK	2nd Nov 12

Report produced to:- Support the Application to Modify the Finishing End of West Cliff Longwall 35 to be submitted to the Department of Trade, Investment, Regional Infrastructure and Services (DTIRIS).

Previous reports:- MSEC326 (Revision C – December 2007) - The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Natural Features and Surface Infrastructure Resulting from the Extraction of Proposed Longwalls 34 to 36 in Area 5 at West Cliff Colliery (In Support of the SMP Application).

MSEC444 (Revision B – February 2010) - The Effects of the Proposed Modified Finishing End of Longwall 34 at West Cliff Colliery on Previous Subsidence Predictions and Impact Assessments.

MSEC463 (Revision B – July 2011) - The Effects of the Proposed Modified Commencing End of Longwall 35 at West Cliff Colliery on Previous Subsidence Predictions and Impact Assessments.

Background reports available at *www.minesubsidence.com*:-

Introduction to Longwall Mining and Subsidence (Revision A)

General Discussion of Mine Subsidence Ground Movements (Revision A)

Mine Subsidence Damage to Building Structures (Revision A)

CONTENTS

LIST OF TABLES, FIGURES AND DRAWINGS

Tables

Tables are prefixed by the number of the chapter in which they are presented.

Figures

Figures are prefixed by the number of the chapter or the letter of the appendix in which they are presented.

Drawings

Drawings referred to in this report are included in Appendix B at the end of this report.

1.0 INTRODUCTION

1.1. Background

Mine Subsidence Engineering Consultants (MSEC) was previously commissioned by Illawarra Coal (IC) to prepare subsidence predictions and impact assessments for the proposed Longwalls 34 to 36 at West Cliff Colliery. Report No. MSEC326 (Revision C) was issued in December 2007, which supported the SMP Application for these longwalls. The Department of Trade and Investment, Regional Infrastructure and Services (DTIRIS), then known as Industry and Investment NSW, granted IC approval under the SMP approval process for extraction of Longwalls 34 to 36 on the 13th May 2009.

Impacts were observed in the Georges River as a result of the extraction of Longwalls 32 and 33. Fracturing was first observed in Rockbar 36 at the completion of Longwall 32, which is located immediately adjacent to the north-eastern corner of this longwall. Further fracturing was observed in this rockbar as Longwall 33 approached the Georges River. The water level in the pool upstream of Rockbar 36 was observed to drop on the 27th November 2009, when the longwall extraction face was 80 metres from the finishing end. Fracturing was also observed in Rockbar 39, during the extraction of Longwall 33, and then the water level in the pool upstream was observed to drop at the completion of the longwall. Rockbar 36 is located 40 metres from the finishing end of this longwall.

IC then made the decision to shorten the finishing (i.e. eastern) end of Longwall 34 by 125 metres, so as to minimise the potential for further impacts on the Georges River. Report No. MSEC444 was issued in February 2010 in support of this modification. Industry and Investment NSW, now referred to as DTIRIS, granted approval for the shortened longwall finishing end on 6th August 2010. There was no major fracturing or reduction of pool water levels along the Georges River resulting from the extraction of Longwall 34.

IC now proposes to shorten the finishing (eastern) end of Longwall 35 by 185 metres from that indicated in the SMP Approval. The proposed location of the modified finishing end is based on an assessment of the offset distances of the previous longwalls from the Georges River prior to Type 3 (i.e. more than minor) impacts occurring. This report provides information that will support a Variation to the Approved Subsidence Management Plan.

It is noted, that IC also previously shortened the commencing (i.e. western) end of Longwall 35 by 750 metres from that indicated in the SMP Approval. Report No. MSEC463 (Revision B) was issued in July 2011, which supported the application for the modification of the commencing end of this longwall.

The longwall layout adopted in Report No. MSEC326, which supported the SMP Application for Longwalls 34 to 36, is referred to as the *SMP Layout* in this report. The longwall layout adopted in Report No. MSEC463, which includes the previous modifications to the finishing end of Longwall 34 and the commencing end of Longwall 35, is referred to as the *Approved Layout* in this report. The longwall layout that includes the proposed modified finishing end of Longwalls 35, as well as the previous modifications to the finishing end of Longwall 34 and the commencing end of Longwall 35, is referred to as the *Modified Layout* in this report.

1.2. Mining Geometry

The Approved and Modified Layouts of the longwalls at West Cliff Colliery are overlaid in Drawing No. MSEC598-01, in Appendix B. A summary of the dimensions of Longwall 35 for both these layouts is provided in Table 1.1.

Table 1.1 Dimensions of Longwall 35 Based on the Approved and Modified Layouts

Layout	Overall Void Length Including Installation Heading (m)	Overall Void Width Including First Workings (m)	Overall Tailgate Chain Pillar Width (m)
Approved Layout	3490	305	42
Modified Layout	3305	305	42

It can be seen from the above table, that the length of Longwall 35 is proposed to be shortened by 185 metres, at the finishing (i.e. eastern) end, from the approved length which was adopted in Report No. MSEC463.

The depths of cover contours for the Bulli Seam are shown in Drawing No. MSEC598-02. The minimum depth of cover directly above the finishing end of Longwall 35 is around 465 metres based on the Approved Layout, and is around 490 metres based on the Modified Layout. The seam thickness at the finishing end of Longwall 35 varies between 2.5 metres and 2.6 metres. IC proposes to extract the full seam thickness.

2.0 THE EFFECTS OF THE PROPOSED MODIFIED FINISHING END OF LONGWALL 35 ON THE MAXIMUM PREDICTED SUBSIDENCE PARAMETERS

2.1. Maximum Predicted Conventional Subsidence Parameters

The Incremental Profile Method was previously used to predict the conventional subsidence parameters resulting from the extraction of Longwalls 29 to 36, based on the SMP Layout, and these predictions were provided in Report No. MSEC326. The Incremental Profile Method was also used to predict the conventional subsidence parameters resulting from the extraction of Longwalls 29 to 36, based on the Approved Layout, which were provided in Report No. MSEC463.

The Incremental Profile Method has now been used to predict the conventional subsidence parameters resulting from the extraction of Longwalls 29 to 36, based on the Modified Layout. The predicted incremental subsidence contours due to the extraction of Longwall 35, based on the Modified Layout, are shown in Drawing No. MSEC598-06. The predicted total subsidence contours resulting from the extraction of Longwalls 29 to 36, based on the Modified Layout, are shown in Drawing No. MSEC598-07. The predicted incremental and total 20 mm subsidence contours, based on the Approved Layout, are also shown in these drawings for comparison.

A summary of the maximum predicted values of incremental conventional subsidence, tilt and curvature due to the extraction of Longwall 35, based on the Approved and Modified Layouts, is provided in Table 2.1.

Table 2.1 Maximum Predicted Incremental Conventional Subsidence, Tilt and Curvature Resulting from the Extraction of Longwall 35 Based on the Approved and Modified Layouts

Layout	Maximum Predicted Incremental Subsidence (mm)	Maximum Predicted Incremental Tilt (mm/m)	Maximum Predicted Incremental Hogging Curvature (km^{-1})	Maximum Predicted Incremental Sagging Curvature (km^{-1})
Approved Layout	800	6.0	0.06	0.12
Modified Layout	800	6.0	0.06	0.12

It can be seen from the above table, that the maximum predicted incremental conventional subsidence parameters, due to the extraction of Longwall 35, do not change as a result of the proposed modification to the longwall finishing end. Similarly, the maximum predicted total conventional subsidence parameters, resulting from the extraction of Longwalls 29 to 36, also do not change as a result of the proposed modification.

Although the predicted maxima do not change, the locations of the predicted maximum longitudinal tilt and curvatures change as a result of the proposed modification to the longwall finishing end. This is illustrated in Fig. A.01, in Appendix A, which shows the profiles of predicted incremental subsidence, tilt and curvature along Prediction Line 1, which has been taken through the centreline of Longwall 35, as shown in Drawing Nos. MSEC598-06 and MSEC598-07.

It can be seen from Fig. A.01, that the predicted longitudinal tilts and curvatures at the finishing end of Longwall 35 have moved around 185 metres west as a result of the proposed modification. It can also be seen, that the magnitudes of the predicted longitudinal tilt and curvatures, based on the Modified Layout, are slightly less than those predicted based on the Approved Layout.

2.2. Predicted Strains

The prediction of strain is more difficult than the prediction of subsidence, tilt and curvature. The reason for this is that strain is affected by many factors, including ground curvature and horizontal movement, as well as local variations in the near surface geology, the locations of pre-existing natural joints at bedrock, and the depth of bedrock. Survey tolerance can also represent a substantial portion of the measured strain, in cases where the strains are of a low order of magnitude. The profiles of observed strain, therefore, can be irregular even when the profiles of observed subsidence, tilt and curvature are relatively smooth.

In previous MSEC subsidence reports, predictions of conventional strain were provided based on the best estimate of the relationship between curvature and strain. Similar relationships have been proposed by other authors. The reliability of the strain predictions was highlighted in these reports, where it was stated that measured strains can vary considerably from the predicted conventional values. Adopting a linear relationship between curvature and strain provides a reasonable prediction for the conventional tensile and compressive strains. The locations that are predicted to experience hogging or convex curvature are expected to be net tensile strain zones and locations that are predicted to experience sagging or concave curvature are expected to be net compressive strain zones.

In the Southern Coalfield, it has been found that a factor of 15 provides a reasonable relationship between the maximum predicted conventional curvatures and the maximum predicted conventional strains. The maximum predicted incremental conventional strains due to the extraction of Longwall 35, based on applying a factor of 15 to the maximum predicted incremental conventional curvatures, are 1 mm/m tensile and 2 mm/m compressive, for both the Approved and Modified Layouts.

At a point, however, there can be considerable variation from the linear relationship, resulting from non-conventional movements or from the normal scatters which are observed in strain profiles. When expressed as a percentage, observed strains can be many times greater than the predicted conventional strains for low magnitudes of curvature. In this report, therefore, we have provided a statistical approach to account for the variability, instead of just providing a single predicted conventional strain.

The range of potential strains above Longwall 35 has been determined using monitoring data from the previously extracted longwalls in the Southern Coalfield. The monitoring data was used from West Cliff Colliery, as well as the nearby Appin, Tower and Tahmoor Collieries, where the overburden geology and mining geometry are reasonably similar to the proposed longwalls. The range of strains measured during the extraction of these longwalls should, therefore, provide a reasonable indication of the range of potential strains for the proposed longwall.

The data used in the analysis of observed strains included those resulting from both conventional and non-conventional anomalous movements, but did not include those resulting from valley related movements, which are addressed separately in this report. The strains resulting from damaged or disturbed survey marks have also been excluded.

The survey database has been analysed to extract the maximum total tensile and compressive strains that have been measured at any time during mining, for survey bays that were located directly above goaf or the chain pillars that are located between the extracted longwalls. A number of probability distribution functions were fitted to the empirical data. It was found that a Generalised Pareto Distribution (GPD) provided a reasonable fit to the raw strain data.

The histogram of the maximum observed total tensile and compressive strains measured in survey bays above goaf, for the previously extracted longwalls from the Southern Coalfield, is provided in Fig. 4.1. The probability distribution functions, based on the fitted GPDs, have also been shown in this figure.

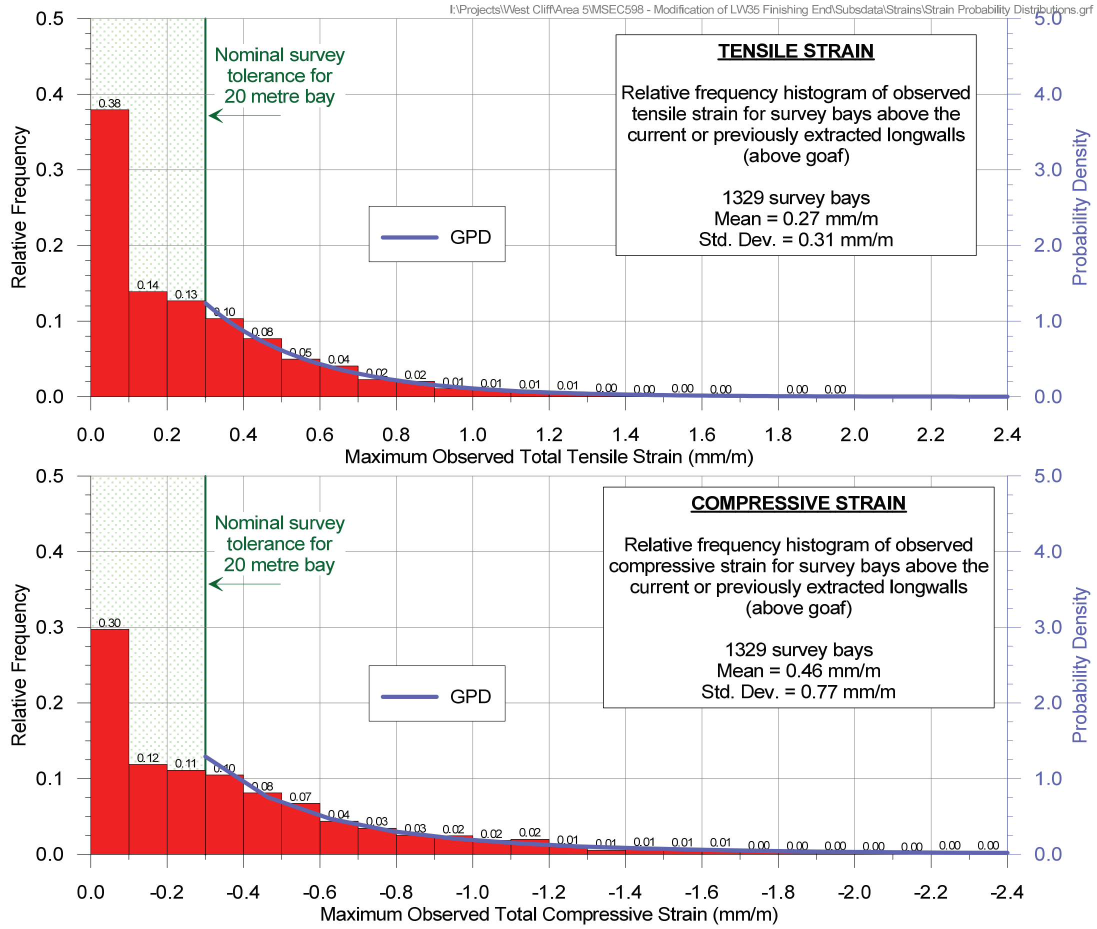

Fig. 2.1 Distributions of the Maximum Observed Total Tensile and Compressive Strains during the Extraction of Previous Longwalls for Survey Bays Located Above Goaf

Confidence levels have been determined from the empirical strain data using the fitted GPDs. In the cases where survey bays were measured multiple times during a longwall extraction, the maximum tensile strain and the maximum compressive strain were used in the analysis (i.e. single tensile strain and single compressive strain measurement per survey bay).

The 95 % confidence levels for the maximum strains that the individual survey bays experienced at any time during mining were 0.9 mm/m tensile and 1.6 mm/m compressive. The 99 % confidence levels for the maximum strains that the individual survey bays experienced at any time during mining were 1.5 mm/m tensile and 3.1 mm/m compressive.

2.3. Maximum Predicted Valley Related Movements

The predicted valley related movements along the watercourses at West Cliff Colliery have been determined using the methods outlined in ACARP Research Project No. C9067, which were published in the handbook entitled "*Management Information Handbook on the Undermining of Cliffs, Gorges and River Systems*", issued in September 2002. Details on the ACARP Method are provided in the background report entitled "*General Discussion on Mine Subsidence Ground Movements*" which can be obtained from *www.minesubsidence.com*.

The predicted upsidence and closure movements along the watercourses have been determined from the empirical database based on their lateral and longitudinal distances from the extracted longwalls, the depths of the valleys and the maximum predicted incremental subsidence resulting from the extraction of each longwall. The predicted upsidence and closure movements for the watercourses near the finishing end of Longwall 35 are discussed further in Chapter 3.

For the watercourses which are located directly above Longwall 35, the predicted maximum upsidence and closure movements do not change as a result of the proposed modification to the finishing end of this longwall.

For the watercourses which are located outside the extents of Longwall 35, the predicted maximum upsidence and closure movement, based on the Modified Layout, are similar to or less than the maxima predicted based on the Approved Layout, depending on the relative location to the finishing end of this longwall.

Further discussions on the predicted valley related movements are provided in Chapter 3.

3.0 THE EFFECTS OF THE PROPOSED MODIFIED FINISHING END OF LONGWALL 35 ON THE PREDICTIONS AND IMPACT ASSESSMENTS FOR THE NATURAL AND BUILT FEATURES

3.1. The Study Area

The *Study Area* has been defined as the zone where the predicted mine subsidence parameters, based on the Modified Layout, are different to those predicted based on the Approved Layout. The Study Area has been based on the following:-

- 35 degree angle of draw line from the Longwall 35 finishing ends, based on both the original position (i.e. Approved Layout) and the modified position (i.e. Modified Layout), and
- The limit where the change in the predicted vertical subsidence, resulting from the proposed modification to the longwall finishing end, is greater than 20 mm.

The extent of the Study Area is shown in Drawing No. MSEC598-01. The Study Area is governed by the 35 degree angle of draw line to the north and to the east of Longwall 35, and is governed by the limit where the change in the predicted vertical subsidence is greater than 20 mm to the south-west of the longwall finishing end, above the previously extracted Longwall 34.

There are a number of natural and built features that are located within the Study Area, which are shown in Drawing Nos. MSEC598-03 to MSEC598-05. There are also a number of features which are located outside this area, which could experience valley related or far-field movements, and could be sensitive to such movements, and these features have also been included as part of the assessments.

The natural and built features which have been included in the assessments provided in this report are:-

- The Georges River,
- Drainage lines,
- Rock outcrops,
- Steep slopes,
- The Dharawal State Conservation Area,
- Copper telecommunications cables,
- One farm dam, and
- Archaeological sites.

The predicted vertical subsidence at the natural and built features located within the Study Area, based on the Modified Layout, are similar to or less than those based on the Approved Layout. The predicted conventional tilts, curvatures and strains at these features, based on the Modified Layout, however, could be greater or less than those based on the Approved Layout, depending on their position relative to the longwall finishing end.

The effects of the proposed modification to the finishing end of Longwall 35 on the subsidence predictions and impact assessments for these features are provided in the following sections.

3.2. The Georges River

The location of the Georges River is shown in Drawing No.MSEC598-03. The mapped pools, rockbars, boulderfields, islands and riffles are also indicated in this drawing. It can be seen from this drawing that Longwall 35 was approved to be extracted up to the bank of the Georges River. The modified finishing end of this longwall is proposed to be setback by 185 metres from the river.

The profiles of predicted incremental and total subsidence, upsidence and closure along the Georges River are shown in Fig. A.02 in Appendix A. The predicted incremental profiles due to the extraction of Longwall 35, based on the Approved and Modified Layouts, are shown as the dashed red and blue lines, respectively. The predicted total profiles resulting from the extraction of Longwalls 29 to 36, based on the Approved and Modified Layouts, are shown as the solid red and the blue lines, respectively.

The predicted profiles of subsidence, upsidence and closure after the completion of Longwall 34 are shown in Fig. A.02 as the solid cyan lines. For comparison, the observed closures at the Georges River monitoring lines, after the completion of Longwall 34, are also shown in this figure. It can be seen, that the observed closures were similar to or less than those predicted at the completion of Longwall 34.

A summary of the maximum predicted incremental subsidence, upsidence and closure along the Georges River, due to the extraction of Longwall 35, is provided in Table 3.1. A summary of the maximum predicted total subsidence, upsidence and closure along the river, resulting from the extraction of Longwalls 29 to 36, is provided in Table 3.2. The results are provided for both the Approved and Modified Layouts.

Table 3.1 Maximum Predicted Incremental Subsidence, Upsidence and Closure along the Georges River due to the Extraction of Longwall 35

Layout	Maximum Predicted Incremental Subsidence (mm)	Maximum Predicted Incremental Upsidence (mm)	Maximum Predicted Incremental Closure (mm)
Approved Layout	75	125	140
Modified Layout	30	70	115

Table 3.2 Maximum Predicted Total Subsidence, Upsidence and Closure along the Georges River Resulting from the Extraction of Longwalls 29 to 36

Layout	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Upsidence (mm)	Maximum Predicted Total Closure (mm)
Approved Layout	75	175	200
Modified Layout	60	155	190

It can be seen from the above tables, that the predicted subsidence, upsidence and closure along the Georges River, based on the Modified Layout, are less than those based on the Approved Layout. This is understandable, as Longwall 35 is proposed to be setback from the river by around 185 metres.

It is concluded, therefore, that the assessed levels of potential impact for the Georges River reduce as a result of the proposed modification of the longwall finishing end. The proposed management strategies for the river are the same as those previously provided in Report No. MSEC326 and the SMP Application.

3.3. Drainage Lines

The locations of the drainage lines are shown in Drawing No. MSEC598-03. The drainage lines that are located partially or wholly within the Study Area are Drainage Lines GR107, GR108, GR109, GR110, GR111, GR111A and GR111B, which are all tributaries of the Georges River.

Drainage Line 111A is partially located above the proposed Longwall 35. A summary of the maximum predicted total subsidence, tilts and curvatures for this drainage line, resulting from the extraction of Longwalls 29 to 36, is provided Table 3.3.

Table 3.3 Maximum Predicted Total Subsidence, Tilts and Curvatures for Drainage Line GR111A Resulting from the Extraction of Longwalls 29 to 36

Layout	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Tilt Along Alignment (mm/m)	Maximum Predicted Tilt Across Alignment (mm/m)	Maximum Predicted Total Hogging Curvature (km^{-1})	Maximum Predicted Total Sagging Curvature (km^{-1})
Approved Layout	850	2.5	2.0	0.05	0.10
Modified Layout	650	3.5	4.5	0.05	0.10

It can be seen from the above table that, whilst the maximum predicted subsidence for this drainage line reduces as a result of the proposed modification, the maximum predicted tilts along and across the alignment of the drainage line increase. The reason for this is that the modified finishing end of Longwall 35 is located closer to this drainage line and, therefore, the tilts increase due to the longwall end effects. The natural and predicted post mining surface levels and grade along Drainage Line GR111A, based on the Modified Layout, are shown in Fig. 3.1 below.

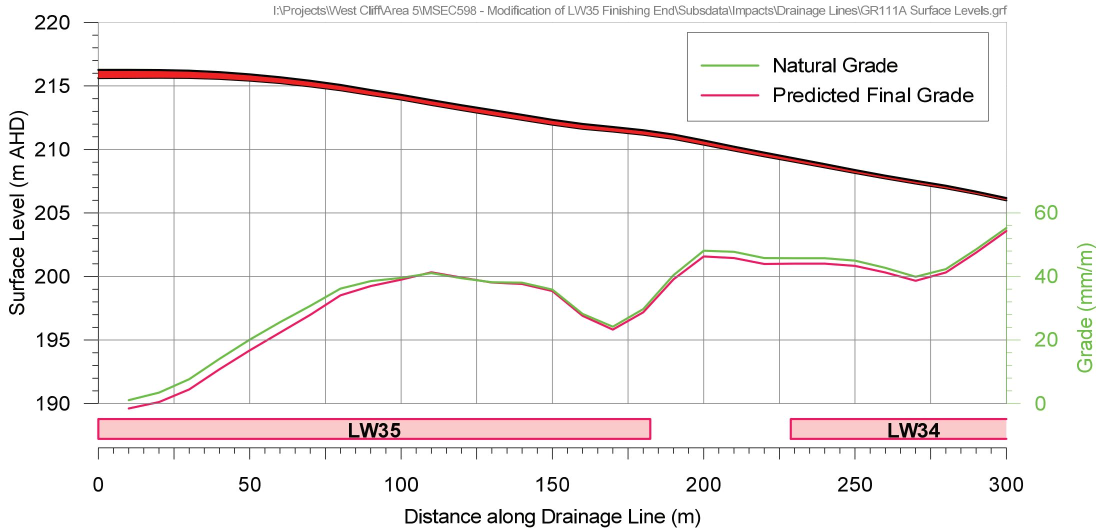

Fig. 3.1 Natural and Predicted Post Mining Surface Levels and Grade along Drainage Line GR111A

It can be seen from the above figure, that the predicted post mining grades (i.e. red line) are similar to the natural grades (i.e. green line). That is, the predicted changes in grade resulting from mining are small when compared to the natural grade along Drainage Line GR111A. The natural and post mining grades are flat at the start of the drainage line (i.e. LHS of the figure), however, this is a high point in the area and, therefore, any increased ponding in this location is not expected to be significant.

The maximum predicted curvatures for Drainage Line GR111A do not change as a result of the proposed modification. Also, the height of the natural valley for this drainage line is small and, therefore, the predicted valley related movements are not considered significant when compared with the predicted conventional movements.

The remaining drainage lines are located outside the extents of Longwall 35 and, therefore, the predicted conventional and valley related movements, based on the Modified Layout, are less than those based on the Approved Layout.

It is concluded, therefore, that the assessed levels of potential impact for the drainage lines do not change or reduce as a result of the proposed modification of the longwall finishing end. The proposed management strategies for the drainage lines are the same as those previously provided in Report No. MSEC326 and the SMP Application.

3.4. Rock Outcrops and Steep Slopes

The locations of the rock outcrops and steep slopes are shown in Drawing No. MSEC598-04. The rock outcrops and steep slopes within the Study Area are located within the valley of the Georges River. These features are located outside the extents of Longwall 35, based on the Modified Layout and, therefore, the predicted conventional and valley related movements reduce as a result of the proposed modification.

It is concluded, therefore, that the assessed levels of potential impact for the rock outcrops and steep slopes reduce as a result of the proposed modification of the longwall finishing end. The proposed management strategies for these features are the same as those previously provided in Report No. MSEC326 and the SMP Application.

3.5. The Dharawal State Conservation Area

The location of the Dharawal State Conservation Area is shown in Drawing No. MSEC598-05. The Conservation Area is partially located in the northern part of the Study Area. The predicted conventional subsidence movements at the Conservation Area, based on the Modified Layout, are similar to or slightly less than those based on the Approved Layout.

It is concluded, therefore, that the assessed levels of potential impact for the Dharawal State Conservation Area are the same or slightly reduce as a result of the proposed modification of the longwall finishing end. The proposed management strategies for the Conservation Area are the same as those previously provided in Report No. MSEC326 and the SMP Application.

3.6. Copper Telecommunications Cables

The locations of the telecommunications infrastructure are shown in Drawing No. MSEC598-05. There is one consumer copper cable which is located just inside the south-western corner of the Study Area. The predicted conventional subsidence movements for this cable, based on the Modified Layout, are similar to or slightly less than those based on the Approved Layout.

It is concluded, therefore, that the assessed level of potential impact for the copper cable is the same or slightly reduces as a result of the proposed modification of the longwall finishing end. The proposed management strategies for the copper cable are the same as those previously provided in Report No. MSEC326 and the SMP Application.

3.7. Farm Dam

The locations of the farm dams are shown in Drawing No. MSEC598-05. There is one farm dam (Ref. A31d1) which is located partially inside the south-western corner of the Study Area. The predicted conventional subsidence movements for this dam, based on the Modified Layout, are similar to or slightly less than those based on the Approved Layout.

It is concluded, therefore, that the assessed level of potential impact for the farm dam is the same or slightly reduces as a result of the proposed modification of the longwall finishing end. The proposed management strategies for the farm dam are the same as those previously provided in Report No. MSEC326 and the SMP Application.

3.8. Archaeological Sites

The locations of the archaeological sites are shown in Drawing No. MSEC598-05. The sites within the Study Area are Refs. 52-2-2234, 52-2-2241 and 52-2-2243, which are all rock shelters with art. The archaeological sites are located outside the extents of Longwall 35 and, therefore, the predicted conventional and valley related movements, based on the Modified Layout, are less than those based on the Approved Layout.

It is concluded, therefore, that the assessed levels of potential impact for the archaeological sites reduce as a result of the proposed modification of the longwall finishing end. The proposed management strategies for these sites are the same as those previously provided in Report No. MSEC326 and the SMP Application.

3.9. Summary

The maximum predicted incremental conventional subsidence parameters, due to the extraction of Longwall 35, do not change as a result of the proposed modification to the longwall finishing end. Similarly, the maximum predicted total conventional subsidence parameters, resulting from the extraction of Longwalls 29 to 36, also do not change as a result of the proposed modification.

Although the predicted maxima do not change, the locations of the maximum predicted longitudinal tilt and curvatures change as a result of the proposed modification to the longwall finishing end. As shown in Fig. A.01, the predicted longitudinal tilts and curvatures at the finishing end of Longwall 35 moved around 185 metres west as a result of the proposed modification.

The maximum predicted mine subsidence parameters for the natural and built features, based on the Modified Layout, are similar to or less than those predicted based on the Approved Layout. The predicted tilts along Drainage Line GR111A slightly increase, as a result of the proposed modification, however, the predicted changes in tilt are small when compared with the natural grades along the drainage line.

It is concluded, therefore, that the assessed levels of potential impact for the natural and built features either do not change or reduce as a result of the proposed modification of the Longwall 35 finishing end. The proposed management strategies for the natural and built features are the same as those previously provided in Report No. MSEC326 and the SMP Application.

APPENDIX A. FIGURES

Predicted Profiles of Incremental Subsidence, Tilt and Curvature along Prediction Line 1 Resulting from the Extraction of Longwall 35

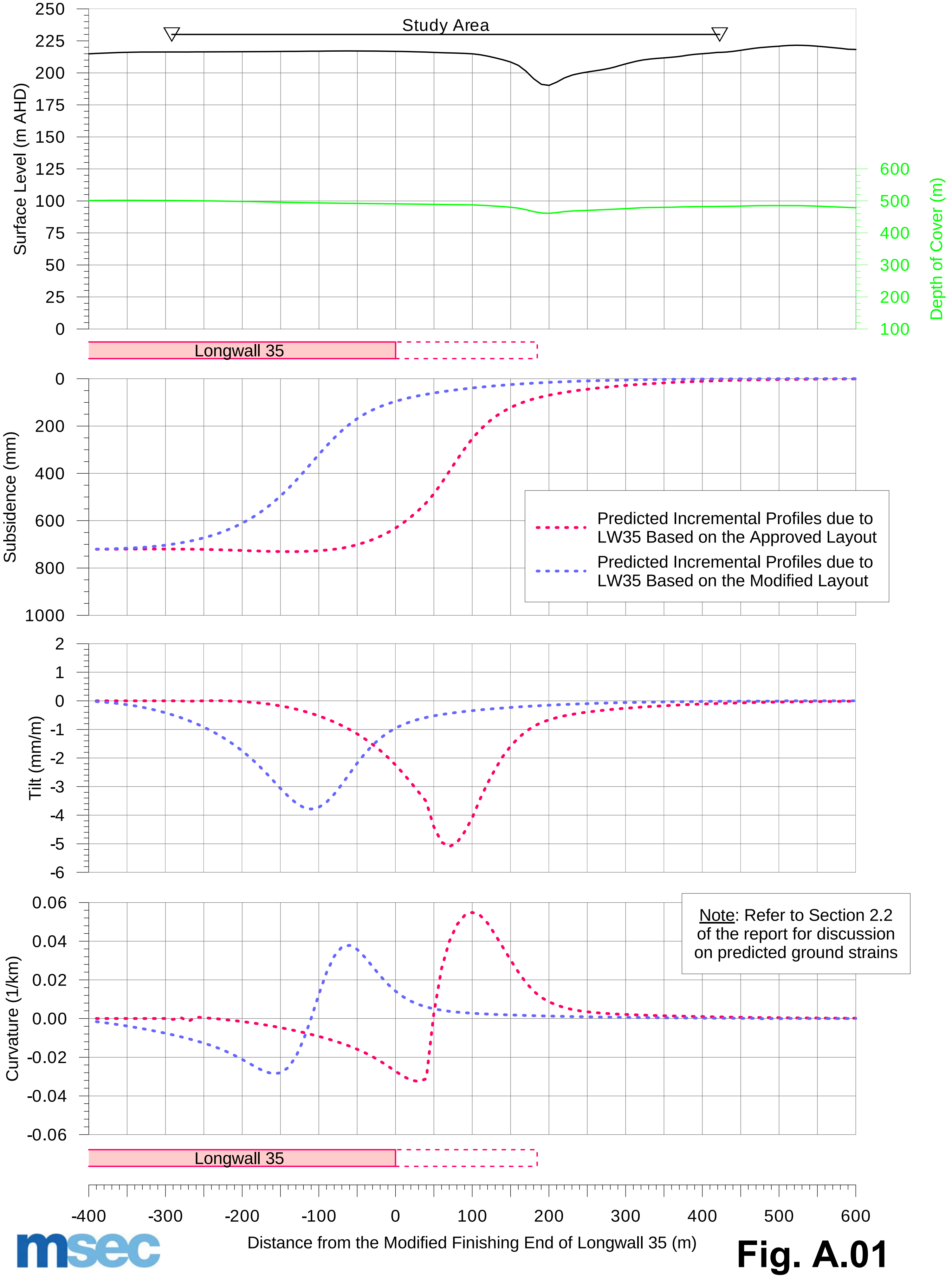

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Fig. A.01

Predicted Profiles of Subsidence, Upsidence and Closure along the Georges River Resulting from the Extraction of Longwalls 29 to 36

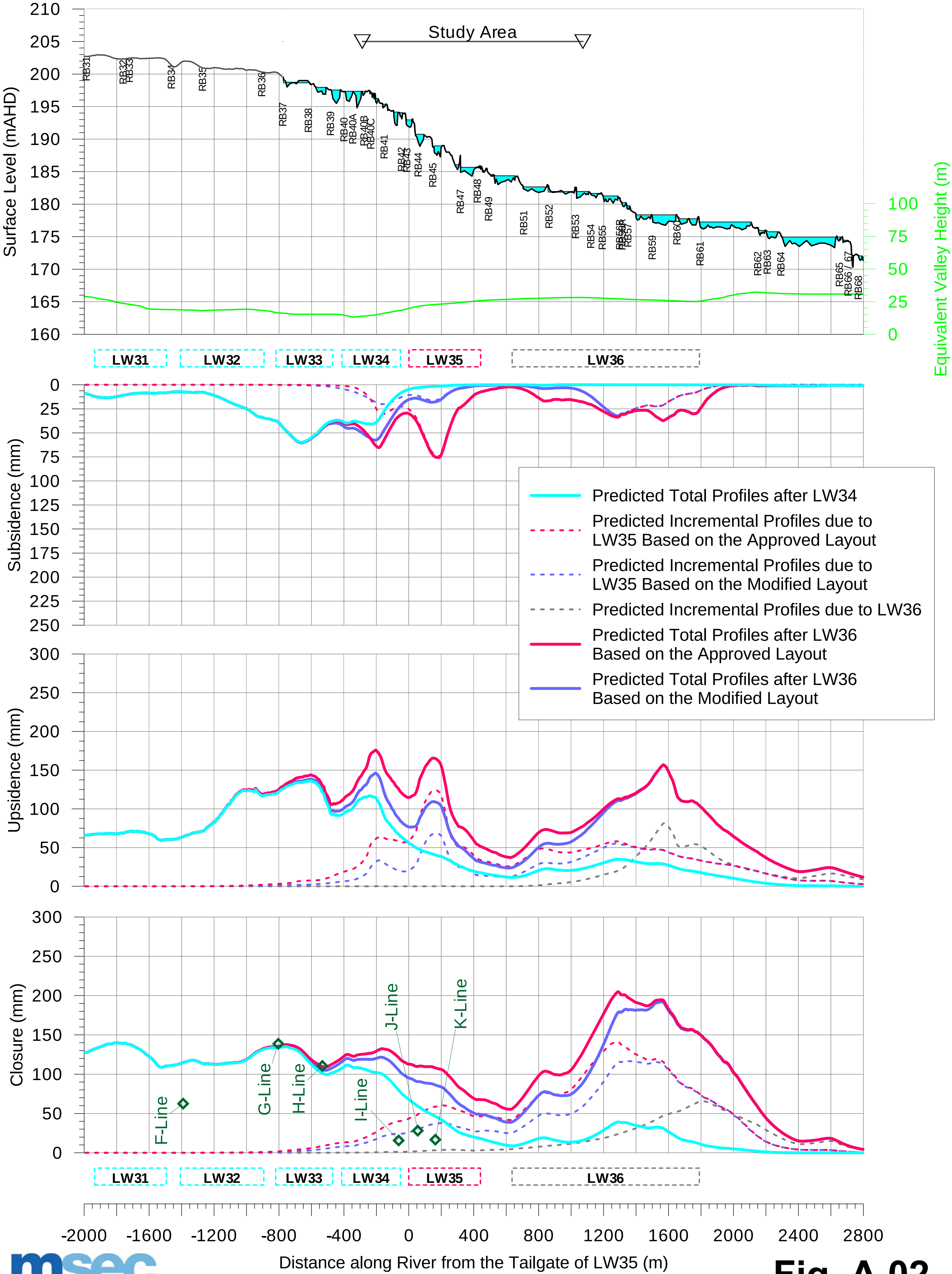

Fig. A.02

APPENDIX B. DRAWINGS

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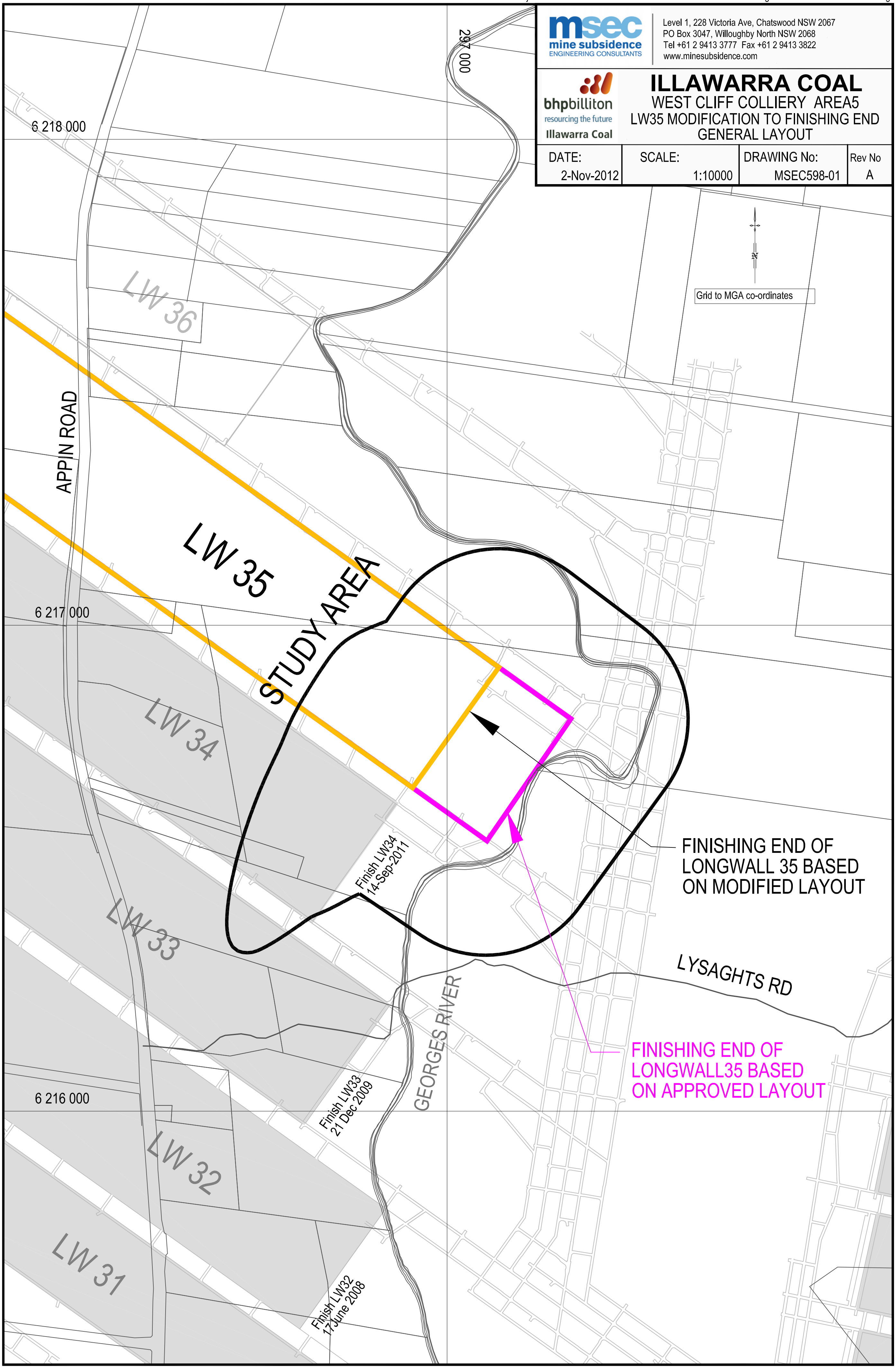

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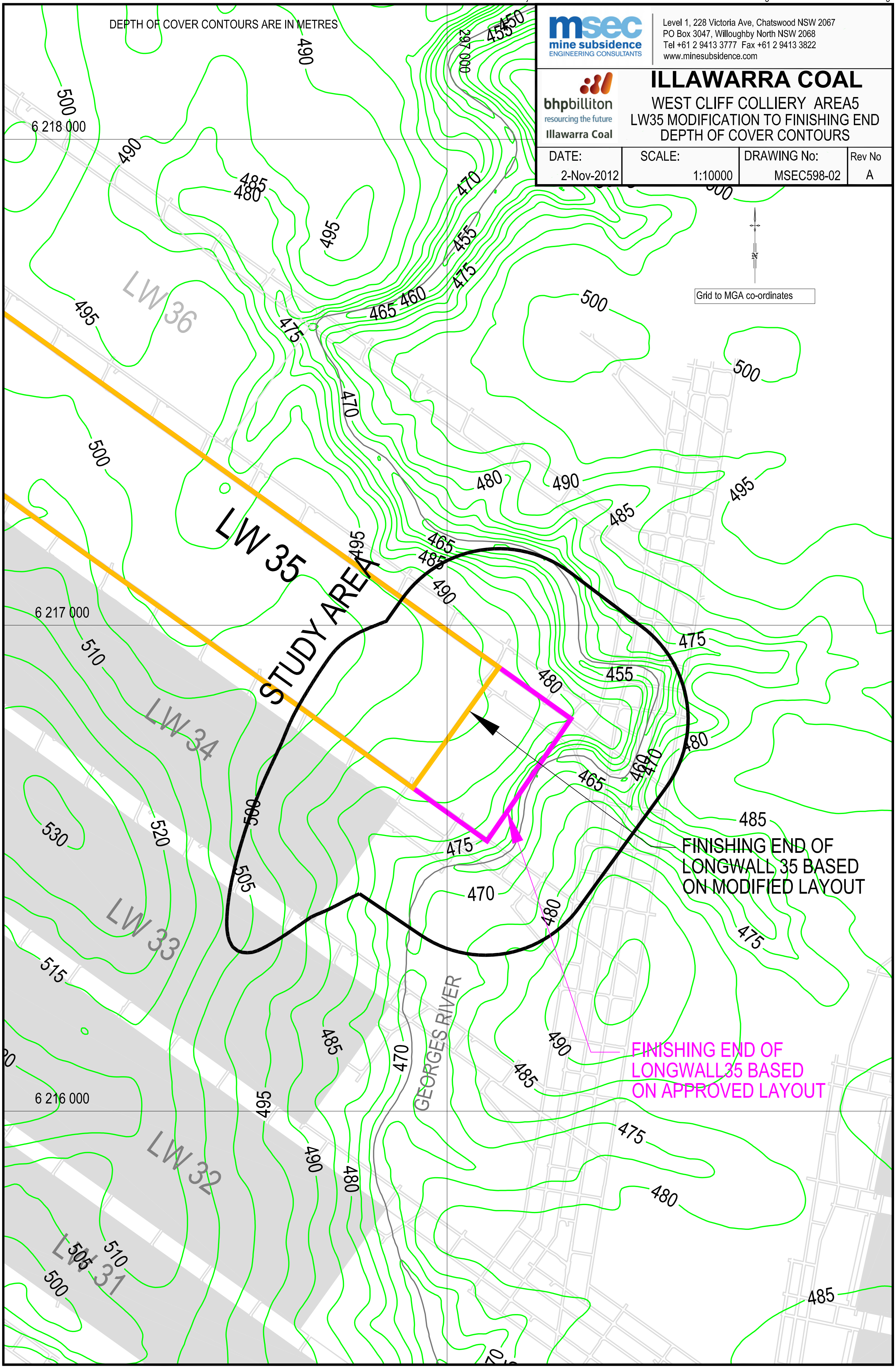

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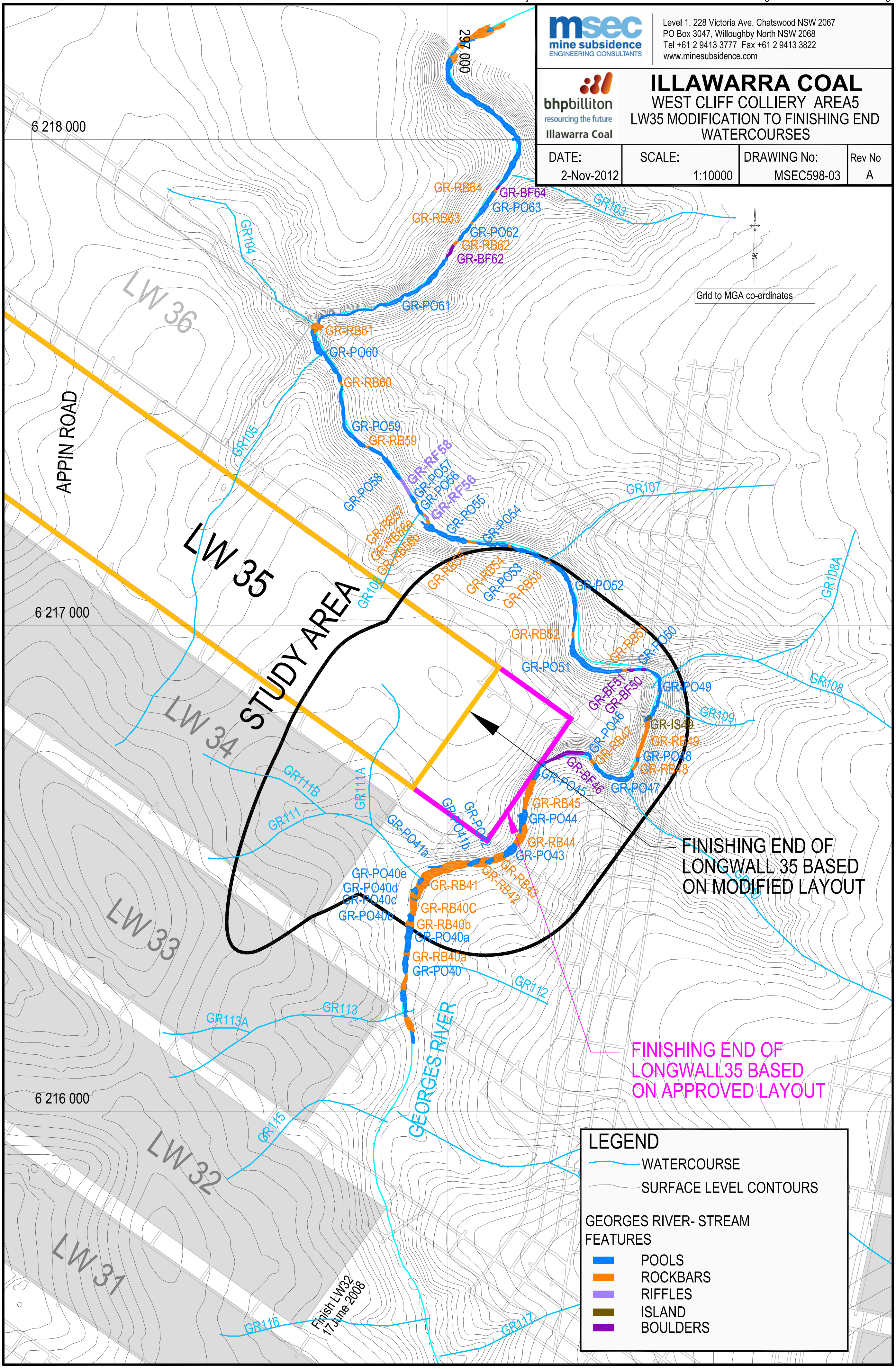

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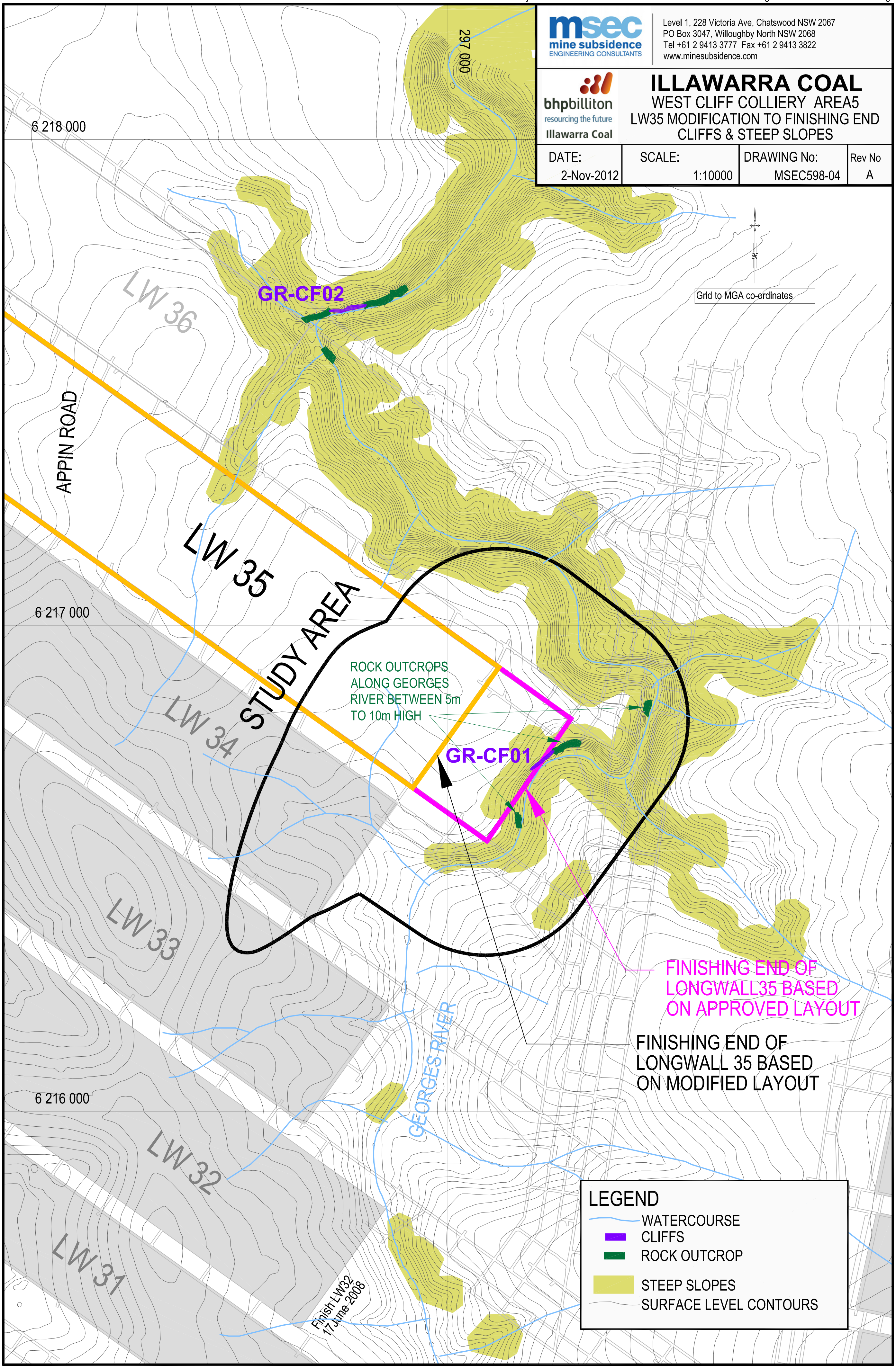

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BUILT FEATURES

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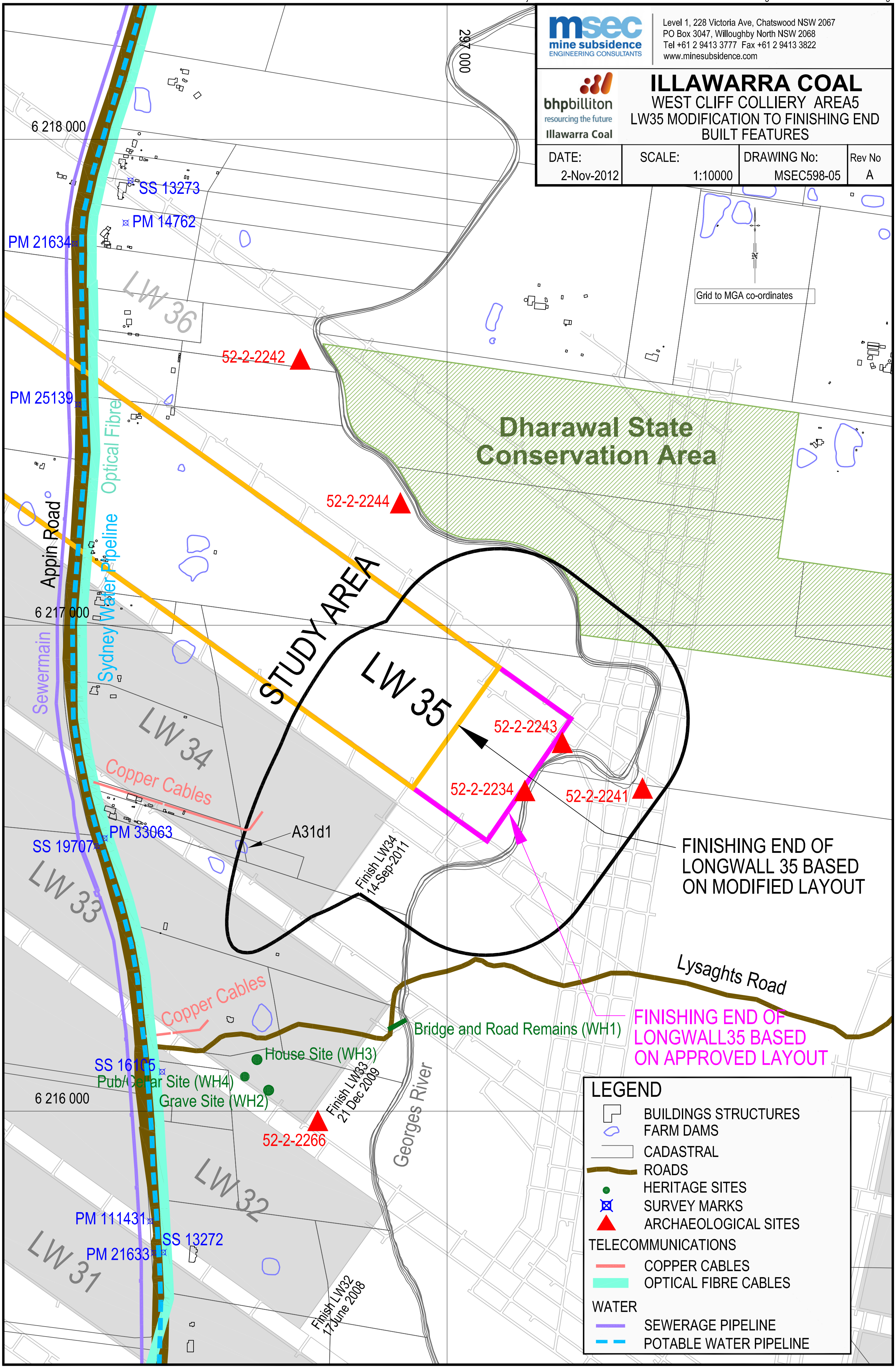

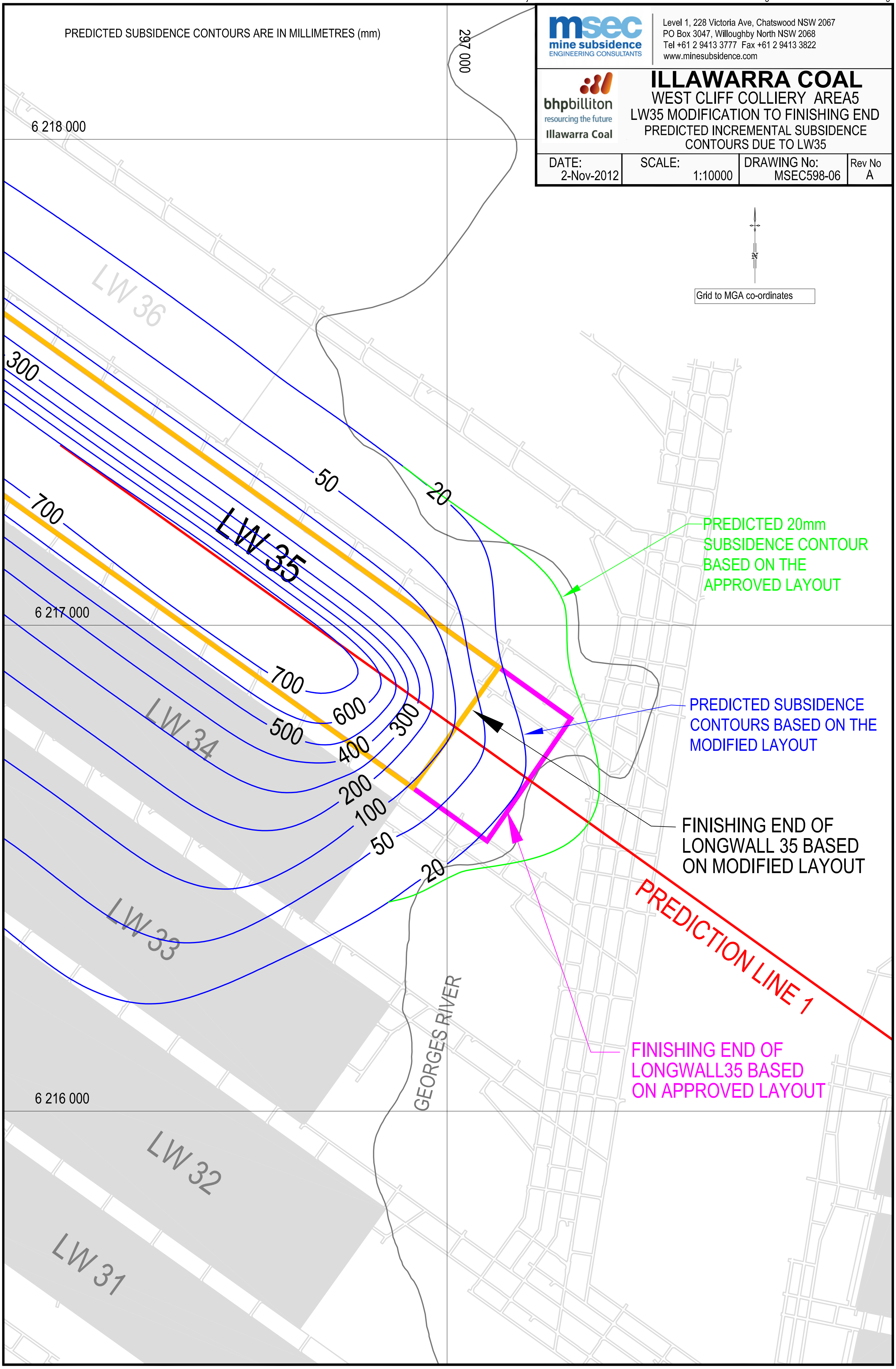

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LW35 MODIFICATION TO FINISHING END
PREDICTED INCREMENTAL SUBSIDENCE CONTOURS DUE TO LW35

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