Illawarra Coal - Carbon Steel Materials

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18 May 2009

The Director,
Environmental Sustainability Branch
Department of Primary Industries – Minerals
PO Box 344, Hunter Region Mail Centre NSW 2310
Attn: Mr Jonathon Smith

Subsidence Management Plan Variation– West Cliff Mine, shortened length Longwall 34

Dear Mr Smith,

In accordance with Chapter 7 of the Guideline for Applications for Subsidence Management Approvals, please find an Application for Variation of the Subsidence Management Plan for Longwalls 34 - 36 at West Cliff Mine.

The variation shortens the length of Longwall 34 (void) by 897 m.

The Variation Application is supported by a Written Report which includes a review of the impacts of the varied longwall length. No change in the West Cliff Area 5 Longwall 34-36 SMP is proposed.

Development for Longwall 34 is progressing in accordance with the approved SMP and will interact with these proposed extensions during the week commencing 25 May 2009. As such, we request that this variation application be considered at your earliest convenience.

If you have any queries in relation to the SMP Variation Application, please call the undersigned on (02) 4255 3312.

Yours sincerely,

Bruce Blunden
Manager – Environmental Approvals

Att:	2 x copies of Approved Plans A & B

Illawarra Coal

West Cliff Colliery
Revised Length of Longwall 34

REPORT

on

THE EFFECTS OF FIVE OPTIONAL MODIFIED COMMENCING ENDS OF LONGWALL 34 AT WEST CLIFF COLLIERY ON PREVIOUS SUBSIDENCE PREDICTIONS AND IMPACT ASSESSMENTS

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Report Number MSEC386 Rev B
December 2008

DOCUMENT REGISTER

Revision	Description	Author	Checker	Date
Draft Ver. 1	DRAFT The effects of the five optional modified commencing ends of Longwall 34 on the subsidence predictions and impact assessments	JB &DK	-	12-Dec-08
Rev. A	Final Report	DK		17-Dec-08
Rev. B	Minor Revisions	DK	JB	18-Dec-08

Report produced for:- Modification of the SMP Application for Longwalls 34 to 36 that was issued to The Department of Primary Industries on 14th January 2008, or as a variation to the Approved SMP.

Previous reports:- WKA97 (May 2002) – West Cliff Colliery – Longwalls 5A5 to 5A8 - The Prediction of Subsidence Parameters and the Assessment of Subsidence Impacts on Natural Features and Surface Infrastructure.

WKA118 (October 2002) – West Cliff Colliery – Revised Longwalls 5A5 to 5A8 - The Prediction of Subsidence Parameters and the Assessment of Subsidence Impacts on Natural Features and Surface Infrastructure (In Support of a Section 138 Application).

MSEC208 (Revision E – March 2006) – The Prediction of Subsidence Parameters and the Assessment of Mine Subsidence Impacts on Surface and Sub-Surface Features due to Mining Longwalls 31 to 33 at West Cliff Colliery (In Support of a SMP Application).

MSEC261 (Revision B – July 2006) - The Effects of the Modified Commencing End of Longwall 32 at West Cliff Colliery on the Subsidence Predictions and Impact Assessments (In Support of a Modification to the Section 138 Application).

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).

MSEC327 (Revision B – September 2007) - The Effects of the Modified Commencing End of Longwall 33 at West Cliff Colliery on the Subsidence Predictions and Impact Assessments (In Support of a Modification to the Section 138 Application).

MSEC344 (Revision B – February 2008) - Predicted Subsidence Parameters at the Sydney Catchment Authority Infrastructure Resulting from Alternative Layouts of West Cliff Longwalls 34 to 36.

EXECUTIVE SUMMARY

BHP Billiton Illawarra Coal (IC) applied for approval to mine Longwalls 34 to 36 at West Cliff Colliery in a Subsidence Management Plan (SMP) Application that was submitted on the 14th January 2008. IC is now proposing to shorten the commencing (western) end of Longwall 34 by a distance of between 710 and 910 metres. The commencing end position of Longwall 34 as detailed in the SMP Application and five optional modified commencing ends of Longwall 34 are shown in Drawings Nos. MSEC386-01 and MSEC386-02.

Mine Subsidence Engineering Consultants (MSEC) has been commissioned by IC to assess the effects of five optional starting positions for Longwall 34 on the subsidence predictions and impact assessments that were issued previously in the SMP Application dated the 14th January 2008 and were detailed in our Report MSEC326 (Revision C – December 2007). These previously issued SMP subsidence predictions and impact assessments are referred to in the remainder of this report as the *initial* subsidence predictions and *initial* impact assessments.

The decision on the exact starting position of Longwall 34 will be made, depending on the effectiveness of the underground in-seam gas drainage. Five optional commencing positions, which are spaced at 50 metres apart, cover the likely range of the actual starting position, as are shown in Drawing No. MSEC386-02.

The *initial* predicted incremental subsidence contours, based on the *initial* commencing end of Longwall 34, are shown in Drawing No. MSEC386-07. The predicted total subsidence contours after the extraction of the proposed Longwall 36 and based on the *initial* commencing end of Longwall 34, are shown in Drawing No. MSEC386-08.

The predicted incremental subsidence contours, based on the five optional modified commencing ends of Longwall 34, are shown in Drawings Nos. MSEC386-09 to MSEC386-13. The predicted total subsidence contours after the extraction of the proposed Longwall 36 and based on two of the five optional modified commencing ends of Longwall 34, are shown in Drawings Nos. MSEC386-14 and MSEC386-15.

The maximum predicted incremental systematic subsidence parameters due to the proposed extraction of Longwall 34 for all optional commencing end positions are the same as those previously provided for in the SMP Application for the *initial* commencing end of this longwall. Although the maximum predicted systematic subsidence parameters have not changed, as a result of the five optional modified commencing ends of Longwall 34, the locations of the maximum predicted longitudinal tilts and strains at the five optional modified commencing ends of this longwall have changed.

The maximum predicted valley related upsidence and closure movements, based on the five optional modified commencing ends of Longwall 34, are similar to or less than the *initial* commencing end of this longwall.

There are a number of natural features and items of surface infrastructure in the vicinity of the *initial* and the five optional modified commencing ends of Longwall 34, including Leafs Gully, steep slopes, the Upper Canal, Devines Tunnel and associated infrastructure, water and natural gas pipelines, electrical infrastructure, building structures, farm dams, archaeological sites and survey control marks. These natural features and items of surface infrastructure in the vicinity of the *initial* and the five optional modified commencing ends of Longwall 34 are shown in Drawings Nos. MSEC386-03 to MSEC386-06.

The predicted systematic subsidence and valley related movements at the natural features and items of infrastructure, based on the five optional modified commencing ends of Longwall 34, are similar to or less than those previously provided for the *initial* commencing end of this longwall.

The impact assessments and proposed management strategies for the natural features and items of infrastructure, based on the five optional modified commencing ends of Longwall 34, are all the same or less than those previously provided in Report No. MSEC326 for the *initial* commencing end of this longwall. With these management strategies in place, it is unlikely that there would be any significant impacts on the natural features and items of infrastructure resulting from the five optional modified commencing ends of Longwall 34.

CONTENTS

LIST OF TABLES, FIGURES AND DRAWINGS

Tables

Tables are prefaced by the number of the Chapter in which they are presented.

Table No. Description

Figures

Figures referred to in this report are included in Appendix A at the end of this report.

Figure No. Description

Drawings

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

CHAPTER 1. INTRODUCTION

1.1. Background

Mine Subsidence Engineering Consultants (MSEC) was previously commissioned by BHP Billiton Illawarra Coal (IC) to study the current mining proposals, to identify all the natural features and items of surface infrastructure and to undertake subsidence predictions and impact assessments for Longwalls 34 to 36, at West Cliff Colliery. Report No. MSEC326 (Revision C) was issued in December 2007 on the completion of that work. IC submitted a Subsidence Management Plan (SMP) Application to the Department of Primary Industries (DPI) for approval to mine Longwalls 34 to 36 at West Cliff Colliery on the 14th January 2008.

IC has now proposed to shorten the commencing (western) end of Longwall 34 by a distance of between 710 and 910 metres. At this stage the exact position of the proposed commencing end of Longwall 34 is not known. Five optional commencing end positions, which are spaced at 50 metres apart, cover the likely range of the actual starting positions.

The locations of the *initial* commencing end of Longwall 34, as detailed in MSEC326 (Revision C), and the five optional modified commencing ends of Longwall 34 are shown in Drawings Nos. MSEC386-01 and MSEC386-02. The decision on the exact commencing end position of Longwall 34 will be made by IC, depending on the effectiveness of the underground in-seam gas drainage.

The location of the proposed commencing end of Longwall 34 in the previously issued SMP application and in MSEC326 (Revision C) shall be referred to as the *initial* commencing end of Longwall 34.

The greatest amount of shortening of Longwall 34 by 910 metres applies to the Base Case (BC), which is the minimum case. This possible commencing end position for Longwall 34 is referred to in the remainder of this report and in the drawings and figures of this report as the BC Case. The other optional commencing position cases are labelled BC+50 metres, BC+100 metres, BC+150 metres and BC+200 metres, which was referred to by IC as the Stretch Case.

MSEC have now been commissioned by IC to assess the effects of the five optional modified commencing ends of Longwall 34 on the subsidence predictions and impact assessments that were issued previously in the SMP Application dated the 14th January 2008 and were detailed in our report MSEC326 (Revision C – December 2007). The previously issued SMP subsidence predictions and impact assessments are referred to in the remainder of this report as the *initial* subsidence predictions and *initial* impact assessments.

This report, MSEC386, has been prepared to support a variation to the SMP Application that was submitted to the DPI on the 14th January 2008, or as a variation to the Approved SMP.

1.2. Details on the Five Optional Modified Commencing Ends of Longwall 34

A summary of the reduction in lengths from the *initial* commencing end position and the proposed overall lengths of Longwall 34 for each of the five optional modified commencing ends positions is provided in Table 1.1.

Table 1.1 *Initial* and Optional Five Lengths of Longwall 34

Dimension	*Initial* Longwall 34, (Proposed in SMP Report MSEC326)	Proposed Longwall 34, Base (BC) Case	Proposed Longwall 34, BC + 50 m Case	Proposed Longwall 34, BC + 100 m Case	Proposed Longwall 34, BC + 150 m Case	Proposed Longwall 34, BC + 200 m Case
Reduction in Length of Longwall 34 (m)	-	910	860	810	760	710
Modified Length of Longwall 34 (m)	4065	3155	3205	3255	3305	3355

An "Affected Area" is defined in Chapter 3 as the surface area where the predicted systematic subsidence parameters, based on the five optional modified commencing ends of Longwall 34, are different to those previously provided in Report No. MSEC326 based on the *initial* commencing end of this longwall. A line has been drawn in all the attached Drawings Nos. MSEC386-01 to MSEC386-15 to show this Affected Area.

The depth of cover to the Bulli Seam within the Affected Area varies between 480 metres in Leafs Gully to the west of the *initial* finishing (western) end of Longwalls 34 and 520 metres near the proposed commencing end of Longwall 35. Near the five optional modified commencing ends of Longwall 34 the depth of cover is 505 metres.

The seam thickness within the Affected Area varies between a minimum of 2.2 metres, near the commencing (western) end of Longwall 33, and a maximum of 2.65 metres, near the *initial* finishing (western) end of Longwall 34. IC proposes to extract a minimum height of 2.4 metres within Longwall 34, i.e. the extracted height will be 2.4 metres even where the seam thickness is less than 2.4 metres and the full height will be extracted where the seam thickness is greater than 2.4 metres. The void width of Longwall 34 is unchanged at 305 metres and the chain pillar width between Longwall 33 and Longwall 34 is unchanged at 40 metres.

There are no significant geological structures mapped at the coal seam level near the five optional modified commencing ends of Longwall 34.

CHAPTER 2. MAXIMUM PREDICTED SUBSIDENCE PARAMETERS RESULTING FROM THE *INITIAL* AND FIVE OPTIONAL MODIFIED COMMENCING ENDS OF LONGWALL 34

2.1. Maximum Predicted Incremental and Total Systematic Subsidence Parameters

The Incremental Profile Method was used to predict the systematic subsidence parameters resulting from the extraction of Longwalls 29 to 36 at West Cliff Colliery, which were provided in Report No. MSEC326. The Incremental Profile Method has also been used to predict the systematic subsidence parameters resulting from the extraction of Longwalls of 29 to 36, based on the five optional modified commencing ends of Longwall 34.

Details on the Incremental Profile Method are provided in the background report entitled *General Discussion on Mine Subsidence Ground Movements* which can be obtained from *www.minesubsidence.com*. The standard Southern Coalfield profiles from the database, based on monitoring data predominantly from the Bulli Seam, were used to predict the systematic subsidence parameters for the longwalls.

The latest surface level contours, extraction height information and seam floor contours, which were provided by IC, were used to predict the systematic subsidence parameters for each optional layout. Predictions were made at points on a regular grid orientated north-south and east-west across the longwalls. A grid spacing of 10 metres in each direction was adopted, which provides sufficient resolution for the generation of subsidence, tilt and strain contours.

The predicted incremental systematic subsidence contours resulting from the extraction of Longwall 34, based on the *initial* longwall layout for Longwall 34, as detailed in SMP Application Report No. MSEC326, are shown in Drawing No. MSEC386-07. The predicted total systematic subsidence contours after the extraction of Longwall 36, based on the *initial* longwall layout for Longwall 34, as detailed in SMP Application Report No. MSEC326, are shown in Drawing No. MSEC386-08.

The predicted incremental systematic subsidence contours resulting from the extraction of Longwall 34, based on the optional Base (BC) Case layout as detailed in Drawing No. MSEC386-02, are shown in Drawing No. MSEC386-09.

The predicted incremental systematic subsidence contours resulting from the extraction of Longwall 34, based on the optional BC + 50 metres Case layout as detailed in Drawing No. MSEC386-02, are shown in Drawing No. MSEC386-10.

The predicted incremental systematic subsidence contours resulting from the extraction of Longwall 34, based on the optional BC + 100 metres Case layout as detailed in Drawing No. MSEC386-02, are shown in Drawing No. MSEC386-11.

The predicted incremental systematic subsidence contours resulting from the extraction of Longwall 34, based on the optional BC + 150 metres Case layout as detailed in Drawing No. MSEC386-02, are shown in Drawing No. MSEC386-12.

The predicted incremental systematic subsidence contours resulting from the extraction of Longwall 34, based on the optional BC + 200 metres Case layout as detailed in Drawing No. MSEC386-02, are shown in Drawing No. MSEC386-13.

A summary of the maximum predicted values of incremental systematic subsidence, tilt and strain resulting from the extraction of Longwall 34, based on the *initial* and the five optional modified commencing ends of this longwall, is provided in Table 2.1.

Table 2.1 Maximum Predicted Incremental Systematic Subsidence, Tilt and Strain Resulting from the Extraction of Longwall 34, based on the *Initial* and Five Optional Modified Commencing Ends of Longwall 34

Layout	Maximum Predicted Incremental Subsidence (mm)	Maximum Predicted Incremental Tilt (mm/m)	Maximum Predicted Incremental Tensile Strain (mm/m)	Maximum Predicted Incremental Compressive Strain (mm/m)
Initial Layout Case	812	5.9	0.8	1.8
Base (BC) Case	812	5.9	0.8	1.8
BC + 50 m Case	812	5.9	0.8	1.8
BC + 100 m Case	812	5.9	0.8	1.8
BC + 150 m Case	812	5.9	0.8	1.8
BC + 200 m Case	812	5.9	0.8	1.8

It can be seen from the above table, that the maximum predicted incremental systematic subsidence parameters resulting from the extraction of Longwall 34, based on the five optional modified commencing ends of Longwall 34, are the same as those based on the *initial* commencing end of this longwall.

The predicted total systematic subsidence contours resulting from the extraction of Longwall 29 to 36, based on the optional BC Case layout for Longwall 34, i.e. the Base Case, as detailed in Drawing No. MSEC386-02, are shown in Drawing No. MSEC386-14.

The predicted total systematic subsidence contours resulting from the extraction of Longwall 29 to 36, based on the optional BC + 200 metres Case layout, i.e. the Stretch Case, for Longwall 34, as detailed in Drawing No. MSEC386-02, are shown in Drawing No. MSEC386-15.

A summary of the maximum predicted values of total systematic subsidence, tilt and strain after the extraction of Longwall 36, based on the *initial* and the five optional modified commencing ends of Longwall 34, is provided in Table 2.2.

Table 2.2 Maximum Predicted Total Systematic Subsidence, Tilt and Strain after the Extraction of Longwall 36, based on the *Initial* and Five Optional Modified Commencing Ends of Longwall 34

Layout	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Tensile Strain (mm/m)	Maximum Predicted Total Compressive Strain (mm/m)
Initial Layout Case	1265	6.6	1.2	2.0
Base (BC) Case	1265	6.6	1.2	2.0
BC + 50 m Case	1265	6.6	1.2	2.0
BC + 100 m Case	1265	6.6	1.2	2.0
BC + 150 m Case	1265	6.6	1.2	2.0
BC + 200 m Case	1265	6.6	1.2	2.0

It can be seen from the above table, that the maximum predicted total systematic subsidence parameters after the extraction of Longwall 36, based on the five optional modified commencing ends of Longwall 34, are the same as those based on the *initial* commencing end of this longwall.

2.2. Maximum Predicted Valley Related Movements

The predicted valley related movements along the creeks and valleys at West Cliff Colliery have been determined using the method outlined in ACARP Research Project No. C9067 entitled *Management Information Handbook on the Undermining of Cliffs, Gorges and River System (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 creeks and valleys are determined by applying factors based on their lateral and longitudinal distances from the extracted longwalls, their valley heights and the maximum predicted incremental subsidence resulting from the extraction of each longwall.

The lateral and longitudinal distances between the commencing end of Longwall 34 and the creeks, based on the five optional modified commencing ends of this longwall, are similar to or less than those based on the *initial* commencing end of this longwall. The lateral and longitudinal factors for the predicted upsidence and closure movements, based on the five optional modified commencing ends of Longwall 34, are, therefore, similar to or less than those based on the *initial* commencing end of this longwall.

The valley height factors for the predicted upsidence and closure movements do not change as a result of the five optional modified commencing ends of Longwall 34. Also as described in Section 2.1, the maximum predicted systematic subsidence and, hence, the subsidence factor for the predicted upsidence and closure movements do not change as a result of the five optional modified commencing ends of Longwall 34.

The maximum predicted upsidence and closure movements along the creeks and valleys, based on the five optional modified commencing ends of Longwall 34, are, therefore, similar to or less than those based on the *initial* commencing end of this longwall.

CHAPTER 3. IDENTIFICATION OF THE NATURAL FEATURES AND ITEMS OF SURFACE INFRASTRUCTURE WITHIN THE AFFECTED AREA

Although the maximum predicted systematic subsidence parameters do not change, as a result of the five optional modified commencing ends of Longwall 34, the locations of the maximum predicted longitudinal tilts and strains at the five optional modified commencing ends of this longwall do change.

The predicted systematic subsidence parameters at the natural features and items of infrastructure located directly above or immediately adjacent to the optional modified commencing ends of Longwall 34, may be greater or less than those previously provided for the *initial* commencing end of this longwall.

3.1. Affected Area

An "Affected Area" has been defined as the surface area where the predicted systematic subsidence parameters, based on the optional modified commencing ends of Longwall 34, are different to those previously provided in Report No. MSEC326 based on the *initial* commencing end of this longwall.

The extent of the Affected Area has been calculated by combining the areas bounded by the following limits:-

- The 35 degree angle of draw line from the *initial* and five optional modified commencing ends of Longwall 34,
- The limit where the predicted differential subsidence between the *initial* and five optional modified layouts of Longwall 34 is less than 20 mm, and
- Features sensitive to far-field movements.

Given that the depth of cover between the *initial* and five optional modified commencing ends of Longwall 34 varies between 480 and 510 metres, the 35 degree angle of draw has been conservatively determined by drawing a line that is a horizontal distance, varying between 340 and 360 metres around the *initial* and five optional modified commencing ends of this longwall.

The predicted incremental systematic subsidence contours, based on the *initial* and five optional modified commencing ends of Longwall 34, were determined using the Incremental Profile Method. The differential subsidence between the *initial* and five optional modified layouts of Longwall 34 was calculated by taking the predicted subsidence based on the five optional modified layout from the predicted subsidence based on the *initial* layout.

In all locations, the predicted differential 20 mm subsidence contour is located within the area bounded by the 35 degree angle of draw line.

A line has therefore been drawn defining the affected area, based upon the 35 degree angle of draw line, and this line has been labelled "Affected Area" as is shown in all the attached Drawings Nos. MSEC386-01 to MSEC386-15.

3.2. Features within the Affected Area

There are a number of natural features and items of infrastructure within the Affected Area including:-

- Leafs Gully,
- Steep slopes,
- The Upper Canal, Devines Tunnel and associated infrastructure,
- Water pipeline,
- Natural gas pipelines,
- 330 kV transmission line,
- 66 kV powerline,
- Building structures,
- Farm dams,
- Archaeological sites, and
- Survey control marks.

Outside the Affected Area, the predicted systematic subsidence parameters, based on the five optional modified commencing ends of Longwall 34, are the same as those previously provided for the *initial* commencing end of this longwall.

Also outside the Affected Area, the predicted valley related movements, based on the five optional modified commencing ends of Longwall 34, are similar to or less than those previously provided for the *initial* commencing end of this longwall.

There are no natural features or items of surface infrastructure in the vicinity of the Affected Area that would be considered sensitive to far-field horizontal movements.

The impact assessments for the natural features and items of infrastructure located outside the Affected Area are, therefore, the same as those previously provided in Report No. MSEC326.

CHAPTER 4. THE EFFECTS OF THE FIVE OPTIONAL MODIFIED COMMENCING ENDS OF LONGWALL 34 ON PREVIOUS PREDICTIONS AND IMPACT ASSESSMENTS FOR THE NATURAL FEATURES AND ITEMS OF SURFACE INFRASTRUCTURE

The natural features and items of surface infrastructure within the Affected Area are shown in Drawings Nos. MSEC386-03 to MSEC386-06 in Appendix A. Descriptions of all these features and items of surface infrastructure are provided in Report No. MSEC326.

Detailed subsidence predictions and assessments of the impacts of the predicted ground movements at these features and items of surface infrastructure based on the *initial* commencing end location are provided in Report No. MSEC326. A comparison of these *initial* predictions and *initial* impact assessments with the predictions and impact assessments for each feature and item of surface infrastructure within the Affected Area, based on the five optional modified commencing ends of Longwall 34, are provided in the following sections.

4.1. Leafs Gully

The location of Leafs Gully is shown in Drawing No. MSEC386-03 and Leafs Gully is described in Report No. MSEC326.

A comparison of the predicted subsidence, upsidence, net vertical movement and closure profiles along Leafs Gully resulting from the Extraction of Longwalls 29 to 36, based on the *initial* and five optional modified commencing ends of Longwall 34, is provided in Fig. A.01 in Appendix A.

The predicted systematic subsidence parameters along Leafs Gully, based on the five optional modified commencing ends of Longwall 34, are less than the previously predicted parameters provided in Report No. MSEC326 for the *initial* commencing end of this longwall.

In addition to this, the predicted valley related upsidence and closure movements along Leafs Gully, based on the five optional modified commencing ends of Longwall 34, are all less than those previously provided in Report No. MSEC326 for the *initial* commencing end of this longwall.

The impact assessments and proposed management strategies for Leafs Gully, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impact on Leafs Gully, resulting from the five optional modified commencing ends of Longwall 34.

4.1.1. Other Watercourses

There are no other watercourses located within the Affected Area.

The predicted systematic subsidence parameters at the watercourses located outside the Affected Area, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those previously provided in Report No. MSEC326 for the *initial* commencing end of this longwall.

4.2. Steep Slopes

For the purposes of this report, a steep slope has been defined as an area of land having a gradient between 1 in 3 (i.e. a grade of 33 %, or an angle to the horizontal of 18°) and 2 in 1 (i.e. a grade of 200 %, or an angle to the horizontal of 63°).

The locations of the steep slopes which have been identified within the Affected Area are shown in Drawing No. MSEC386-03. The steep slopes are generally located along the alignment of Leafs Gully and have natural gradients varying between 1 in 3 and 1 in 2.

As described in Section 4.1, the predicted systematic subsidence and valley related movements along the alignment Leafs Gully resulting from the extraction of Longwall 34, based on the five optional modified commencing ends of this longwall, are less than those based on the *initial* commencing end of this longwall.

The impact assessments and proposed management strategies for the steep slopes, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the steep slopes, resulting from the five optional modified commencing ends of Longwall 34.

4.3. The Upper Canal, Devines Tunnel and Associated Infrastructure

The locations of the Upper Canal, Devines Tunnel and associated infrastructure are shown in Drawing No. MSEC386-04 and they are described in Reports Nos. MSEC326 and Report No. MSEC344.

The Upper Canal and Devines Tunnel are located approximately 300 metres west of the *initial* commencing end and are located between 880 and 1050 metres west of the five optional modified commencing ends of Longwall 34, at their closest points.

The predicted systematic subsidence parameters at the Upper Canal, Devines Tunnel and associated infrastructure, based on the five optional modified commencing ends of Longwall 34, are, therefore, less than those predicted for the *initial* commencing end case as detailed in Reports Nos. MSEC326 and Report No. MSEC344.

The predicted closure, upsidence and far field horizontal movements at all the Sydney Catchment Authority infrastructure, based on the five optional modified commencing ends of Longwall 34, are, therefore, less than those predicted for the *initial* commencing end case as detailed in Reports Nos. MSEC326 and Report No. MSEC344.

The proposed subsidence monitoring program at the Upper Canal, Devines Tunnel and associated infrastructure that was detailed in Report No. MSEC326 can be modified to reduce the frequency of surveys as a result of the five optional modified commencing ends of Longwall 34 since these revised commencing ends of Longwall 34 are positioned further away from this infrastructure.

The impact assessments and proposed management strategies for the Upper Canal, Devines Tunnel and associated infrastructure, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those provided in Reports Nos. MSEC326 and Report No. MSEC344. With these management strategies in place, it is unlikely that there would be any significant impacts on these items of infrastructure, resulting from the five optional modified commencing ends of Longwall 34.

4.4. Water and Natural Gas Pipelines

One water and three natural gas pipelines are located within an easement, the location of which is shown in Drawing No. MSEC386-04 and they are described in Report No. MSEC326.

Whilst the pipeline easement was located about 1000 metres from the *initial* commend of Longwall 34, the pipeline easement is located between 145 and 320 metres east of the five optional modified commencing ends of Longwall 34, at their closest points. This proximity of the pipeline easement to the five optional modified commencing ends of Longwall 34 results in slightly higher final tilts and strains across the easement than for the *initial* case and reduced travelling subsidence, tilts and strains compared to the *initial* case.

A comparison between the predicted and observed subsidence, tilt and strain along the Pipeline Easement, resulting from the extraction of Longwalls 29 to 36 and based on the *initial* and the five optional modified commencing ends of Longwall 34, is provided in Fig. A.02 in Appendix A. A comparison between the predicted and observed net vertical movements along the Pipeline Easement and the systematic plus closure horizontal movements along and across the Pipeline Easement resulting from the extraction of Longwalls 29 to 36, based on the *initial* and the five optional modified commencing ends of Longwall 34, is provided in Fig. A.03 in Appendix A.

The proximity of the pipeline easement to the five optional modified commencing ends of Longwall 34 results in a small reduction in the predicted systematic subsidence movements along the alignments of the pipelines compared to the *initial* predicted systematic subsidence movements.

The pipelines would be subjected to slightly greater tilts and strains across their alignments resulting from the longitudinal subsidence movements at the five optional modified ends of this longwall. The magnitudes of the maximum predicted tilts and strains across the alignments of the pipelines are an order of magnitude smaller than the maximum predicted tilts and strains along their alignments and the tilts and strains across the alignment are not critical. It is unlikely, therefore, that the small additional tilts and strains across the alignments of the pipelines would result in any systematic subsidence impacts.

The predicted valley related upsidence and closure movements along Mallaty Creek are not affected by the five optional modified commencing ends of Longwall 34.

The predicted valley related upsidence and closure movements along Leafs Gully, based on the five optional modified commencing ends of Longwall 34, are slightly less than those previously provided in Report No. MSEC326 for the *initial* commencing end of this longwall. Where the pipeline easement crosses Leafs Gully, the predicted upsidence and closure movements, based on the five optional modified commencing ends of Longwall 34, are approximately 15 % less than those based on the *initial* commencing end of this longwall as shown in Fig. A.03 in Appendix A.

The impact assessments and proposed management strategies for the water and natural gas pipelines, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the pipelines, resulting from the five optional modified commencing ends of Longwall 34.

4.5. Electrical Services

The 330 kV transmission line and the 66 kV powerline, which both cross Longwall 34 near the five optional modified commencing ends of Longwall 34, are shown in Drawing No. MSEC386-05 and they are described in Report No. MSEC326.

The predictions and impact assessments for these services are provided in the following sections.

4.5.1. 330 kV Transmission Line

The predicted profiles of incremental and cumulative systematic subsidence, tilt along and tilt across the alignment of the 330 kV transmission line, resulting from the extraction of Longwalls 29 to 36, for the *initial* commencing end case are shown in Fig. A.04 in Appendix A. The predicted profiles after the extraction of Longwall 36, based on the five optional modified commencing ends of Longwall 34, are also shown in this figure.

A summary of the maximum predicted values of total systematic subsidence, tilt along, tilt across and strain at the transmission line after the extraction of Longwall 34, based on the *initial* and five optional modified commencing ends of this longwall, is provided in Table 4.1. The values provided in this table are the maximum predicted systematic subsidence parameters which occur anywhere along the transmission line within the Affected Area.

It can be seen from Fig. A.04 and Table 4.1 that the maximum predicted systematic subsidence and tilt along the alignment of the transmission line, based on the five optional modified commencing ends of Longwall 34, are less than those based on the *initial* commencing end of this longwall. The maximum predicted systematic tensile and compressive strains along the alignment of the transmission line, based on the five optional modified commencing ends of Longwall 34, are similar to or less than those based on the *initial* commencing end of this longwall.

Table 4.1 Maximum Predicted Total Systematic Subsidence, Tilt Along, Tilt Across and Strain at the 330 kV Transmission Line Resulting from the Extraction of Longwalls 29 to 36 for the Initial and Five Optional Commencement Ends of Longwall 34

Layout	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt Along Alignment (mm/m)	Maximum Predicted Total Tilt Across Alignment (mm/m)	Maximum Predicted Total Tensile Strain (mm/m)	Maximum Predicted Total Compressive Strain (mm/m)
Initial Layout Case	1010	3.4	3.3	0.5	1.0
Base (BC) Case	780	2.8	3.3	0.3	1.0
BC + 50 m Case	795	2.8	3.7	0.4	0.9
BC + 100 m Case	830	2.8	3.3	0.4	0.7
BC + 150 m Case	890	2.8	3.3	0.4	0.5
BC + 200 m Case	935	2.8	3.3	0.4	0.7

The maximum predicted tilt across the alignment of the transmission line, based one of the five optional modified commencing ends of Longwall 34, is slightly greater than those based on the *initial* commencing end of this longwall. The reason for this is that the transmission line is located above or adjacent to the five optional modified commencing ends of Longwall 34 and, therefore, the transmission line experiences part of the longitudinal tilt at the five optional modified ends of this longwall.

The locations of the transmission towers along this 330kV transmission line are shown in Drawing No. MSEC386-05.

Tower 105 is a tension tower where the alignment of the transmission line changes by 17 degrees. A summary of the maximum predicted values of total systematic subsidence, tilt along, tilt across and strain at Tower 105 after the extraction of Longwall 36, based on the *initial* and five optional modified commencing ends of this longwall, is provided in Table 4.2.

Table 4.2 Maximum Predicted Total Systematic Subsidence, Tilt Along and Across and Strain at the Tower 105 Resulting from the Extraction of Longwalls 29 to 36 for the *Initial* and Five Optional Commencement Ends of Longwall 34

Layout	Tower	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt Along Alignment (mm/m)	Maximum Predicted Total Tilt Across Alignment (mm/m)	Maximum Predicted Total Tensile Strain (mm/m)	Maximum Predicted Total Compressive Strain (mm/m)
Initial Layout Case	105	800	1.0	0.9	0.3	< 0.0
Base (BC) Case	105	525	1.4	2.5	0.2	0.9
BC + 50 m Case	105	600	1.3	2.6	0.2	0.8
BC + 100 m Case	105	665	1.1	2.5	0.2	0.7
BC + 150 m Case	105	715	0.9	2.2	0.3	0.4
BC + 200 m Case	105	755	0.8	1.6	0.3	0.3

The values provided in the above table are the maximum predicted systematic subsidence parameters which occur within 20 metres of the centreline of Tower 105.

It can be seen from Table 4.2, that the maximum predicted subsidence at Tower 105, based on the five optional modified commencing ends of Longwall 34, are similar to or less than those based on the *initial* commencing end of this longwall.

The maximum predicted systematic tilt along and across the alignment of the transmission line at Tower 105, based on the five optional modified commencing ends of Longwall 34, of 2.6 mm/m (i.e. 0.26 %), or a change in grade of 1 in 385, is greater than those based on the *initial* commencing end of this longwall. The maximum predicted compressive strain, based on the five optional modified commencing ends of Longwall 34, is greater than those based on the *initial* commencing end of this longwall.

The reason why the maximum predicted tilts and strains at Tower 105, based on the five optional modified commencing ends of Longwall 34, are higher than those predicted for the initial case, is due to the close proximity of this Tower to the five optional modified commencing ends of Longwall 34 and, therefore, this tower experiences part of the longitudinal tilt of this longwall.

Although these predicted subsidence tilts and strains at this tower are not expected to result in any significant systematic subsidence impacts for a suspension tower, because Tower 105 is a tension corner tower, it is recommended that the predicted subsidence, tilt and strain movements at Tower 105 are provided to TransGrid so that the structural integrity of the transmission line can be assessed based on the revised movements.

It is expected that the impact assessments and proposed management strategies for the transmission line would be the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the transmission line, resulting from the five optional modified commencing ends of Longwall 34.

4.5.2. 66 kV Powerline

The predicted profiles of incremental and total systematic subsidence, tilt and strain along the alignment of the 66 kV powerline, resulting from the extraction of Longwalls 29 to 36, for the *initial* commencing end case are provided in Fig. A.05 in Appendix A. The predicted total profiles after the extraction of Longwall 36, based on the five optional modified commencing ends of Longwall 34, are also shown in this figure.

A summary of the maximum predicted values of total systematic subsidence, tilt and strain along the alignment of the powerline after the extraction of Longwall 36, based on the five optional modified and *initial* commencing ends of Longwall 34, is provided in Table 4.3. The values provided in this table are the maximum predicted systematic subsidence parameters which occur anywhere along the 66kV power line within the Affected Area.

Table 4.3 Maximum Predicted Total Systematic Subsidence, Tilt and Strain at the 66 kV Powerline Resulting from the Extraction of Longwalls 29 to 36 for the *Initial* and Five Optional Commencement Ends of Longwall 34

Layout	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Total Tensile Strain (mm/m)	Maximum Predicted Total Compressive Strain (mm/m)
Initial Layout Case	1010	3.5	0.5	1.0
Base (BC) Case	765	2.4	0.2	0.3
BC + 50 m Case	780	2.4	0.2	0.3
BC + 100 m Case	795	2.4	0.2	0.3
BC + 150 m Case	840	2.4	0.2	0.4
BC + 200 m Case	900	2.4	0.2	0.7

It can be seen from Fig. A.05 and Table 4.3, that the maximum predicted systematic subsidence parameters along the alignment of the 66kV powerline, based on the five optional modified commencing ends of Longwall 34, are similar to or less than those based on the *initial* commencing end of this longwall.

The impact assessments and proposed management strategies for the 66 kV powerline, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the powerline, resulting from the five optional modified commencing ends of Longwall 34.

4.6. Building Structures and Tanks

The building structures and tanks that are located within the Affected Area are shown on Drawing No. MSEC386-06 and they are described in Report No. MSEC326. It can be seen from this drawing that no structures are located immediately east of the five optional commencing ends and therefore no structures are subjected to increased longitudinal tilts and strains.

As the longwall length is being reduced, the predicted systematic subsidence parameters at these structures, based on the five optional modified commencing ends of Longwall 34, are less than those previously provided in Report No. MSEC326 for the *initial* commencing end of this longwall.

The impact assessments and proposed management strategies for the building structures and tanks, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the building structures and tanks, resulting from the five optional modified commencing ends of Longwall 34.

4.7. Fences

As discussed in Section 2.1, the maximum predicted systematic subsidence parameters, based on the five optional modified commencing ends of Longwall 34, are the same as those based on the *initial* commencing end of this longwall. It should be noted, however, that the locations of the maximum predicted incremental tilts and strains, resulting from the extraction of Longwall 34, have changed as the result of the five optional modified commencing ends of this longwall.

The impact assessments and proposed management strategies for the fences, based on the five optional modified commencing ends of Longwall 34, are the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the fences, resulting from the five optional modified commencing ends of Longwall 34.

4.8. Farm Dams

There are 26 farm dams located within the Affected Area, the locations of which are shown in Drawing No. MSEC386-06 and they are described in Report No. MSEC326. There are no farms located directly above the five optional commencing end positions. One farm dam, which is labelled G08 on Drawing No. MSEC386-06, is located near the five optional modified commencing ends of Longwall 34.

The maximum predicted total systematic subsidence, tilt and strain parameters at all the farm dams within the Affected Area, based on the five optional modified commencing ends of Longwall 34 are less than those based on the *initial* commencing end of this longwall, excluding Dam G08.

The maximum predicted total systematic tilt at the Dam G08, based on the five optional modified commencing ends of Longwall 34, is slightly greater than those based on the *initial* commencing end of this longwall. The reason for this is that Dam G08d04 is located close to the five optional modified commencing ends of Longwall 34 and, therefore, experiences part of the longitudinal tilt at the five optional modified ends of this longwall

The impact assessments and proposed management strategies for the farm dams, based on the five optional modified commencing ends of Longwall 34, are, therefore, the generally the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the farm dams, resulting from the five optional modified commencing ends of Longwall 34.

4.9. Archaeological Sites

There is one archaeological site located within the Affected Area, which is called Leafs Gully 1 and has a recording code of 52-2-2265. This site is a stone artefact scatter site. The location of this site is shown in Drawing No. MSEC386-06.

Longwall 34 extracts coal under this archaeological site in the *initial* case, BC + 150 and BC + 200 metres cases. This archaeological site is located over solid unmined coal for the Base Case, BC + 50 and BC + 100 metres cases.

A summary of the maximum predicted values of systematic subsidence, tilt and strain at this archaeological site at any time during or at the completion of Longwalls 29 to 36, based on the *initial* and five optional modified commencing ends of Longwall 34, is provided in Table 4.4.

Table 4.4 Maximum Predicted Total Systematic Subsidence Parameters at the Archaeological Site, 52-2-2265, based on the *Initial* and Five Optional Modified Commencing Ends of Longwall 34, after the extraction of Longwalls 29 to 36

Layout	Maximum Predicted Subsidence (mm)	Maximum Predicted Tilt (mm/m)	Maximum Predicted Tensile Strain (mm/m)	Maximum Predicted Compressive Strain (mm/m)
Initial Layout Case	761	1.7	0.3	-0.5
Base (BC) Case	144	1.0	0.1	0.0
BC + 50 m Case	173	1.2	0.1	0.0
BC + 100 m Case	223	1.6	0.2	0.0
BC + 150 m Case	293	2.1	0.4	-0.1
BC + 200 m Case	395	3.0	0.5	-0.2

The values provided in the above table are the maximum predicted parameters within 20 metres of the archaeological site.

It can be seen in Table 4.4, that the maximum predicted systematic subsidence values at the archaeological site, based on the five optional modified commencing ends of Longwall 34, are typically similar to or less than those based on the *initial* commencing end of this longwall. Since this site is located close to the proposed commencing ends for the BC + 150 and BC + 200 metres, the maximum predicted tilts and tensile strains at this site for these cases are higher than the *initial* commencing end of this longwall. However the predicted maximum tilt and tensile strains do not exceed 3 mm/m and 0.5 mm/m respectively.

Whilst the artefacts themselves would not be impacted by surface cracking, open artefact sites can potentially be affected by cracking in the bedrock or surface soils as a result of mine subsidence movements. The potential for surface cracking resulting from the extraction of the proposed longwalls is discussed in Section 5.33.5 of the SMP Report No. MSEC326. Generally, fractures are less likely to be observed in exposed bedrock where tensile strain levels are low, typically less than 2 mm/m.

The impact assessments and proposed management strategies for the archaeological sites, based on the five optional modified commencing ends of Longwall 34, are, therefore, the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the archaeological sites, resulting from the five optional modified commencing ends of Longwall 34.

4.10. Survey Control Marks

There is one survey control mark located within the Affected Area, being PM82965. The location of this survey control mark is shown in Drawing No. MSEC386-06.

This survey control marks is located over the tail gate of Longwall 35 and is to be undermined by the *initial* and the five optional modified commencing ends of Longwall 34.

The maximum predicted far-field horizontal movements at the survey control marks in the vicinity of the Affected Area, based on the five optional modified commencing ends of Longwall 34, are similar to or less than those based on the *initial* commencing end of this longwall. The survey control marks affected by the extraction of the Longwall 34 can be re-established, as required, at the completion of mining.

The impact assessments and proposed management strategies for the survey control marks, based on the five optional modified commencing ends of Longwall 34, are the same as those provided in Report No. MSEC326. With these management strategies in place, it is unlikely that there would be any significant impacts on the survey control marks, resulting from the five optional modified commencing ends of Longwall 34.

CHAPTER 5. SUMMARY AND CONCLUSION

The impact assessments and proposed management strategies for the natural features and items of surface infrastructure, based on the five optional modified commencing ends of Longwall 34, are the same as those previously provided in Report No. MSEC326.

The predicted subsidence tilts and strains at Tower 105 on the 330kV Transmission Line are not expected to result in any significant systematic subsidence impacts for a suspension tower, but, because Tower 105 is a tension corner tower, it is recommended that the predicted subsidence, tilt and strain movements at Tower 105 are provided to TransGrid so that the structural integrity of the transmission line can be assessed based on the revised movements.

The proposed subsidence monitoring program at the Upper Canal, Devines Tunnel and associated infrastructure that was detailed in Report No. MSEC326 can be modified to reduce the frequency of surveys since the revised commencing ends of Longwall 34 are positioned further away from this infrastructure. No other changes to the recommended subsidence monitoring program are required as a result of the five optional modified commencing ends of Longwall 34.

With the appropriate management strategies in place, it is unlikely that there would be any significant impacts on the natural features and items of surface infrastructure resulting from the five optional modified commencing ends of Longwall 34.

It is recommended that this report is reviewed by the specialist consultants on the project and that the findings in this report are read in conjunction with the findings from these specialist consultants.

APPENDIX A. FIGURES AND DRAWINGS

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

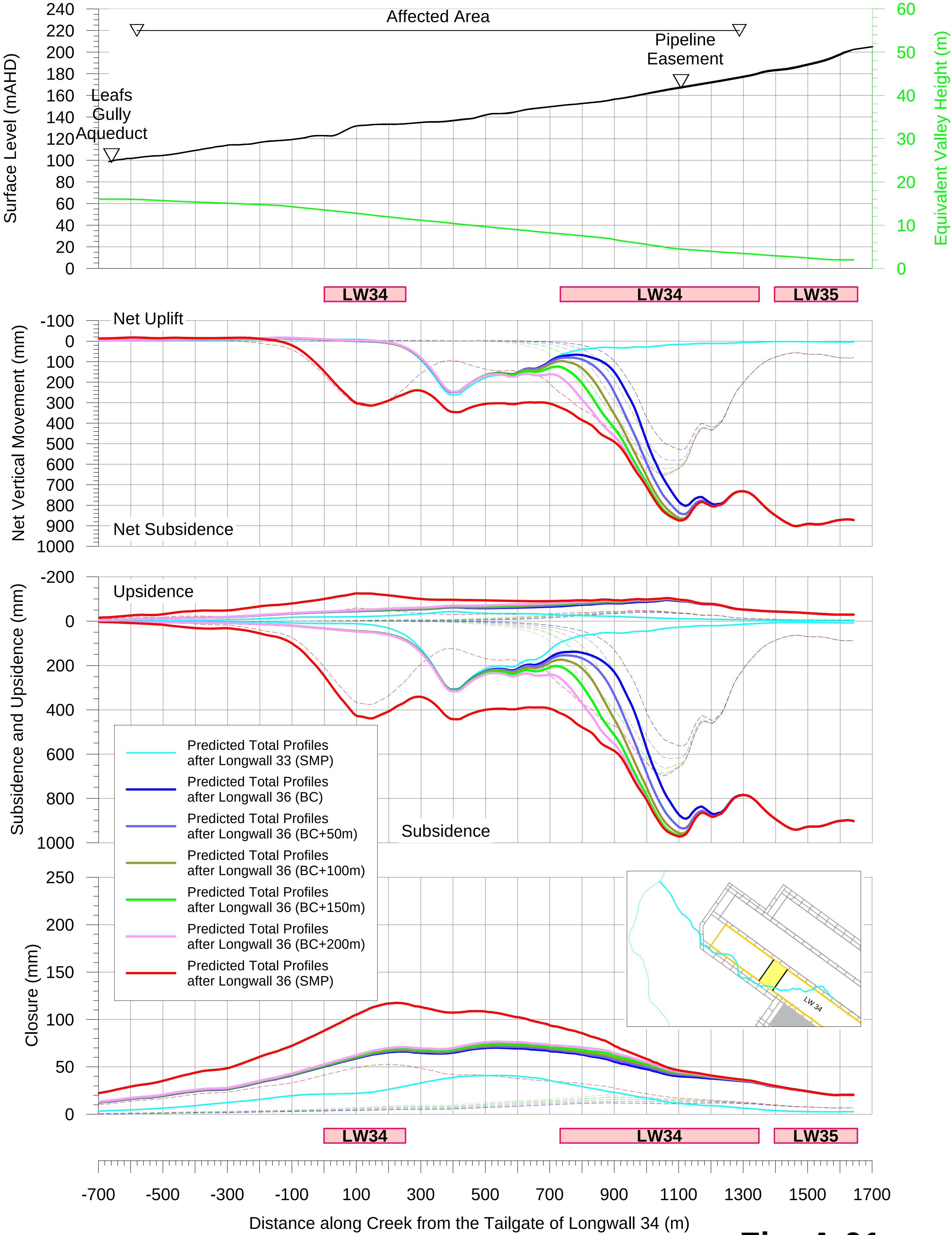

Fig. A.01

Predicted Profiles of Systematic Subsidence, Tilt and Strain along the Pipeline Easement Resulting from the Extraction of Longwalls 29 to 36

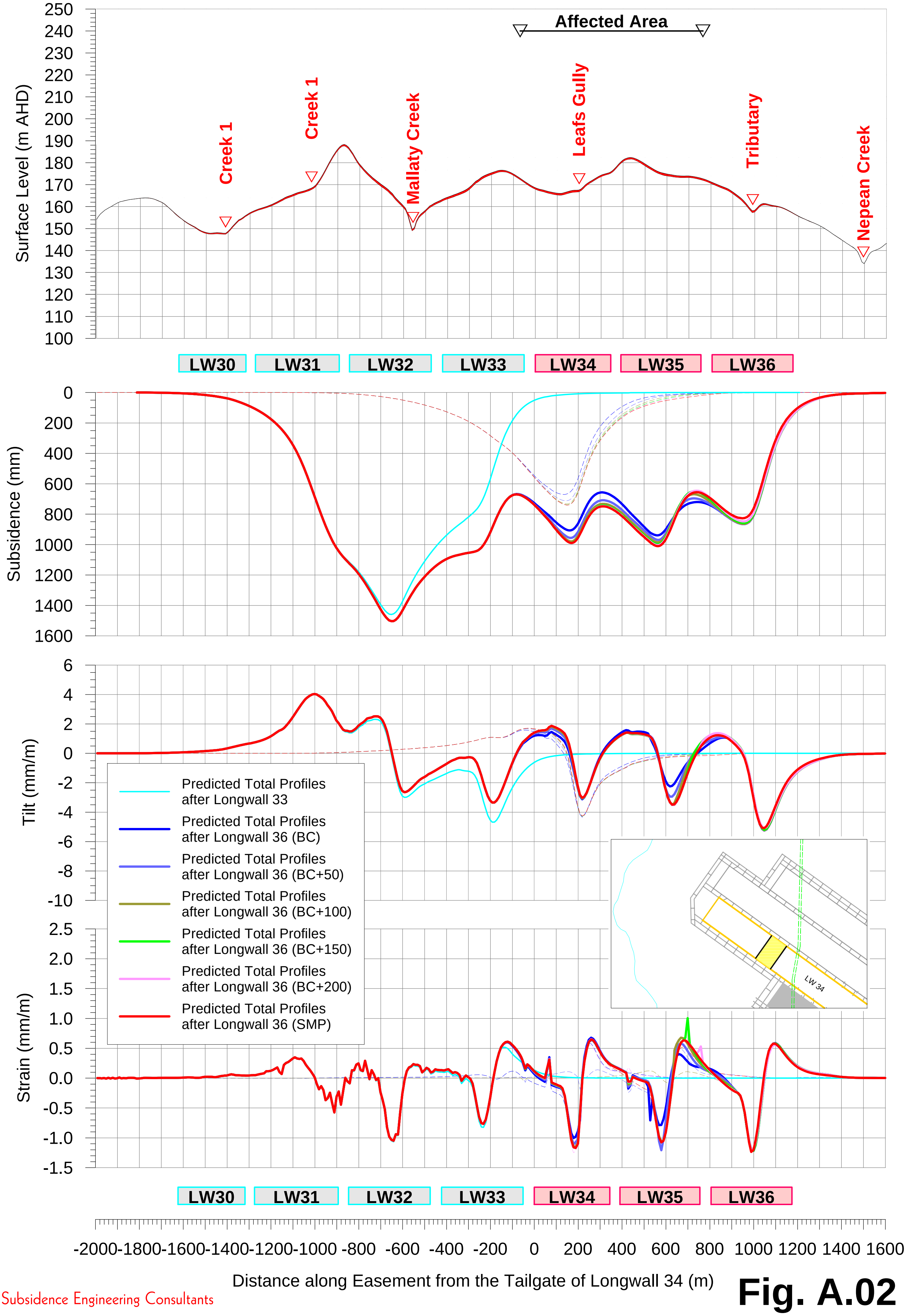

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Fig. A.02

Predicted Profiles of Net Vertical and Horizontal Movements along the Alignment of the Pipeline Easement Resulting from the Extraction of Longwalls 29 to 36

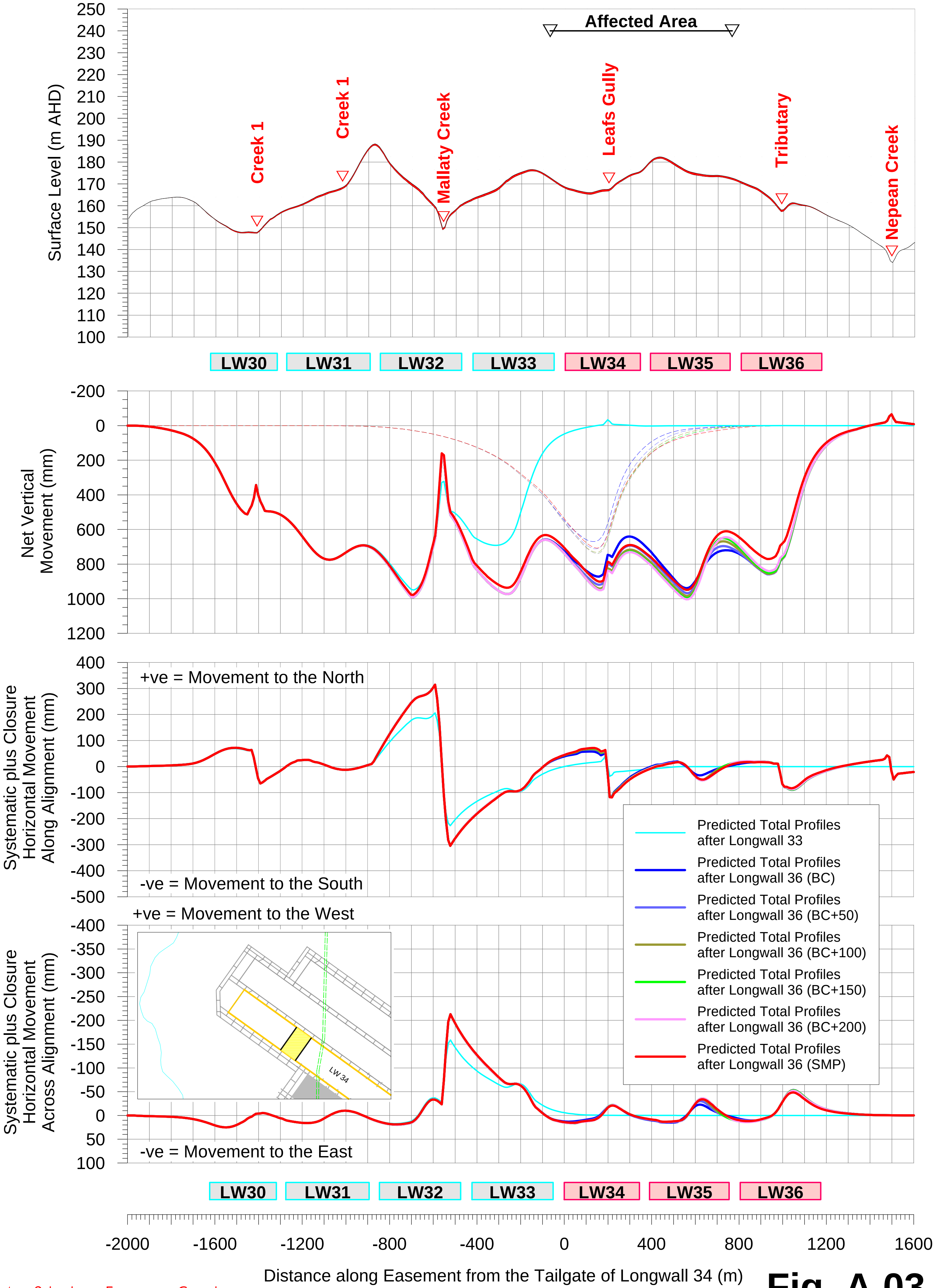

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Fig. A.03

Predicted Profiles of Systematic Subsidence, Tilt Along and Tilt Across the Alignment of the 330 kV Transmission Line due to LW29 to LW36

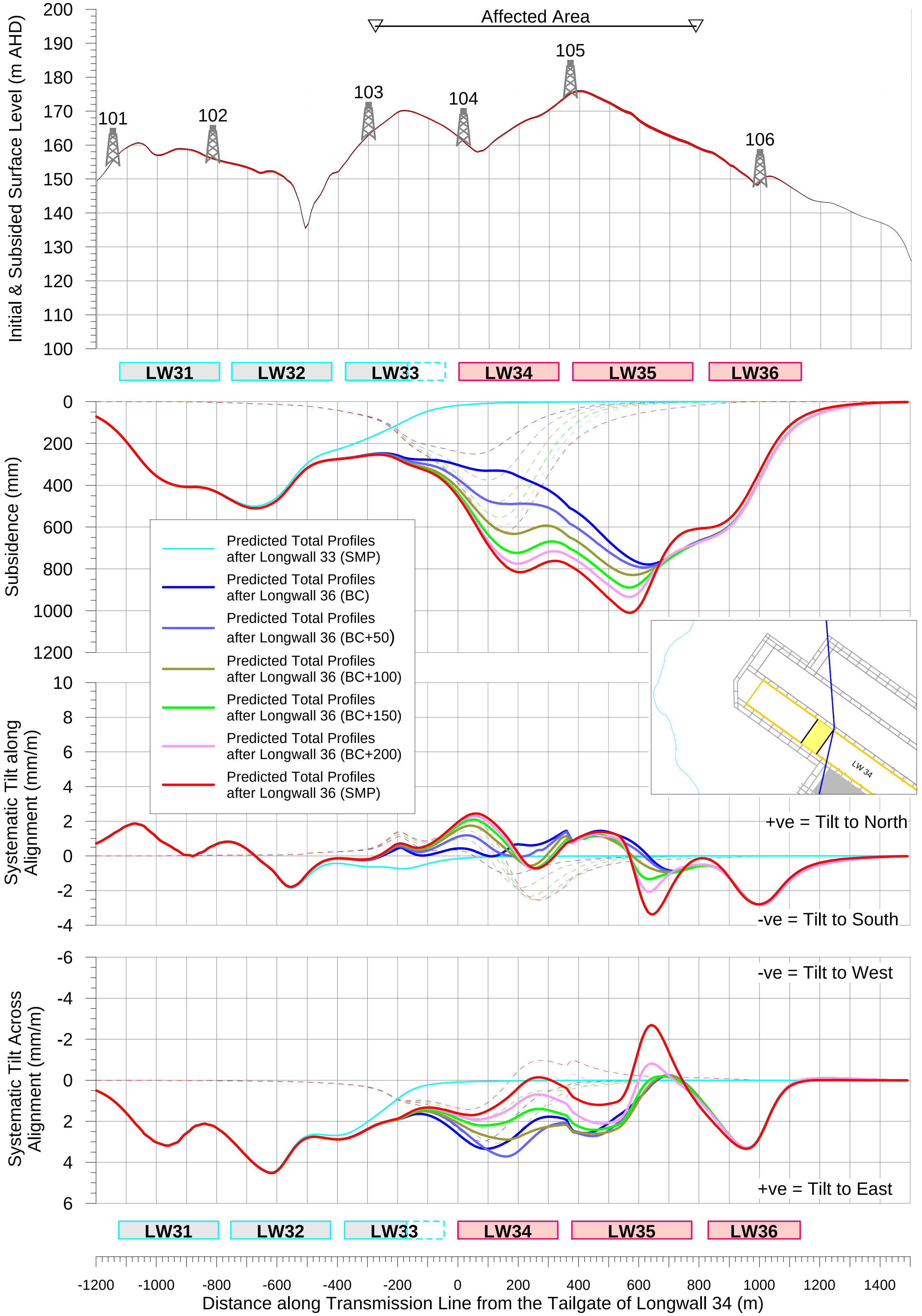

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Fig. A.04

Predicted Profiles of Systematic Subsidence, Tilt and Strain along the 66kV Powerline due to Longwalls 29 to 36

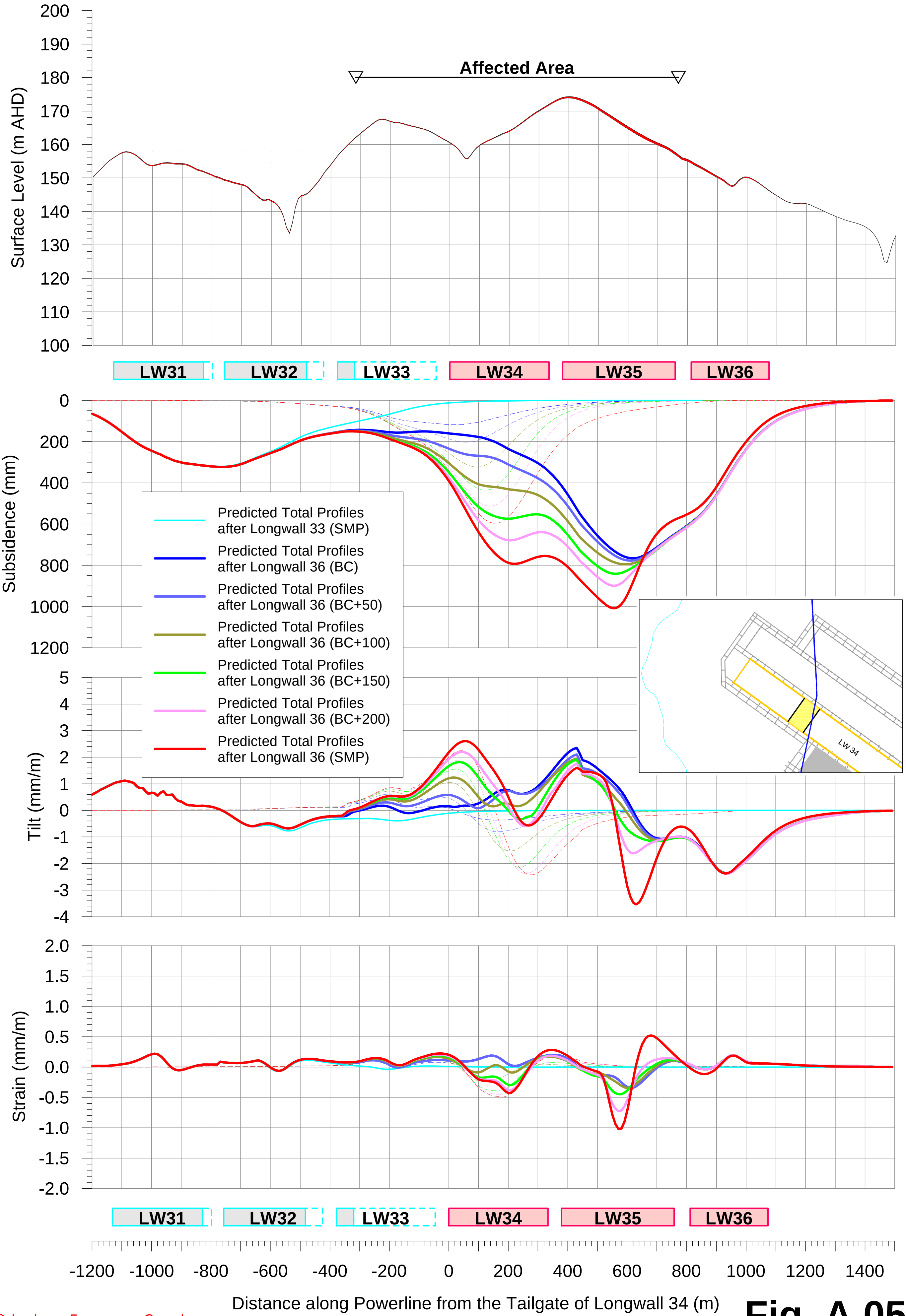

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Fig. A.05

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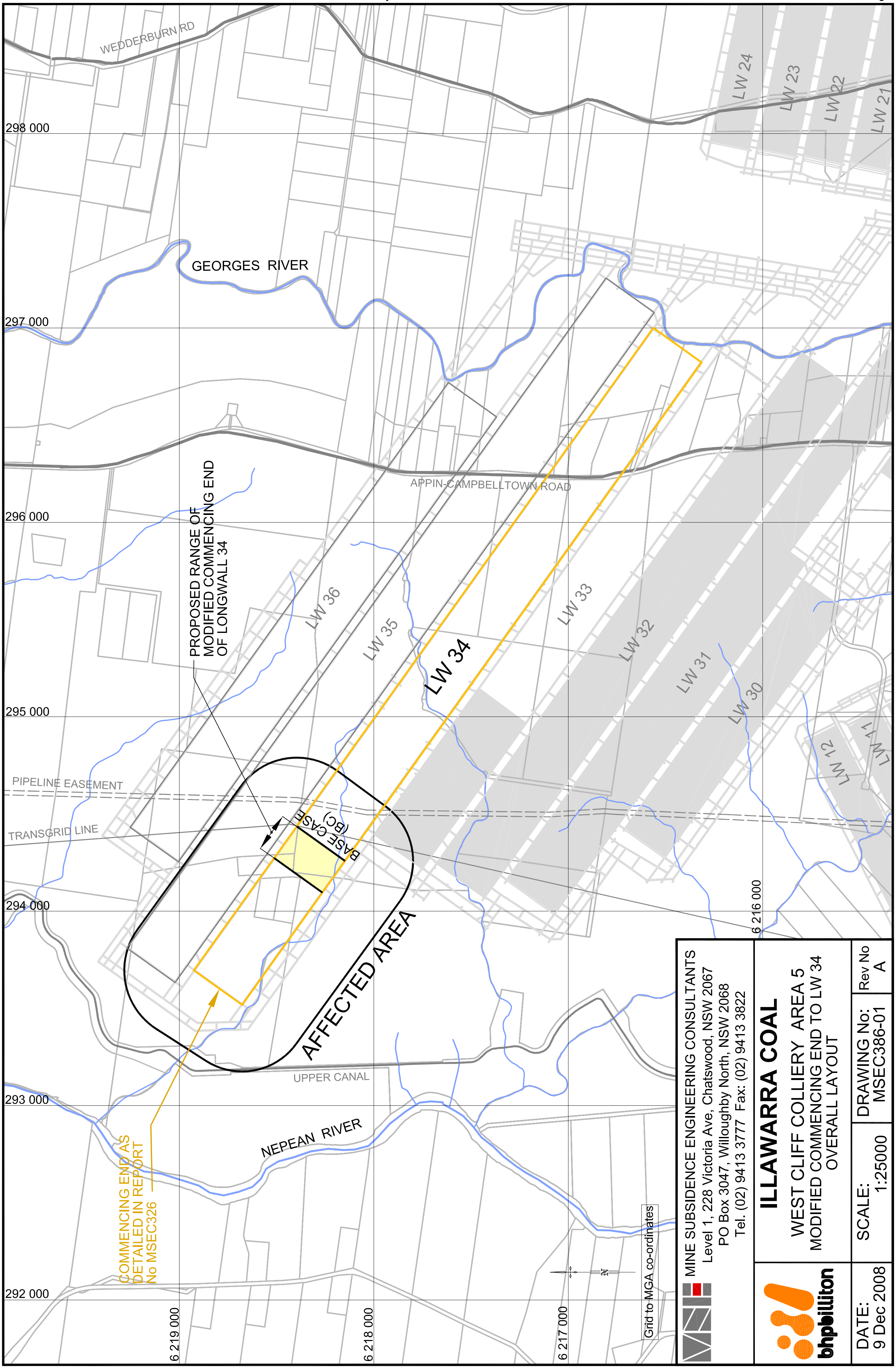

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MODIFIED COMMENCING END TO LW 34 COMPARISON

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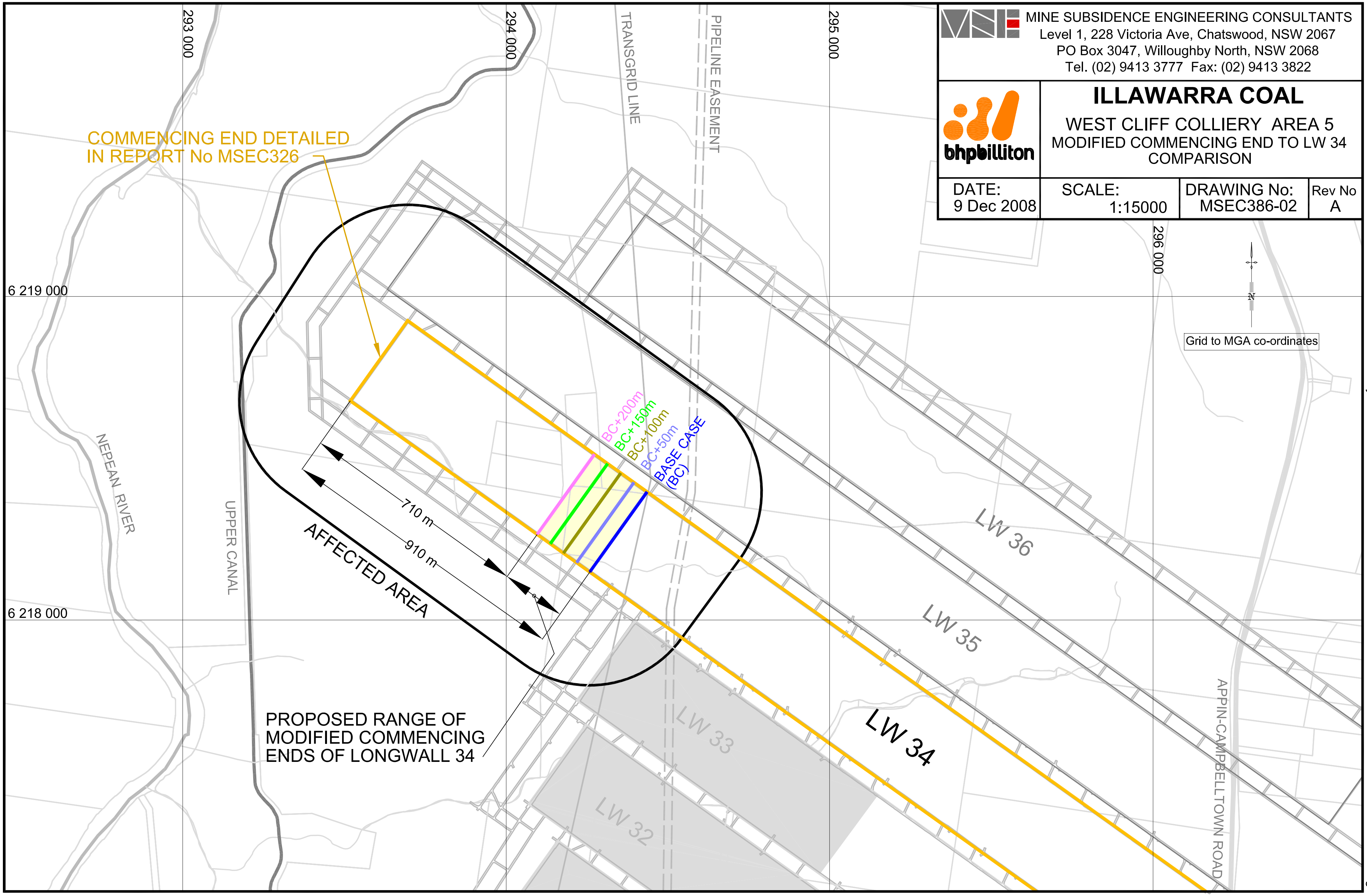

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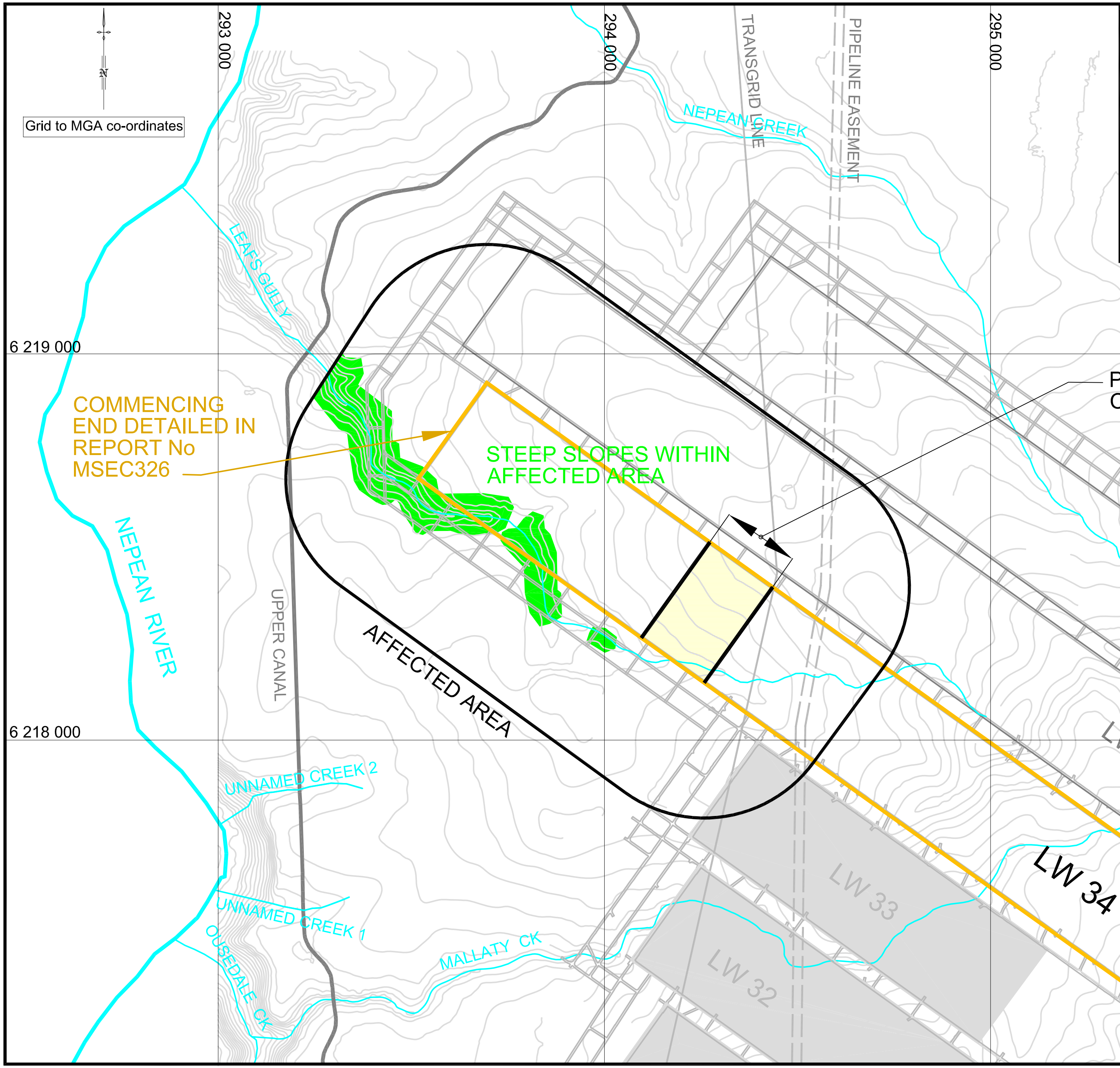

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MODIFIED COMMENCING END TO LW 34
NATURAL FEATURES

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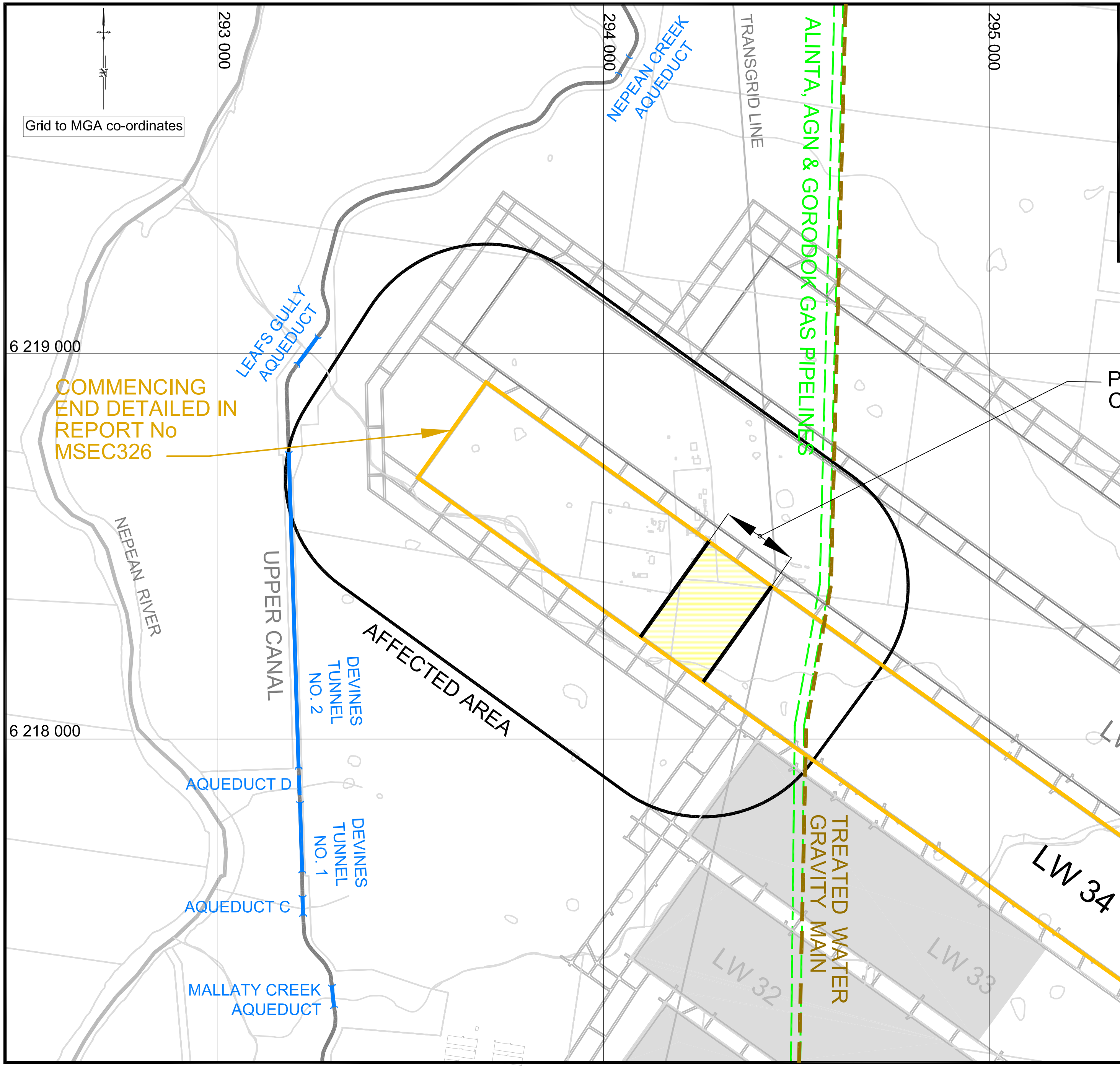

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MODIFIED COMMENCING END TO LW 34
WATER & GAS INFRASTRUCTURE

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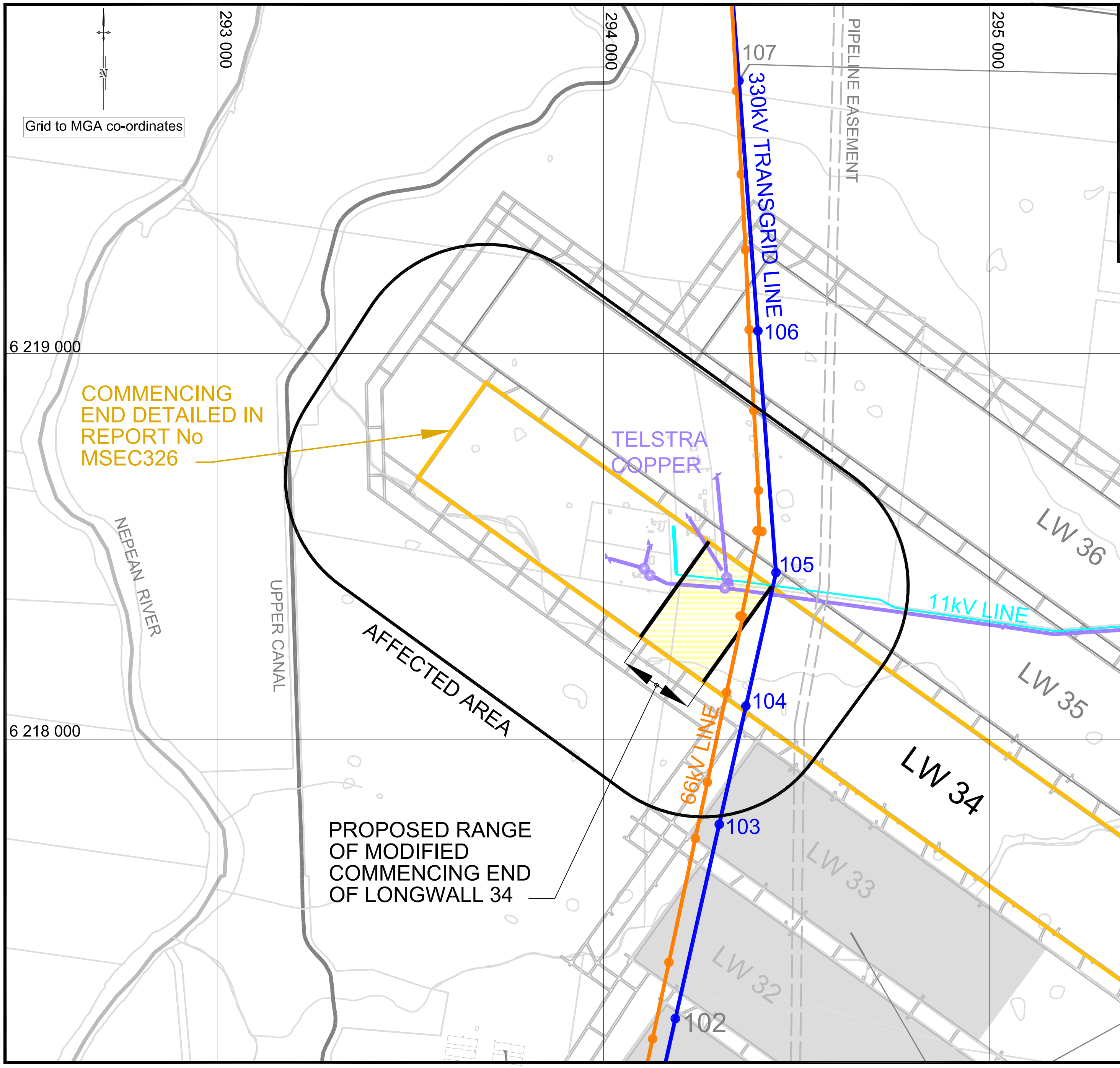

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ELECTRICITY & TELECOMMUNICATIONS INFRASTRUCTURE

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MODIFIED COMMENCING END TO LW 34
BUILDING STRUCTURES, DAMS,
ARCHAEOLOGICAL SITE & SURVEY MARKS

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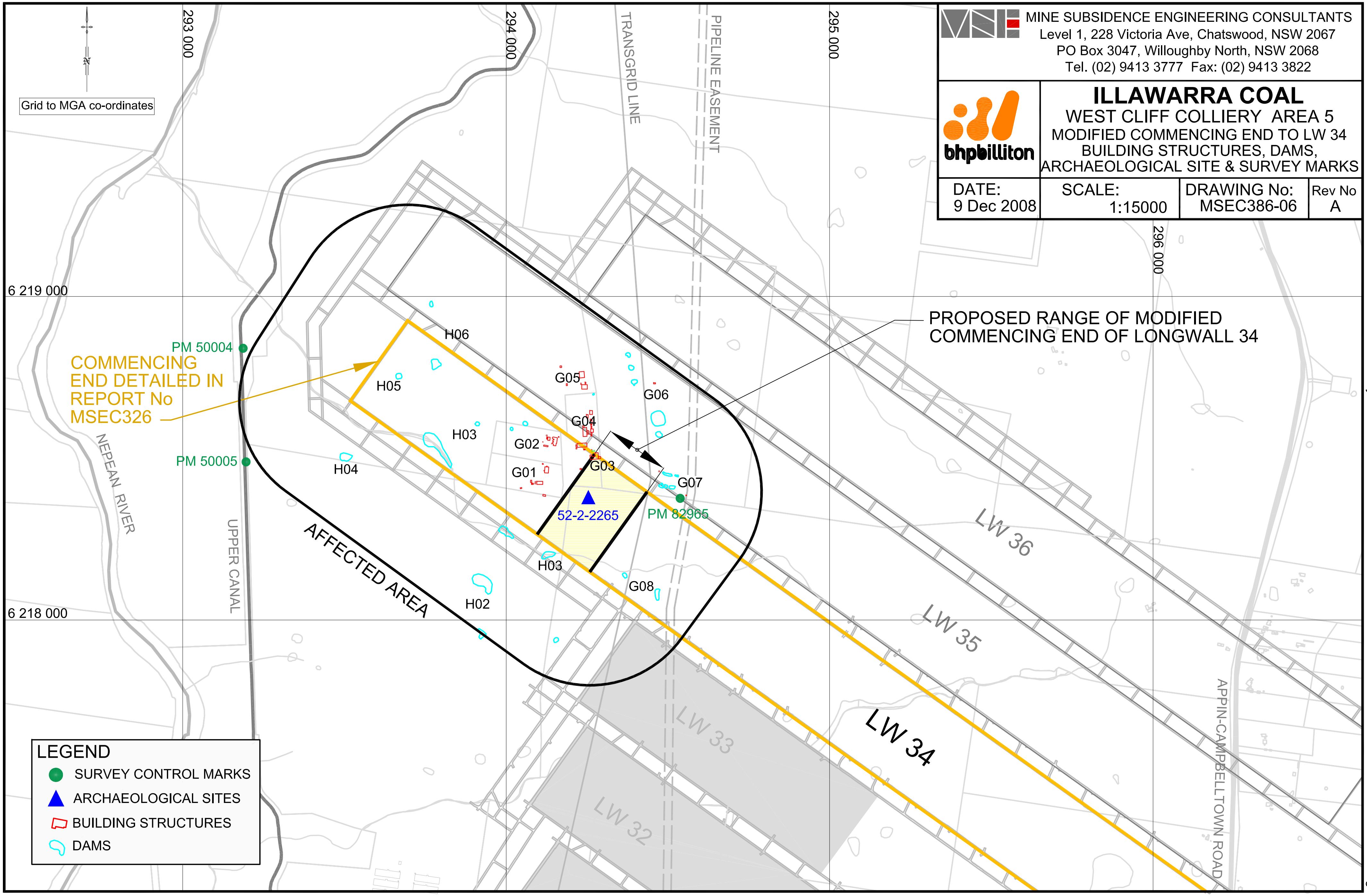

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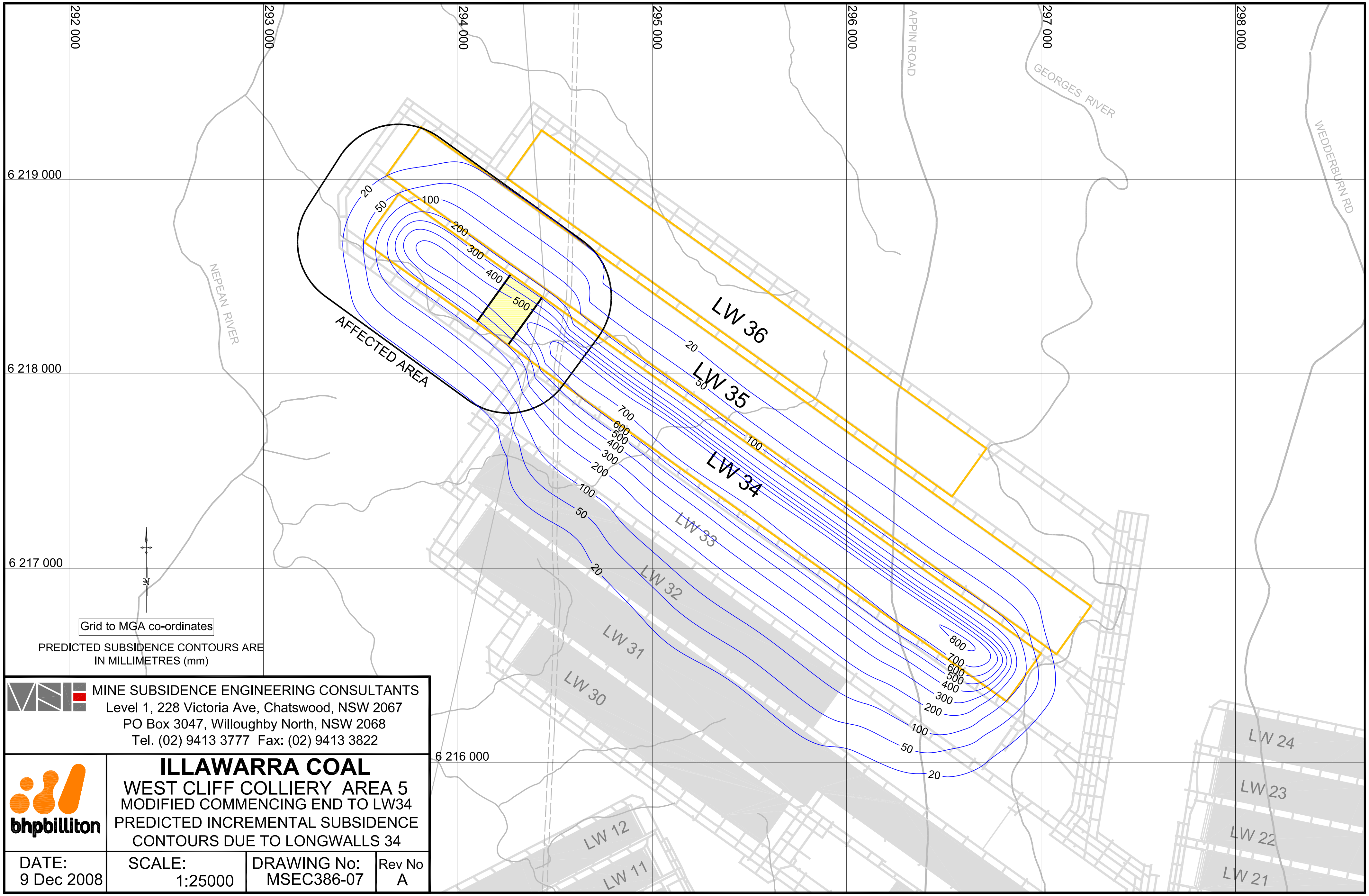

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MODIFIED COMMENCING END TO LW34
PREDICTED INCREMENTAL SUBSIDENCE CONTOURS DUE TO LONGWALLS 34

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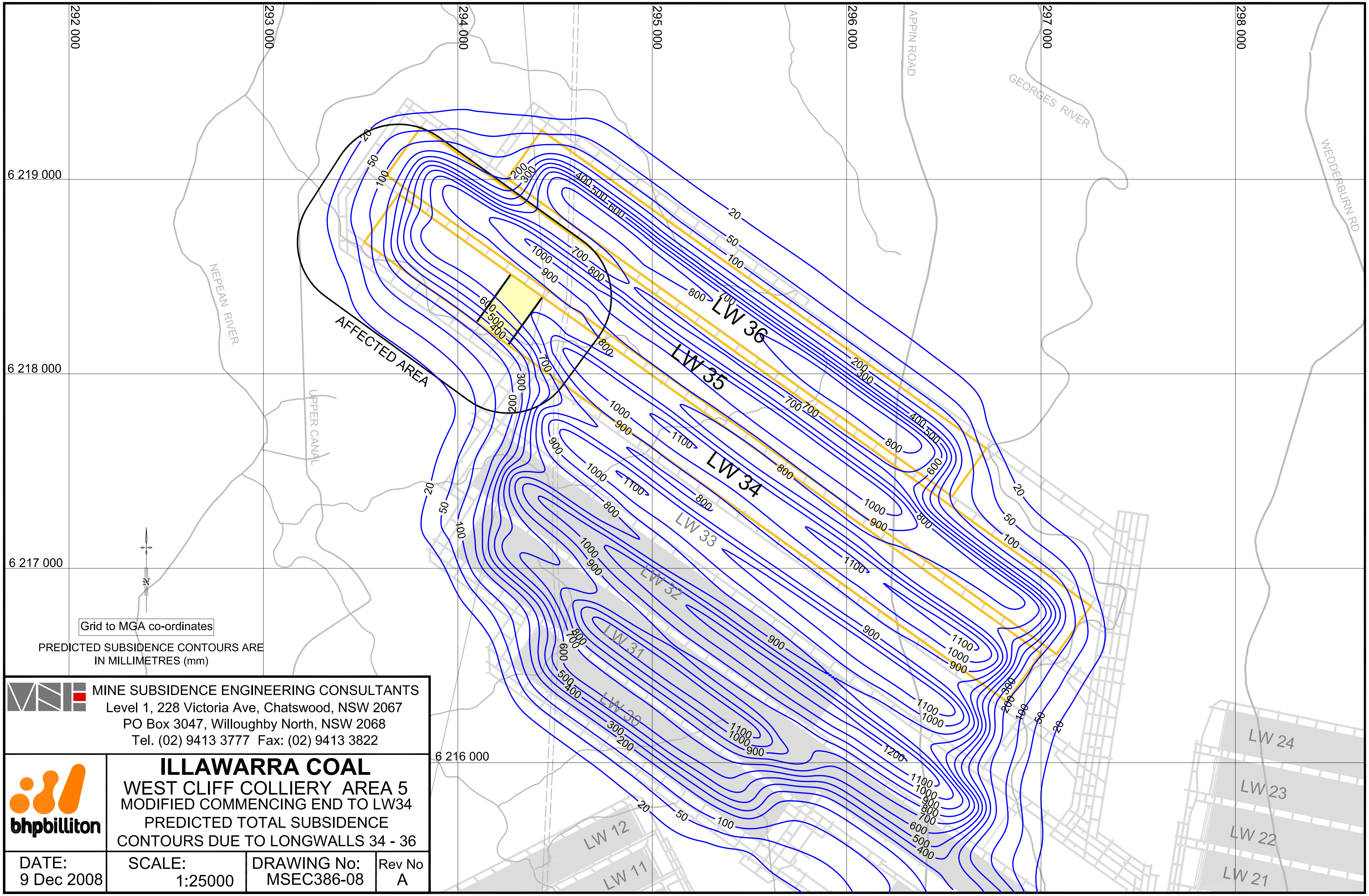

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MODIFIED COMMENCING END TO LW34
PREDICTED TOTAL SUBSIDENCE
CONTOURS DUE TO LONGWALLS 34 - 36

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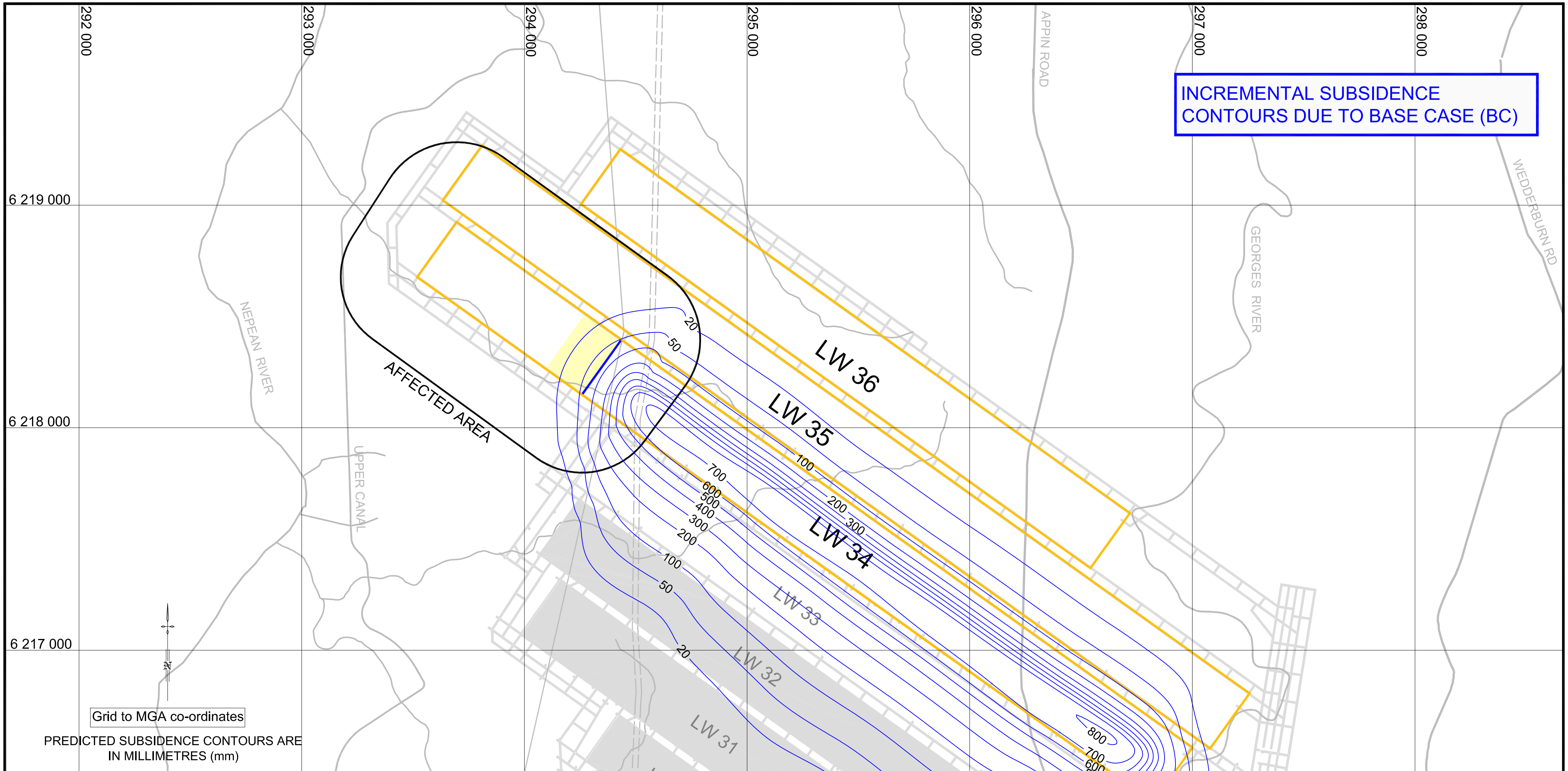

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MODIFIED COMMENCING END TO LW34
PREDICTED INCREMENTAL SUBSIDENCE
CONTOURS DUE TO BC

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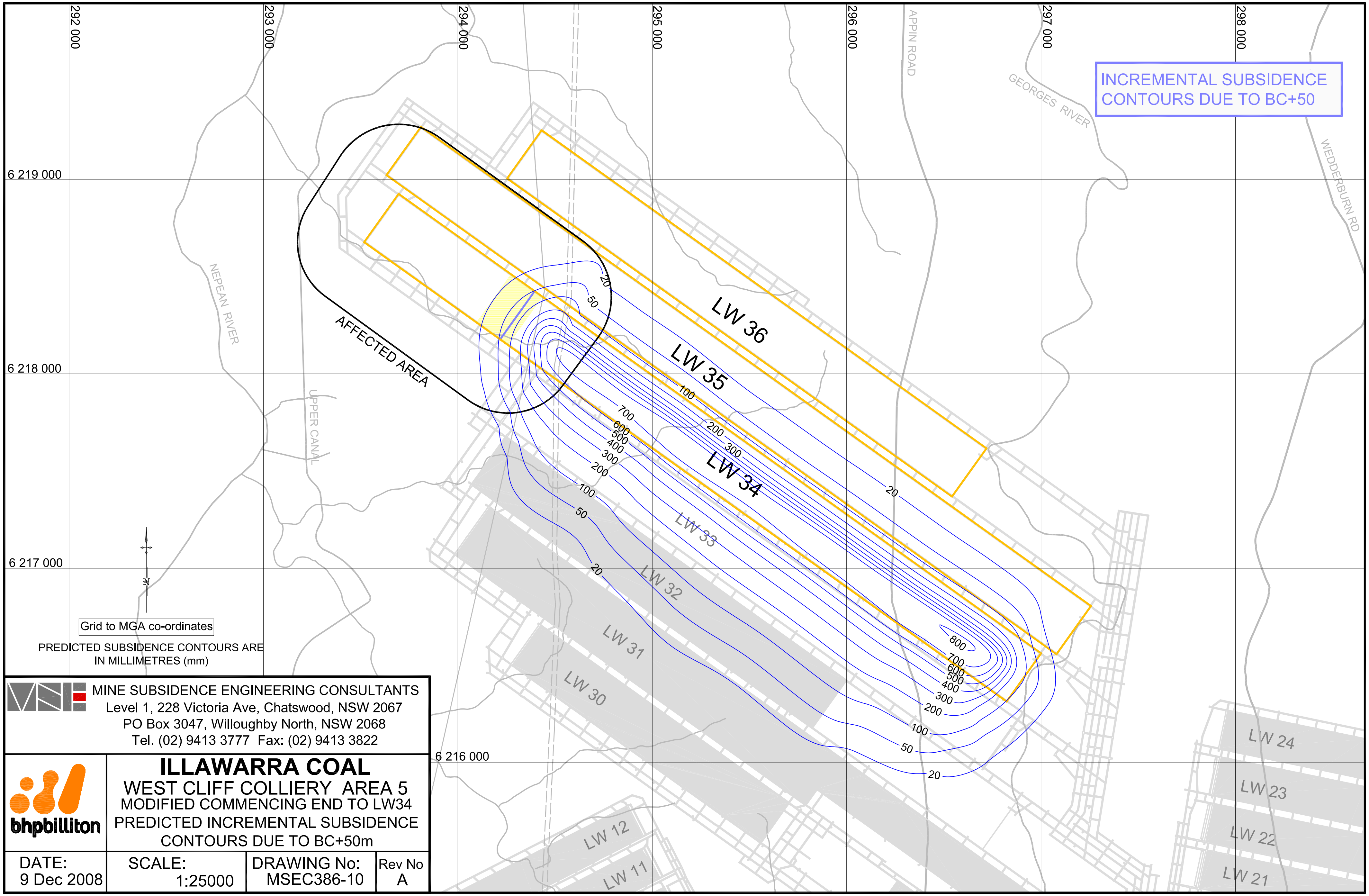

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MODIFIED COMMENCING END TO LW34
PREDICTED INCREMENTAL SUBSIDENCE CONTOURS DUE TO BC+50m

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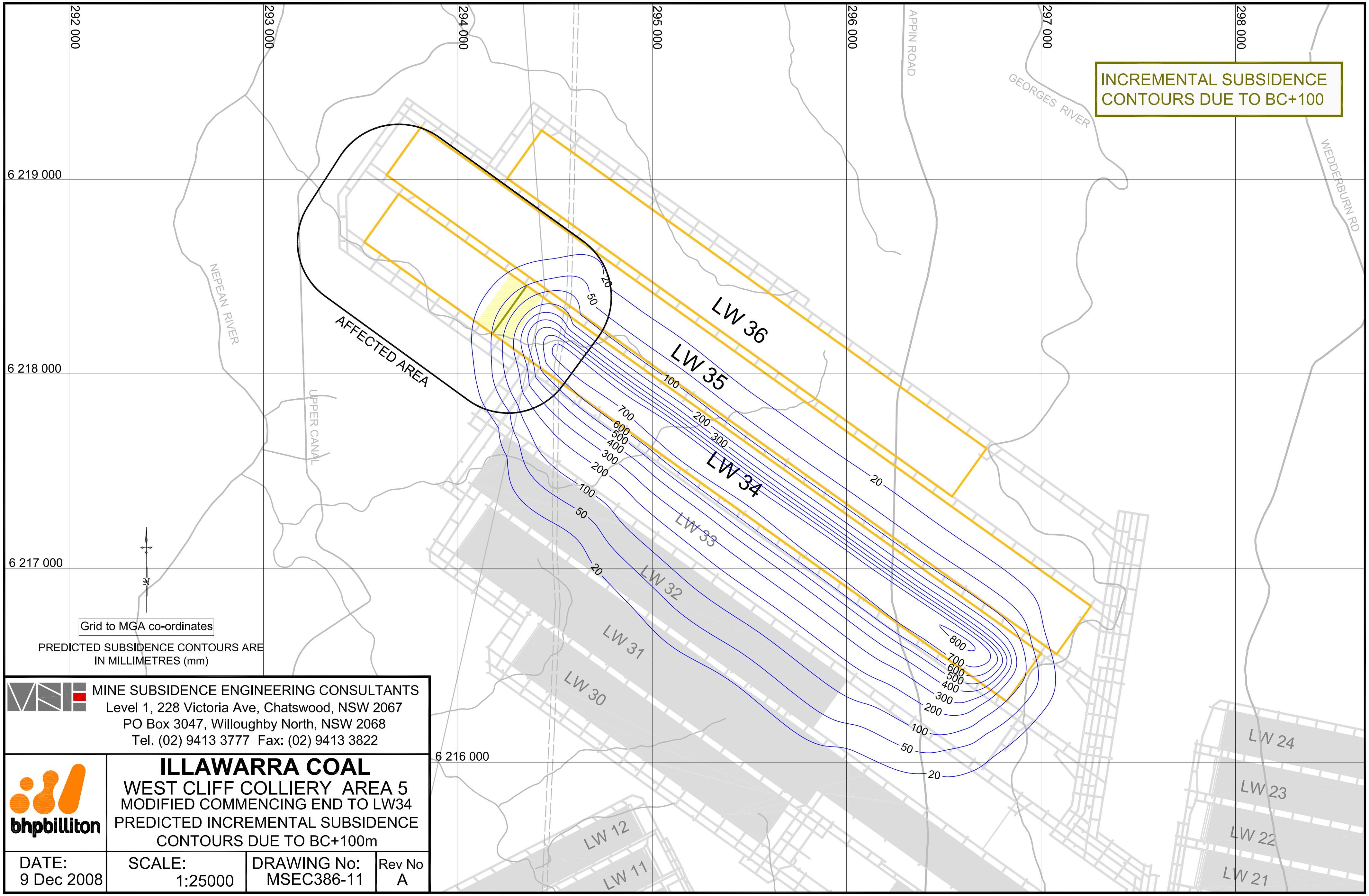

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MODIFIED COMMENCING END TO LW34
PREDICTED INCREMENTAL SUBSIDENCE
CONTOURS DUE TO BC+100m

DATE:	SCALE:	DRAWING No:	Rev No
9 Dec 2008	1:25000	MSEC386-11	A

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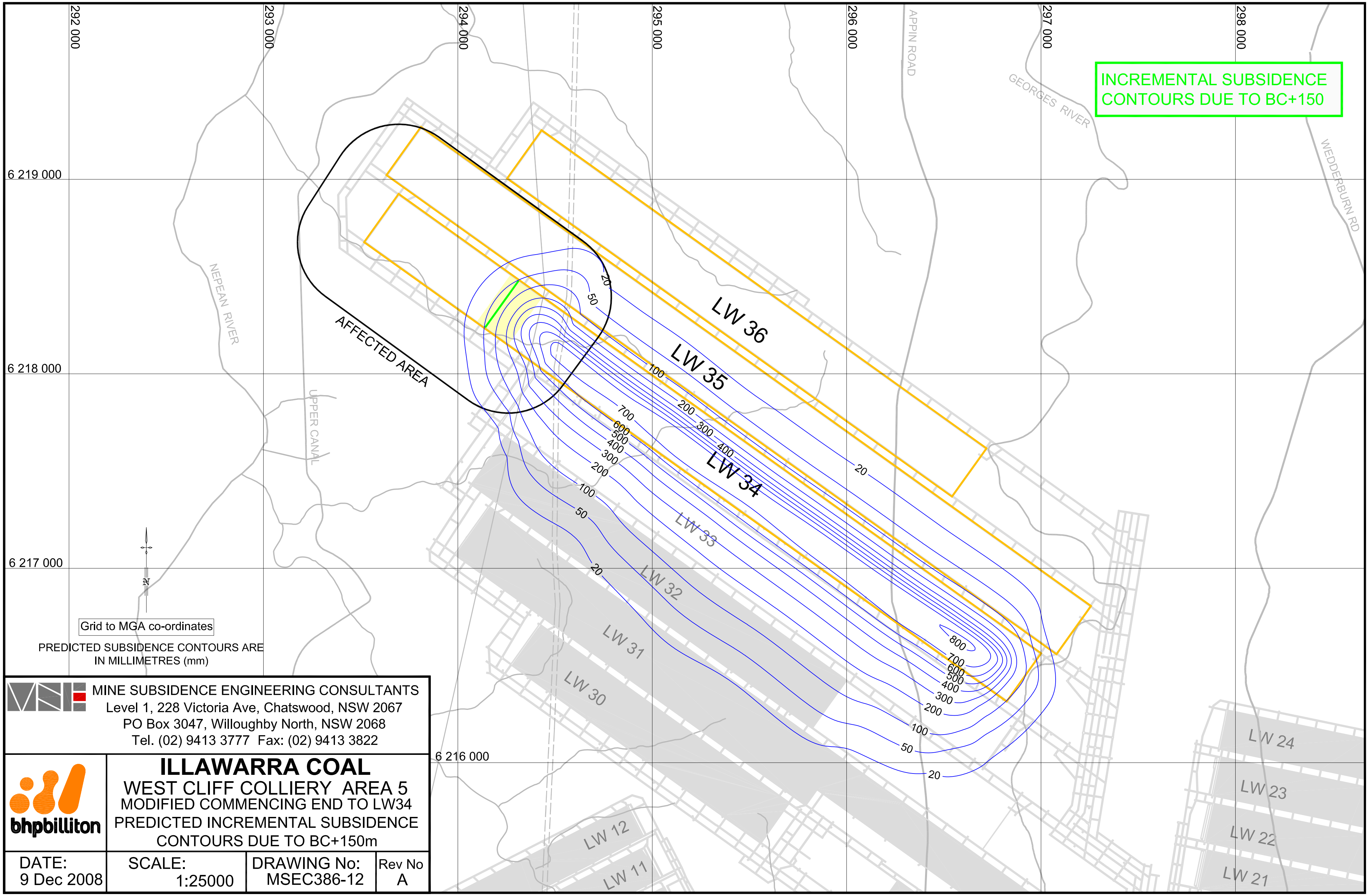
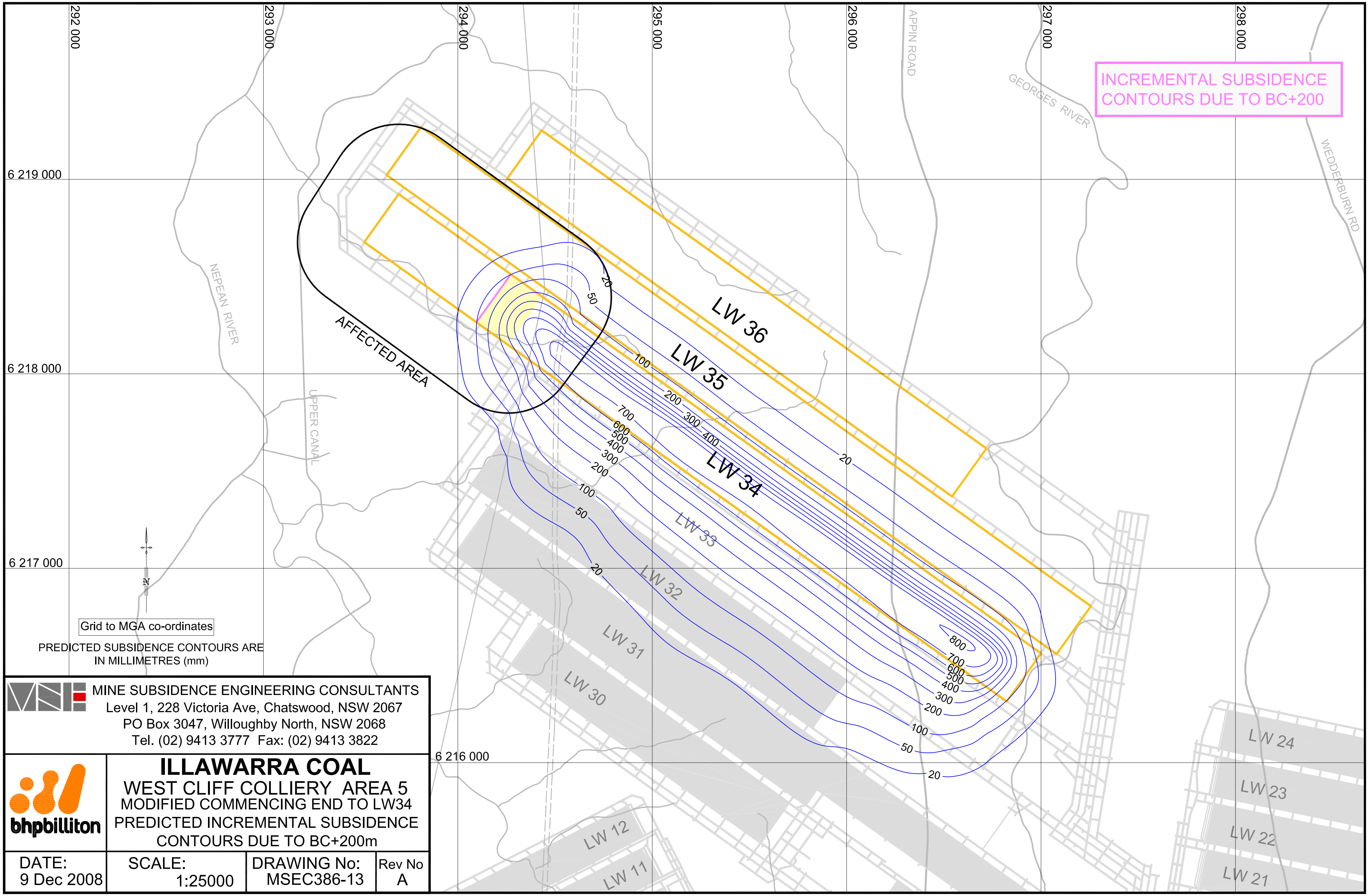


MINE SUBSIDENCE ENGINEERING CONSULTANTS
Level 1, 228 Victoria Ave, Chatswood, NSW 2067
PO Box 3047, Willoughby North, NSW 2068
Tel. (02) 9413 3777 Fax: (02) 9413 3822

ILLAWARRA COAL
WEST CLIFF COLLIERY AREA 5
MODIFIED COMMENCING END TO LW34
PREDICTED INCREMENTAL SUBSIDENCE
CONTOURS DUE TO BC+150m

DATE:	SCALE:	DRAWING No:	Rev No
9 Dec 2008	1:25000	MSEC386-12	A


INCREMENTAL SUBSIDENCE
CONTOURS DUE TO BC+200
292 000
293 000
294 000
295 000
296 000
297 000
298 000
6 219 000
6 218 000
6 217 000
6 216 000
APPIN ROAD
GEORGES RIVER
WEDDERBURN RD
NEPEAN RIVER
UPPER CANAL
AFFECTED AREA
LW 36
LW 35
LW 34
LW 33
LW 32
LW 31
LW 30
LW 12
LW 11
LW 24
LW 23
LW 22
LW 21
20
50
100
200
300
400
500
600
700
800
N
Grid to MGA co-ordinates
PREDICTED SUBSIDENCE CONTOURS ARE IN MILLIMETRES (mm)
MINE SUBSIDENCE ENGINEERING CONSULTANTS
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PO Box 3047, Willoughby North, NSW 2068
Tel. (02) 9413 3777 Fax: (02) 9413 3822
ILLAWARRA COAL
WEST CLIFF COLLIERY AREA 5
MODIFIED COMMENCING END TO LW34
PREDICTED INCREMENTAL SUBSIDENCE CONTOURS DUE TO BC+200m
DATE: 9 Dec 2008
SCALE: 1:25000
DRAWING No: MSEC386-13
Rev No A
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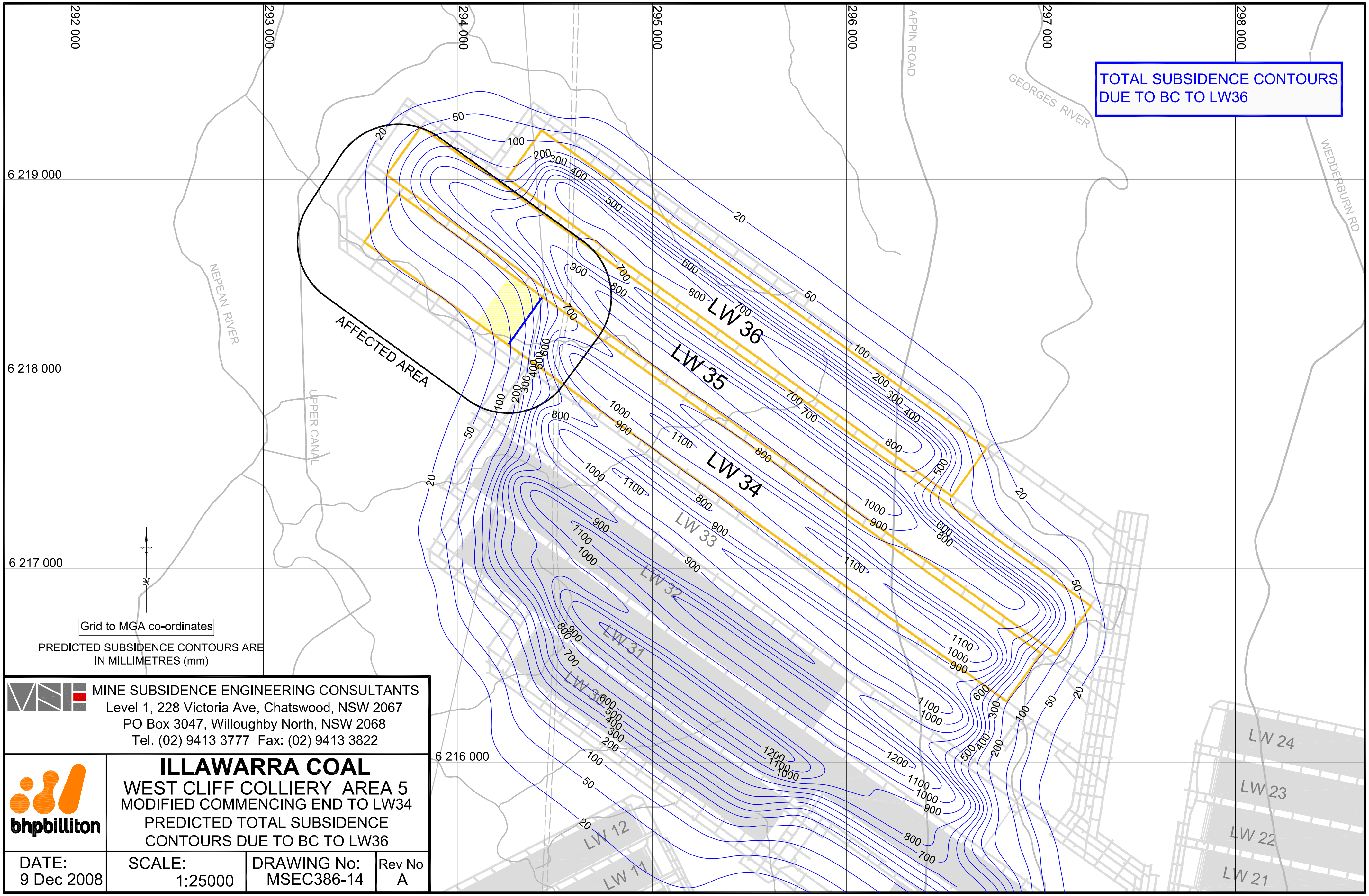

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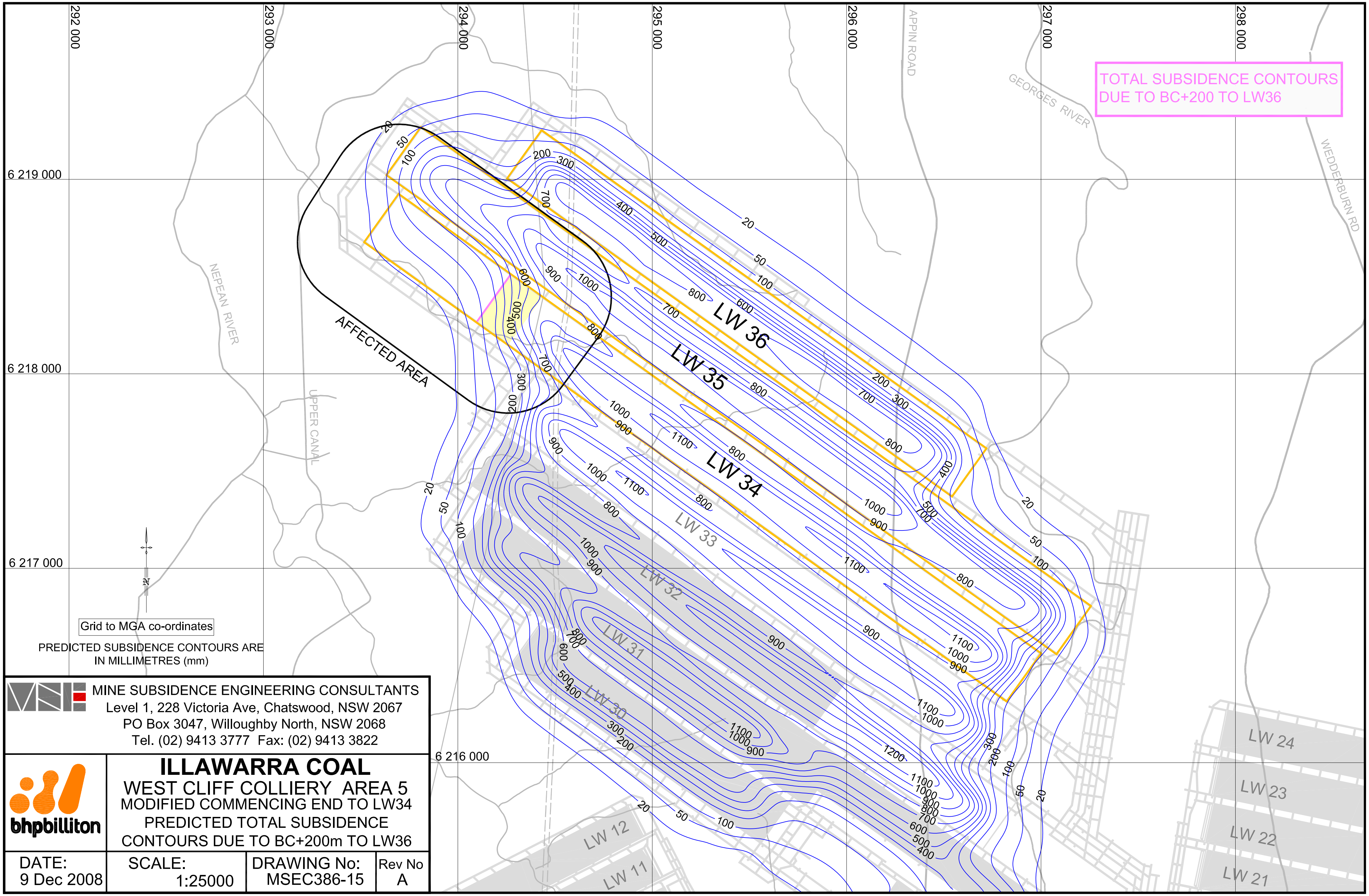
ILLAWARRA COAL
WEST CLIFF COLLIERY AREA 5
MODIFIED COMMENCING END TO LW34
PREDICTED TOTAL SUBSIDENCE
CONTOURS DUE TO BC TO LW36

DATE:	SCALE:	DRAWING No:	Rev No
9 Dec 2008	1:25000	MSEC386-14	A



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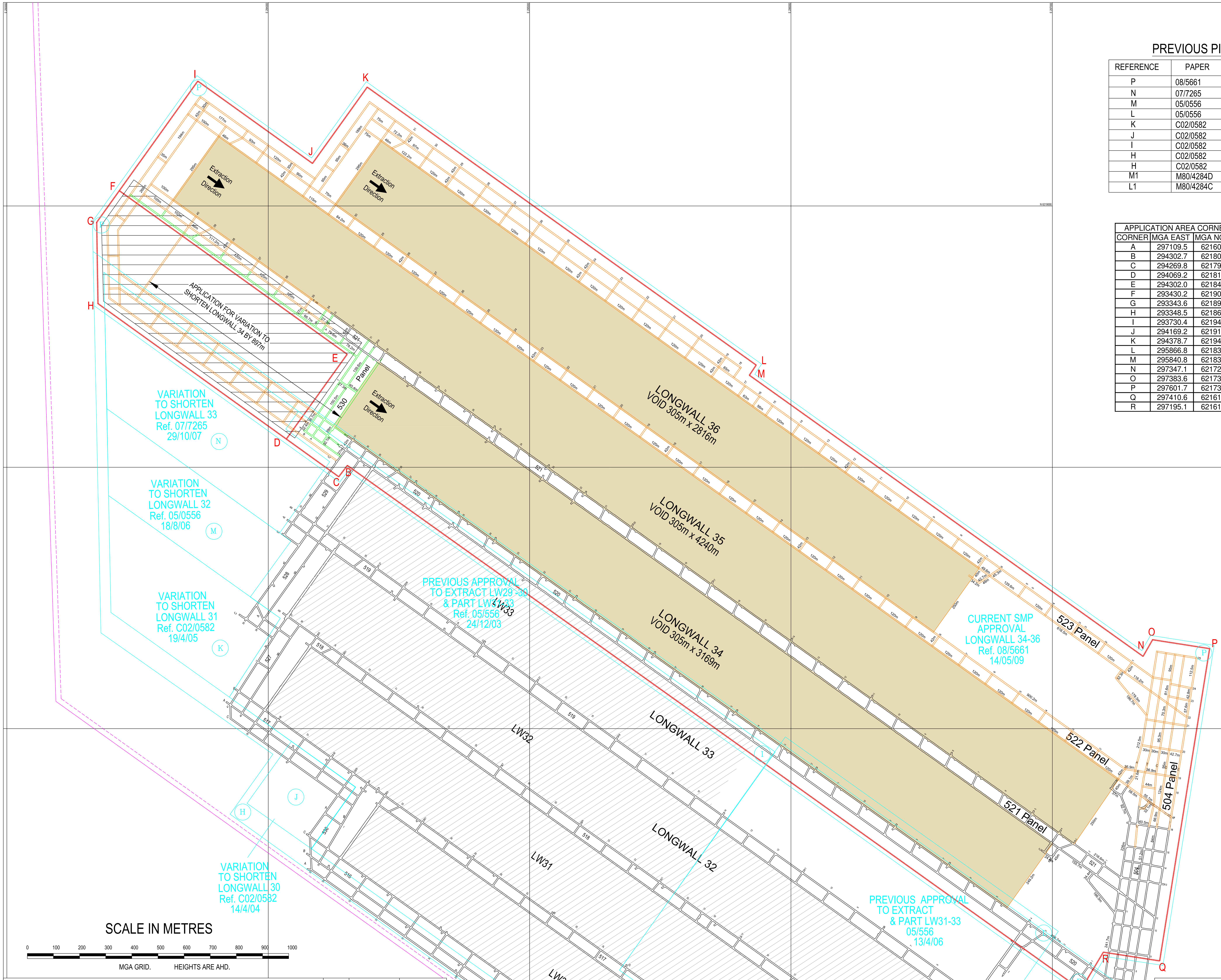
bhpbilliton

ILLAWARRA COAL
WEST CLIFF COLLIERY AREA 5
MODIFIED COMMENCING END TO LW34
PREDICTED TOTAL SUBSIDENCE
CONTOURS DUE TO BC+200m TO LW36

DATE:	SCALE:	DRAWING No:	Rev No
9 Dec 2008	1:25000	MSEC386-15	A



PREVIOUS PILLAR EXTRACTION APPROVALS

REFERENCE	PAPER	DATE	APPLICATION
P	08/5661	14/05/09	SMP APPLICATION LW 34-36
N	07/7265	29/10/07	L.W. 33 VARIATION (SHORTENING)
M	05/0556	18/08/06	L.W. 32 VARIATION (SHORTENING)
L	05/0556	13/04/06	PART L.W. 31-33 EXTRACTION
K	C02/0582	19/04/05	L.W. 31 VARIATION (SHORTENING)
J	C02/0582	14/04/04	L.W. 30 VARIATION (SHORTENING)
I	C02/0582	24/12/03	L.W. 29-30 & PART LW31-33
H	C02/0582	17/06/03	L.W. 29-33 (NAME CHANGE)Revoked
H	C02/0582	22/11/02	L.W. 5A5-5A8 (29-33) EXTRACTION
M1	M80/4284D	20/03/98	L.W. 24 EXTRACTION
L1	M80/4284C	29/11/95	L.W. 22 & 23 EXTRACTION

APPLICATION AREA CORNERS		
CORNER	MGA EAST	MGA NORTH
A	297109.5	6216001.3
B	294302.7	6218007.2
C	294269.8	6217963.9
D	294069.2	6218108.2
E	294302.0	6218432.6
F	293430.2	6219058.5
G	293343.6	6218937.6
H	293348.5	6218626.4
I	293730.4	6219477.9
J	294169.2	6219163.0
K	294378.7	6219454.9
L	295866.8	6218391.3
M	295840.8	6218352.3
N	297347.1	6217276.6
O	297383.6	6217340.2
P	297601.7	6217306.1
Q	297410.6	6216111.2
R	297195.1	6216144.6

LEGEND

- EXISTING WORKINGS
- APPROVED PROPOSED FIRST WORKINGS
- VARIATION TO APPROVED PROPOSED FIRST WORKINGS
- EXTENT OF WORKINGS
- PROPOSED EXTRACTION
- PREVIOUS EXTRACTION APPROVALS
- COLLIERY HOLDING BOUNDARY
- COLLIERY HOLDING BARRIER

I hereby certify the accuracy of the plan.

.... Registered Mining Surveyor Date

I hereby accept the information on the plan.

.... Operations Manager Date

West Cliff Colliery

BHPBilliton Endeavour Coal Pty Ltd
PO Box 514 Unanderra NSW 2526 Australia
ABN 38 099 830 476

	Name	Date
DRN	J.F.Coll	15/05/09
REV		
APP		
SCALE	A0	1 : 5 000

Title: Application For Subsidence Management Plan Variation
Longwall 34 to Longwall 36
Approved Plan

DRAWING NUMBER AS-2221 REV 0

West Cliff Colliery

BHPBilliton Endeavour Coal Pty Ltd
PO Box 514 Unanderra NSW 2526 Australia
ABN 38 099 830 476

	Name	Date
DRN	J.F.Coll	15/05/09
REV		
APP		
SCALE	A0	1 : 5 000

Title: Application For Subsidence Management Plan Variation
Longwall 34 to Longwall 36
Plan 2 - Surface Features

DRAWING NUMBER: AS-2222

REV: 0