ILLAWARRA COAL HOLDINGS:

Appin Mine – Longwalls 712 to LW716

The effects of the proposed modified LW712 to LW716
on previous subsidence predictions and impact assessments

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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)

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

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1.1. Background

Illawarra Coal Holdings Pty Limited (ICHPL), a wholly owned subsidiary of Gear M Illawarra Met Coal Pty Ltd (trading as GM[3]), operates Appin Mine (the Mine), which is located in the Southern Coalfield of New South Wales (NSW). The Mine is situated north of Douglas Park and south-west of Menangle.

ICHPL has completed the mining of Longwalls 701 to 711A (LW701 to LW711A) and is currently mining Longwall 711B (LW711B) in Area 7. ICHPL has also completed the mining of Longwalls 901 to 905 (LW901 to LW905) in Area 9 at Appin Mine.

Mine Subsidence Engineering Consultants (MSEC) was previously commissioned by ICHPL to prepare subsidence predictions and impact assessments for LW712 to LW716 in Area 7 at Appin Mine. Report No. MSEC1459 (Rev. A) was issued in July 2025 in support of the Extraction Plan Application for these longwalls. The Department of Planning, Housing and Infrastructure (DPHI) approved the Extraction Plan Application on 6 August 2026.

The longwall layout in Area 7 that includes LW712 to LW716 as adopted in the Extraction Plan Application and Report No. MSEC1459 is referred to as the *Previous Layout* in this report.

ICHPL now proposes to modify LW712 to LW716 by:

- separating LW712 into two shorter longwalls, referred to as LW712A and LW712B, and leave a coal block between them;
- shorten the commencing (i.e. western) ends of LW713 to LW716 by 1485 m, 1120 m, 910 m and 910 m, respectively, from their previous extents.

The proposed modifications are to avoid high depths of cover in the western part of Area 7 that have been implicated in sandstone outbursts in first working development drivage. These modifications result in a reduction in coal recovery of approximately 10 Mt ROM (i.e. from 36.6 Mt to 26.5 Mt).

The longwall layout in Area 7 that includes the proposed modified LW712 to LW716 is referred to as the *Modified Layout* in this report. This subsidence report has been prepared to support the proposed modification of the Extraction Plan which will be submitted to the DPHI.

1.2. Mining geometry

The locations of the longwalls in Areas 7 and 9 are shown in Drawing No. MSEC1553-01 in Appendix C. The layout of LW712 to LW716 based on the Previous Layout is shown by the magenta lines and the layout of these longwalls based on the Modified Layout is shown by the orange lines in this drawing.

A summary of the dimensions for LW712 to LW716 based on the Previous Layout and Modified Layout is provided in Table 1.1.

Table 1.1 Dimensions of LW712 to LW716 based the Previous Layout and Modified Layout

Layout (Report No.)	Longwall	Overall void length including installation heading (m)	Overall void width including first workings (m)	Overall tailgate chain pillar width (m)
Previous Layout (MSEC1459)	LW712	4195	324	51
	LW713	4030	324	51
	LW714	4030	324	52
	LW715	4110	324	52
	LW716	4195	324	53
Modified Layout (MSEC1553)	LW712A	1245	324	51
	LW712B	2570	324	51
	LW713	2545	324	51
	LW714	2910	324	52
	LW715	3200	324	52
	LW716	3285	324	53

The proposed modification of LW712 will leave a 375 m long coal block between LW712A and LW712B. The main headings will be developed through this coal block. The commencing (i.e. western) ends of LW713 to LW716 are proposed to be shorted by distances varying between 910 m and 1485 m. The main headings will continue along the western sides of these longwalls.

The lengths of longwall extraction excluding the installation headings are approximately 9 m less than shown in Table 1.1. The longwall face widths excluding the first workings (i.e. secondary extraction) for LW712 to LW716 are 315 m based on the Previous Layout and the Modified Layout, i.e. the longwall void widths do not change. Similarly, the solid chain pillar widths for these longwalls do not change.

The longwalls are proposed to be mined in order of LW712B, LW712A and then LW713 to LW716. These longwalls will be mined within the Bulli Seam from the west towards the east.

A summary of the forecast mining schedule based on the Modified Layout is provided in Table 1.2.

Table 1.2 Forecast mining schedule for LW712 to LW716 based the Modified Layout

Longwall	Forecast start date	Forecast completion date
LW712B	March 2027	February 2028
LW712A	March 2028	August 2028
LW713	September 2028	August 2029
LW714	September 2029	September 2030
LW715	September 2030	October 2031
LW716	November 2031	December 2032

The above schedule is subject to change based on the actual rates of longwall retreat.

1.3. Surface and seam

The surface and seam levels across the previous western ends of LW712 to LW716 (i.e. to the west of the modified ends of LW713 to LW716) and along the centrelines of LW712 and LW714 are shown in Fig. 1.1 to Fig. 1.3, respectively. The definition of the Study Area is provided in Section 3.1.

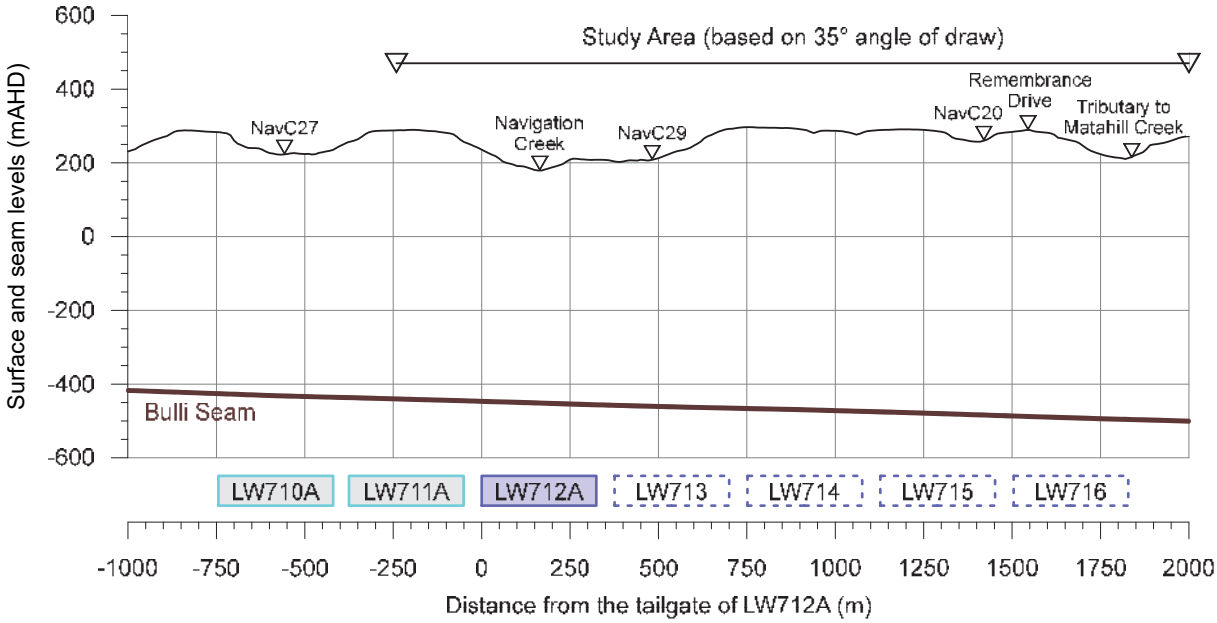


Fig. 1.1 Surface and seam levels across the western ends of LW712 to LW716

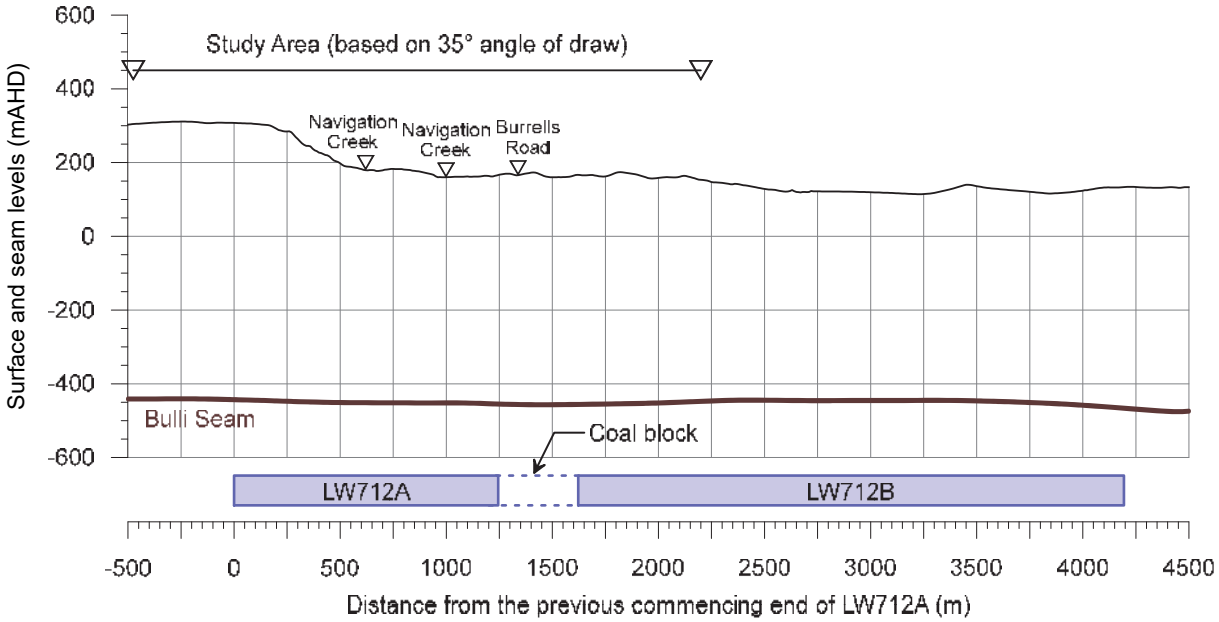


Fig. 1.2 Surface and seam levels along the centreline of LW712

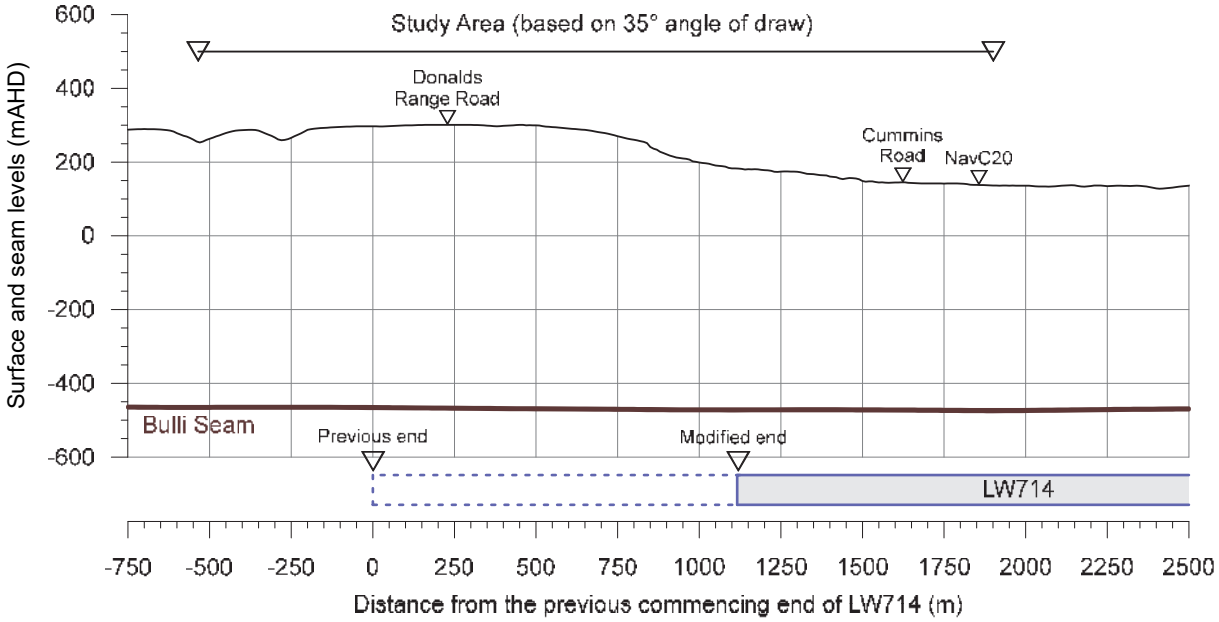


Fig. 1.3 Surface and seam levels along the centreline of LW714

The surface level contours are shown in Drawing No. MSEC1553-02 in Appendix C. The western ends of LW712 to LW716 are located partially beneath Razorback Range. The distances that these longwalls extend beneath this range reduce due to the proposed modifications.

The seam floor contours, seam thickness contours and depth of cover contours for the Bulli Seam are shown in Drawing Nos. MSEC1553-03, MSEC1553-04 and MSEC1553-05, respectively. The contours are based on the information presented in Report No. MSEC1459 which supported the Extraction Plan Application for LW712 to LW716.

The depths of cover to the Bulli Seam above LW712 to LW716 based on the Modified Layout vary between 555 m and 780 m. The minimum depth of cover occurs above the mid-length of LW712 along a tributary to Navigation Creek, and the maximum depth of cover occurs above the mid-length of LW716 beneath Razorback Range. The depths of cover above these longwalls based on the Previous Layout vary between 555 m and 800 m.

The thickness of the Bulli Seam within the extents of the LW712 to LW716 varies between 3.0 m and 3.6 m based on both the Previous Layout and Modified Layout. ICHPL proposes to extract the full seam thickness.

2.1. Maximum predicted conventional subsidence effects

The Incremental Profile Method (IPM) was previously used to predict the conventional subsidence effects due to the mining in Area 7, based on the Previous Layout, and these are provided in Report No. MSEC1459. The IPM has now been used to predict the conventional subsidence effects for these longwalls based on the Modified Layout.

A summary of the maximum predicted values of incremental vertical subsidence, tilt and curvature due to the mining of each of LW712 to LW716 based on the Previous Layout and Modified Layout is provided in Table 2.1. These values are the maximum predicted subsidence effects due to the mining of each individual longwall anywhere above the mining area, i.e. including outside the Study Area.

Table 2.1 Maximum predicted incremental conventional subsidence effects due to the mining of each of LW712 to LW716 based on the Previous Layout and Modified Layout

Layout (Report No.)	Longwall	Maximum predicted incremental vertical subsidence (mm)	Maximum predicted incremental tilt (mm/m)	Maximum predicted incremental hogging curvature (km^{-1})	Maximum predicted incremental sagging curvature (km^{-1})
Previous Layout (MSEC1459)	LW712	925	6.5	0.07	0.13
	LW713	950	6.5	0.07	0.13
	LW714	925	6.5	0.06	0.11
	LW715	900	6.0	0.06	0.11
	LW716	875	6.0	0.06	0.10
Modified Layout (MSEC1553)	LW712B	925	6.5	0.06	0.12
	LW712A	775	5.0	0.05	0.08
	LW713	950	6.5	0.06	0.12
	LW714	925	6.5	0.06	0.11
	LW716	900	6.0	0.06	0.11
	LW716	875	6.0	0.06	0.10

The maximum predicted incremental subsidence effects for each of LW712 to LW716, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout. The predicted incremental subsidence effects do not change, as they occur above the eastern ends of the longwalls (i.e. away from the proposed modifications) where the depths of cover are shallower.

The predicted cumulative subsidence contours due to the mining of LW712 to LW716, based on the Modified Layout, are shown in Drawing No. MSEC1553-09. These contours represent the accumulated movements due to the mining of LW712 to LW716 only, i.e. the predicted movements following the completion of LW711A and LW711B. The predicted cumulative 20 mm subsidence contour due to the mining of LW712 to LW716, based on the Previous Layout, is also shown in this drawing for comparison.

The extent of vertical subsidence decreases due to the proposed modifications. The surface area located within the predicted cumulative 20 mm subsidence contour for LW712 to LW716 is 1348 hectares (ha) based on the Previous Layout and 1166 ha based on the Modified Layout. That is, the surface area within the predicted limit of vertical subsidence reduces by approximately 182 ha due to the proposed modifications.

The predicted total subsidence contours due to the mining in Areas 7 and 9, based on the Modified Layout, are shown in Drawing No. MSEC1553-10. These contours represent the accumulated movements due to the mining of LW702 to LW716 and LW901 to LW905. The predicted total 20 mm subsidence contour, based on the Previous Layout, is also shown in this drawing for comparison.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature due to the mining of LW702 to LW716 and LW901 to LW905, based on the Previous Layout and Modified Layout, is provided in Table 2.2. These values are the maximum predicted subsidence effects anywhere above the mining area, i.e. including outside the Study Area.

Table 2.2 Maximum predicted total conventional vertical subsidence, tilt and curvature anywhere above the mining area based on the Previous Layout and Modified Layout

Layout (Report No.)	Longwalls	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	LW702 to LW716 and LW901 to LW905	1550	7.5	0.09	0.17
Modified Layout (MSEC1553)	LW702 to LW716 and LW901 to LW905	1550	7.5	0.09	0.17

The maximum predicted total subsidence effects anywhere within the mining area, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout. That is, separating LW712 into two shorter longwalls (i.e. LW712A and LW712B) and shortening the western ends of LW713 to LW716 do not affect the maximum predicted total values. The predicted total subsidence effects do not change, as they occur above the eastern part of the mining area (i.e. away from the proposed modifications) where the depths of cover are shallower.

While the maximum predicted total subsidence effects above the mining area do not change, the predicted vertical subsidence reduces above the coal block between LW712A and LW712B and above the previous western ends of LW713 to LW716. In consequence, the locations of the predicted maximum longitudinal tilts, curvatures and strains change due to the proposed modifications.

The Study Area represents the surface area where the predicted subsidence effects change due to the proposed modifications. The Study Area is further defined in Chapter 3 and it is illustrated in Drawing No. MSEC1553-01.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature within the Study Area, based on the Previous Layout and Modified Layout, is provided in Table 2.3. The values are the maximum predicted subsidence effects within the Study Area due to the mining of all longwalls.

Table 2.3 Maximum predicted total conventional vertical subsidence, tilt and curvature within the Study Area based on the Previous Layout and Modified Layout

Layout (Report No.)	Longwalls	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	LW702 to LW716 and LW901 to LW905	1300	6.5	0.07	0.14
Modified Layout (MSEC1553)	LW702 to LW716 and LW901 to LW905	1300	6.0	0.07	0.14

The maximum predicted total vertical subsidence, hogging curvature and sagging curvature within the Study Area, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout. The maximum predicted tilt slightly reduces due to the proposed modifications.

The predicted subsidence effects have been illustrated along three prediction lines, with Prediction Line 1 across the western ends of the previous LW712 to LW716 and Prediction Lines 2 and 3 along the centrelines of LW712 and LW714, respectively.

The predicted profiles of total vertical subsidence, tilt and curvature along Prediction Lines 1 to 3 are illustrated in Figs. A.01 to A.03, respectively, in Appendix A. The profiles based on the Previous Layout are shown by the red lines and the profiles based on the Modified Layout are shown by the blue lines in these figures.

It can be seen in Fig. A.01, that the predicted subsidence effects above the previous western ends of LW713 to LW716 reduce due to the proposed modifications. The reason is the western ends of these longwalls do not mine beneath Prediction Line 1 based on the Modified Layout.

It can be seen in Fig. A.02, that the maximum predicted vertical subsidence above the western part of LW712 (i.e. LW712A) reduce due to the proposed modifications. While the predicted longitudinal tilts and curvatures above the commencing (i.e. western) end of LW712(A) slightly reduce, the predicted longitudinal tilts and curvatures above the coal block slightly increase.

It can be seen in Fig. A.03, that the predicted subsidence effects above the western end of LW714 reduce due to the proposed modifications. The predicted longitudinal tilts and curvatures above the commencing (i.e. western) end of this longwall also reduce and move towards the east.

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.

The maximum predicted conventional strains within the Study Area, based on applying a factor of 15 to the maximum predicted conventional curvatures, are approximately 1 mm/m tensile and 2 mm/m compressive based on both the Previous Layout and Modified Layout. These strains represent typical values when the ground subsides regularly with no localised or elevated strains due to near-surface geological structures or valley-related effects. The maximum strains can be much greater than these typical values, especially in the locations of near-surface geological structures, on steep slopes or within valleys.

At any 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 strain for low magnitudes of curvature. In this report, therefore, we have provided a statistical approach to account for the variability, rather than just providing a single predicted conventional strain.

The range of potential strains above the mining area has been determined using monitoring data from the extracted longwalls at Appin Mine and other nearby collieries, where the mining geometry and overburden geometry are similar. The method of prediction is outlined in Section 4.3 of Report No. MSEC1459.

The maximum predicted strains above the mining area, based on both the Previous Layout and Modified Layout, are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence interval, and are 1.5 mm/m tensile and 3.2 mm/m compressive based on the 99 % confidence interval. The maximum predicted strains outside the mining area are 0.6 mm/m tensile and 0.5 mm/m compressive based on the 95 % confidence interval.

2.3. Maximum predicted valley-related effects

The predicted valley-related effects along the streams at Appin Mine 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 2002 Prediction 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 effects along the streams have been determined from the empirical database based on their lateral and longitudinal distances from the mined longwalls, the depths of the valleys and the maximum predicted incremental subsidence resulting from the mining of each longwall.

First and second order sections of Navigation Creek and tributary NavC20 are located within the Study Area. There is a short third-order section of Navigation Creek partly located within the Study Area; however this will not be directly mined beneath by the proposed LW712 to LW716 based on either the Previous Layout or the Modified Layout. The predicted valley-related effects for these streams are discussed in Chapter 3. The predicted valley-related effects for other streams located further outside the Study Area do not change due to the proposed modifications.

3.1. The Study Area

The *Study Area* has been defined as the surface area where the predicted subsidence effects, based on the Modified Layout, are different to those predicted based on the Previous Layout. The Study Area has been based on the following:

- 35° angle of draw line around the proposed coal block between LW712A and LW712B and the modified western ends of the proposed LW713 to LW716; and
- the limit where the change in the predicted vertical subsidence, due to the proposed modifications, is greater than 20 mm.

The depths of cover contours for the Bulli Seam are shown in Drawing No. MSEC1553-05. The depths of cover within the Study Area vary between 580 m and 800 m. The 35° angle of draw, therefore, has been determined by drawing a line that is a horizontal distance varying between 406 m and 546 m around the proposed coal block between LW712A and LW712B and the modified western ends of the proposed LW713 to LW716.

The predicted limit of vertical subsidence, taken as the predicted cumulative 20 mm subsidence contour due to the mining of LW712A, LW712B and LW713 to LW716, has been determined using the Incremental Profile Method (IPM). This method is described in Report No. MSEC1459 which supported the Extraction Plan Application.

The predicted 20 mm change in vertical subsidence contour due to the proposed modifications is located partly outside the 35° angle of draw above the existing LW711A but is otherwise located inside the 35° angle of draw. The Study Area is therefore defined by the combination of the 35° angle of draw and the predicted 20 mm change in vertical subsidence contour.

The Study Area based on the combination of the 35° angle of draw and the predicted 20 mm change in vertical subsidence contour, simply referred to as the Study Area based on the 35° angle of draw in this report, is shown in Drawing Nos. MSEC1553-01 to MSEC1527-07 in Appendix C.

The surface features that are located within 600 m of the proposed coal block between LW712A and LW712B and within 600 m of the shortened western ends of the proposed LW713 to LW716 may experience changes in the predicted valley-related effects and could be sensitive to these effects. These features have therefore also been included in the assessments provided in this report.

The Study Area based on the 600 m boundary is also shown in Drawing Nos. MSEC1553-01 to MSEC1527-07 in Appendix C.

The natural and built features that are located within or in close proximity to the Study Areas based on the 35° degree angle of draw and the 600 m boundary are shown in Drawing Nos. MSEC1553-06 and MSEC1527-07 in Appendix C.

The surface features that have been included in the assessments provided in this report are:

- Navigation Creek and Tributary NavC20;
- first and second order tributaries;
- cliffs and minor cliffs
- steep slopes;
- public roads including Burrells Road, Cummins Road, Donalds Range Road, Plateau Drive, Quirkes Lane and Remembrance Drive;
- 11 kV and low voltage powerlines;
- copper telecommunications cables;
- houses;
- non-residential and other structures;
- Aboriginal heritage sites;
- historic sites; and
- farm dams.

The effects of the proposed modifications of LW712 to LW716 on the subsidence predictions and impact assessments for these features are provided in the following sections.

The *Amended Extraction Plan Area* is also shown in Drawing No. MSEC1553-01. This area is based on the 35° angle of draw and predicted 20 mm subsidence contour for LW712 to LW716 based on the Modified Layout. The Amended Extraction Plan Area represents the surface area that is affected by the conventional subsidence effects due to the mining of LW712 to LW716.

3.2. Navigation Creek

Navigation Creek and the other named creeks and their tributaries are shown in Drawing No. MSEC1553-06.

The NSW Government's Strategic Review into the Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield (DoP, 2008) recommended that Risk Management Zones (RMZs) be applied to all streams of third order or above in the Strahler stream classification.

First and second order sections of Navigation Creek are located within the Study Area, above the existing LW710A and LW711A and the proposed LW712A. There is a short third-order section of Navigation Creek partially located within the Study Area, which is located above the existing LW711A and LW711B; however this will not be mined beneath by the proposed LW712 to LW716 based on either the Previous Layout or the Modified Layout.

The length of Navigation Creek within the 600 m Study Area boundary is 2.6 km. The length of first and second order sections of the creek located above the proposed mining area (i.e. LW712A) is 1.0 km. The length of the third order section of Navigation Creek located above the existing LW711A and LW711B is 0.4 km with a further 0.5 km located above the coal block between LW711A and LW711B. There is no third order section of Navigation Creek located above the proposed LW712 to LW716.

The predicted profiles of total vertical subsidence, tilt and curvature along Navigation Creek are illustrated in Fig. A.04 in Appendix A. The profiles based on the Previous Layout and Modified Layout are shown by the red lines and blue lines, respectively, in this figure.

A summary of the maximum predicted total vertical subsidence, tilt and curvature for Navigation Creek, based on the Previous Layout and Modified Layout, is provided in Table 3.1. The values are the maximum predicted subsidence effects for the section of creek located within the Study Area based on the 600 m boundary due to the mining of LW702 to LW716.

Table 3.1 Maximum predicted total vertical subsidence, tilt and curvature for Navigation Creek due to mining of LW702 to LW716

Layout (Report No.)	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	1200	4.5	0.06	0.09
Modified Layout (MSEC1553)	1100	5.0	0.06	0.09

The maximum predicted total vertical subsidence for the section of Navigation Creek within the Study Area, based on the Modified Layout, is slightly less than the maximum predicted value based on the Previous Layout. The predicted vertical subsidence slightly decreases where the creek crosses adjacent to the proposed coal block between LW712A and LW712B.

The maximum predicted total tilt for the section of Navigation Creek within the Study Area, based on the Modified Layout, is slightly greater than the maximum predicted value based on the Previous Layout. The increase in tilt is small (i.e. change in grade of less than 1 %) and the total tilt is less than the maximum value further downstream of the Study Area of 6.5 mm/m.

The maximum predicted total curvatures for the section of Navigation Creek within the Study Area, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout. The greatest curvatures occur directly above LW712A and LW712B.

The creeks will also experience valley-related effects. As described in Section 5.3.2 of Report No. MSEC1459, the range of predicted closure movements for the streams within the Study Area has been determined from a statistical analysis of streams previously mined beneath at Appin and other nearby mines. From a total of 121 monitoring lines used to measure closure due to mining in the Bulli Seam, with effective valley heights for these streams in the range from 5 m to 80 m, the mean measured closure is 100 mm and the maximum measured closure is 640 mm.

The effective valley-height for the upper reaches (i.e. first and second order) section of Navigation Creek is up to 100 m. The closure for these sections of stream could be greater than that previously measured due to mining elsewhere in the Bulli Seam, of 640 mm. However, the closure due to the proposed mining of LW712 to LW716 in the shallower and thicker Wongawilli Seam is expected to be less than the maximum measured value, of 880 mm. Elsewhere, the effective valley heights for the lower reaches of Navigation Creek and the other streams within the Study Area typically vary between 10 m and 60 m. The predicted closures for these streams range between 125 mm and 500 mm based on the 95 % confidence level.

The maximum predicted total upsidence and closure for the section of Navigation Creek within the Study Area, based on the Modified Layout, is the same as the maximum predicted values based on the Previous Layout. While the maximum values does not change, the predicted upsidence and closure for the section of creek closest to the coal block between LW712A and LW712B reduces slightly.

The assessed levels of potential impact for Navigation Creek, based on the Modified Layout, are the same as those based on the Previous Layout. The assessments and recommended management strategies for the creek, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.3. Tributary NavC20

Tributary NavC20 is a tributary to Navigation Creek, as shown in Drawing No. MSEC1553-06.

First and second order sections of Tributary NavC20 are located within the Study Area based on the 600 m boundary, above the proposed LW714 and LW715. There is no third-order section of NavC20 located within the Study Area.

The length of Tributary NavC20 within the Study Area based on the 600 m boundary is 1.8 km. The length of first and second order sections of the creek located above the proposed mining area (i.e. LW714 and LW715) is 1.8 km based on the Previous Layout and 1.1 km based on the Modified Layout.

The predicted profiles of total vertical subsidence, tilt and curvature along Tributary NavC20 are illustrated in Fig. A.05 in Appendix A. The profiles based on the Previous Layout and Modified Layout are shown by the red lines and blue lines, respectively, in this figure.

A summary of the maximum predicted total vertical subsidence, tilt and curvature along Tributary NavC20, based on the Previous Layout and Modified Layout, is provided in Table 3.1. The values are the maximum predicted subsidence effects for the section of creek located within the Study Area based on the 600 m boundary due to the mining of LW702 to LW716.

Table 3.2 Maximum predicted total vertical subsidence, tilt and curvature for Tributary NavC20 due to mining of LW702 to LW716

Layout (Report No.)	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	1300	2.5	0.05	0.10
Modified Layout (MSEC1553)	1250	2.5	0.04	0.10

The maximum predicted total vertical subsidence effects for the section of Tributary NavC20 within the Study Area, based on the Modified Layout, are the same or slightly less than the maximum predicted values based on the Previous Layout. The predicted vertical subsidence and hogging curvature slightly reduce as the extent of the tributary directly mined beneath reduces due to the proposed modifications.

The maximum predicted total upsidence and closure for the section of Tributary NavC20 within the Study Area, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout. While the maximum values do not change, the predicted upsidence and closure for the section of creek above the previous western ends of LW714 and LW715 reduce.

The assessed levels of potential impact for Tributary NavC20, based on the Modified Layout, are the same as those based on the Previous Layout. The assessments and recommended management strategies for the creek, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.4. First and second order tributaries

The tributaries are shown in Drawing No. MSEC1553-06.

There are other first and second order tributaries to Navigation Creek and Apps Gully located within the Study Area based on the 600 m boundary. As discussed in Sections 3.2 and 3.3, there are no third order streams within the Study Area, apart from the short third-order section of Navigation Creek.

The first and second order tributaries to Navigation Creek and Apps Gully are located above the existing LW711A and LW711B and the proposed LW712 to LW716. These tributaries could experience the full range of predicted subsidence effects, as summarised in Table 2.3.

The maximum predicted subsidence effects for the first and second order tributaries within the Study Area, based on the Modified Layout, are the same or slightly less than the maximum predicted values based on the Previous Layout. While the maximum predicted values do not change, the predicted subsidence effects for the sections of tributaries above the previous western ends of LW713 to LW716 reduce due to the proposed modifications. The reason is the western ends of these longwalls do not mine beneath these tributaries based on the Modified Layout.

The assessed levels of potential impact for the first and second order tributaries, based on the Modified Layout, are similar to or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for the tributaries, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.5. Cliffs and minor cliffs

The cliffs and minor cliffs are shown in Drawing No. MSEC1553-07.

There is one cliff (RR-CL8) identified within the Study Area based on the 35° degree angle of draw. This cliff is located above the proposed LW714 based on the Previous Layout; however, it is located outside the mining area based on the Modified Layout.

There are six minor cliffs identified within the Study Area based on the 35° degree angle of draw, which are identified as MCL01 to MCL06. Two of these minor cliffs (i.e. MCL01 and MCL05) are located above the mining area based on the Previous Layout; however, they are located outside the mining area based on the Modified Layout. The remaining minor cliffs (i.e. MCL02 to MCL04 and MCL06) are located above the mining area based on both the Previous Layout and Modified Layout.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature for the cliff and minor cliffs within the Study Area are provided in Table 3.3 and Table 3.4, respectively. The values are the maximum predicted subsidence effects within 20 m of each cliff and minor cliff after the mining of the proposed LW702 to LW716.

Table 3.3 Maximum predicted total vertical subsidence, tilt and curvatures for the cliff within the Study Area due to the mining of LW702 to LW716

Layout (Report No.)	Reference	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	RR-CL8	900	1.5	0.04	< 0.01
Modified Layout (MSEC1553)	RR-CL8	30	0.5	0.01	< 0.01

Table 3.4 Maximum predicted total vertical subsidence, tilt and curvatures for the minor cliffs within the Study Area due to the mining of LW702 to LW716

Layout (Report No.)	Reference	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	MCL01	1100	3.0	0.04	0.06
	MCL02	1150	3.0	0.02	0.08
	MCL03	1150	3.0	0.02	0.07
	MCL04	1150	3.0	0.02	0.08
	MCL05	650	5.5	0.05	0.02
	MCL06	350	3.5	0.06	< 0.01
Modified Layout (MSEC1553)	MCL01	70	0.5	0.01	< 0.01
	MCL02	150	1.5	0.01	< 0.01
	MCL03	325	3.5	0.02	0.02
	MCL04	575	4.0	0.01	0.05
	MCL05	90	1.0	0.01	< 0.01
	MCL06	100	1.5	0.02	< 0.01

The maximum predicted subsidence effects for the cliff and minor cliffs within the Study Area, based on the Modified Layout, are typically less than the maximum predicted subsidence effects for these features based on the Previous Layout. The predicted subsidence effects typically reduce as the cliffs and minor cliffs are located outside the mining area or in close proximity of the longwall commencing (i.e. western) ends due to the proposed modifications, i.e. increase longwall end effects.

The maximum predicted tilts for minor cliffs MCL03 and MCL04 slightly increase due to the proposed modifications. The reason is that these minor cliffs are located near the modified commencing end of LW715. The predicted increases in tilt are very small (i.e. change in grade of less than 1 %) and they are less than the maximum predicted tilt for the other minor cliffs within the Study Area.

There are other cliffs and minor cliffs located outside and near to the Study Area based on the 600 m boundary. The predicted subsidence effects for these cliffs, based on the Modified Layout, are the same as the predicted values based on the Previous Layout.

The assessed levels of potential impact for the cliffs and minor cliffs, based on the Modified Layout, are similar to or less than those based on the Previous Layout. The assessments and recommended management strategies for the cliffs and minor cliffs, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.6. Steep slopes

The steep slopes are shown in Drawing No. MSEC1553-07.

Steep slopes are located across the Study Area based on the 35° angle of draw which are associated with the lower part of Razorback Range. There are also localised steep slopes associated with the banks of Navigation Creek and its tributaries to the east of Razorback Range.

A summary of the maximum predicted total vertical subsidence, tilt and curvatures for the steep slopes within the Study Area based on the °35 angle of draw, based on the Previous Layout and Modified Layout, is provided in Table 3.5. The values are the maximum predicted subsidence effects within 20 m of the mapped extents of the steep slopes due to the mining of LW702 to LW716.

Table 3.5 Maximum predicted total vertical subsidence, tilt and curvature for the steep slopes within the Study Area due to the mining of LW702 to LW716

Layout (Report No.)	Location	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	Razorback Range	1250	6.0	0.07	0.13
	Valleys of streams	1300	6.5	0.07	0.14
Modified Layout (MSEC1553)	Razorback Range	1200	6.0	0.06	0.11
	Valleys of streams	1300	6.0	0.07	0.14

The maximum predicted subsidence effects for the steep slopes within the Study Area, based on the Modified Layout, are the same or slightly less than the maximum predicted values based on the Previous Layout. The predicted area of steep slopes that are directly mined beneath reduces due to the shortened commencing (i.e. western) ends of LW713 to LW716.

The assessed levels of potential impact for the steep slopes, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for the steep slopes, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.7. Public roads

The public roads are shown in Drawing No. MSEC1553-08.

Sections of Burrells Road, Cummins Road, Donalds Range Road, Fairlea Road, Plateau Drive, Quirkes Lane and Remembrance Drive are located within the Study Area based on the 35° angle of draw.

The included sections of Donalds Range Road and Plateau Drive and part of the included section of Remembrance Drive are located above the western ends of LW713 to LW716 based on the Previous Layout but will not be directly mined beneath based on the Modified Layout. The western end of Burrells Road is located above the coal block between LW712A and LW712B and will not be directly mined beneath based on the Modified Layout. Fairlea Road is located outside the mining area based on both the Previous Layout and the Modified Layout.

The western end of Quirkes Lane is located above LW712A, adjacent to the coal block between LW712A and LW712B. The western end of Cummins Road is located above the modified commencing end of LW714 and the section of Remembrance Drive within the Study Area is located mostly above the modified commencing end of LW716.

The predicted profiles of total vertical subsidence, tilt and curvature along Burrells Road, Cummins Road, Donalds Range Road, Quirkes Lane and Remembrance Drive are illustrated in Figs. A.06 to A.10, respectively, in Appendix A. The profiles based on the Previous Layout and Modified Layout are shown by the red lines and blue lines, respectively, in these figures.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature along the public roads, based on the Previous Layout and Modified Layout, is provided in Table 3.6. The values are the maximum predicted subsidence effects for the sections of road within the Study Area due to the mining of the proposed LW702 to LW716.

Table 3.6 Maximum predicted total conventional vertical subsidence, tilt and curvature along the public roads due to mining of LW702 to LW716

Layout (Report No.)	Road	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	Burrells Road	875	2.5	0.05	0.02
	Cummins Road	1250	1.5	0.04	0.09
	Donalds Range Road	975	3.0	0.04	0.07
	Quirkes Lane	1100	5.0	0.05	0.10
	Remembrance Drive	875	2.5	0.06	0.01
Modified Layout (MSEC1553)	Burrells Road	875	2.5	0.05	0.02
	Cummins Road	1200	2.5	0.02	0.09
	Donalds Range Road	40	0.5	0.01	< 0.01
	Quirkes Lane	950	5.0	0.05	0.09
	Remembrance Drive	850	2.5	0.06	0.01

The maximum predicted subsidence effects for the public roads within the Study Area, based on the Modified Layout, are the typically the same or slightly less than the maximum predicted values based on the Previous Layout.

The maximum predicted total tilt for the section of Cummins Road within the Study Area slightly increases due to the proposed modifications. The reason is that the western end of this road is located near the modified commencing (i.e. western) end of the proposed LW714. However, the increase is small (i.e. change in grade of less than 1 %) and the maximum tilt within the Study Area is less than the maximum tilt for the section of road located outside and east of the Study Area.

The predicted tilts also locally increase where Burrells Road is located above and adjacent to the coal block between the proposed LW712A and LW712B, and where Remembrance Drive crosses the modified commencing (i.e. western) end of the proposed LW716. However, the predicted tilts in these locations are similar to or less than the maximum tilts that occur elsewhere along these roads including within and outside of the Study Area.

The predicted subsidence effects for Donalds Range Road and the western end of Remembrance Drive reduce due to the proposed modifications. The reason is that these sections of road are located above the western ends of the proposed LW713 to LW716, based on the Previous Layout, but they are outside the mining area based on the Modified Layout.

The remaining public roads are located outside the Study Area based on the 35° angle of draw. The maximum predicted subsidence effects for these roads, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout.

The assessed levels of potential impact for the public roads, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for the roads, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.8. Electrical services

The electrical services are shown in Drawing No. MSEC1553-08.

There are 11 kV and low voltage powerlines within the Study Area that follow the public roads including Burrells Road, Cummins Road, Donalds Range Road, Fairlea Road, Plateau Drive, Quirkes Lane and Remembrance Drive. The powerlines service the residential properties along these roads.

The overhead powerlines comprise aerial copper cables supported on timber poles. The low voltage underground powerlines are direct buried and/or buried in conduit. The electrical infrastructure is owned and operated by Endeavour Energy.

There are powerlines located above LW712A, the coal block between LW712A and LW712B and above the shortened western ends of LW714 to LW716, based on the Modified Layout. The powerlines along the sections of Donalds Range Road, Plateau Drive and Remembrance Drive which are above the western ends of LW713 to LW716 based on the Previous Layout, but will no longer be mined directly beneath.

The predicted profiles of total vertical subsidence, tilt and curvature along Burrells Road, Cummins Road, Donalds Range Road, Quirkes Lane and Remembrance Drive and therefore, the alignments of the 11 kV powerlines, are illustrated in Figs. A.06 to A.10, respectively, in Appendix A. The profiles based on the Previous Layout and Modified Layout are shown by the red lines and blue lines, respectively, in these figures.

A summary of the maximum predicted values of total vertical subsidence, tilt along and tilt across the alignments of the 11 kV powerlines, based on the Previous Layout and Modified Layout, is provided in Table 3.7. The values are the maximum predicted subsidence effects for the sections of powerline within the Study Area due to the mining of the modified LW702 to LW716.

Table 3.7 Maximum predicted total vertical subsidence, tilt along and tilt across the alignments of the 11 kV powerlines due to mining of LW702 to LW716

Layout (Report No.)	Location	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt along alignment (mm/m)	Maximum predicted total tilt across alignment (mm/m)
Previous Layout (MSEC1459)	Burrells Road	875	2.5	1.0
	Cummins Road	1250	1.5	4.0
	Donalds Range Road	975	3.0	3.0
	Quirkes Lane	1100	5.0	3.0
	Remembrance Drive	875	2.5	2.0
Modified Layout (MSEC1553)	Burrells Road	875	2.5	1.0
	Cummins Road	1200	2.5	4.0
	Donalds Range Road	40	0.5	0.5
	Quirkes Lane	950	5.0	4.0
	Remembrance Drive	850	2.5	1.5

The maximum predicted subsidence effects for the 11 kV powerlines within the Study Area, based on the Modified Layout, are typically the same or slightly less than the maximum predicted values based on the Previous Layout.

The maximum predicted total tilt for the 11 kV powerline along the section of Cummins Road and the maximum predicted cross-tilt for the 11 kV powerline along Quirkes Lane slightly increases due to the proposed modifications. The reason is that these powerlines are located near the modified commencing (i.e. western) end of the proposed LW714 and the modified finishing (i.e. eastern) end of the proposed LW712A. However, the increases are small (i.e. change in grade of less than 1 %) and the maximum tilts within the Study Area are less than the maximum tilts for the powerlines located outside and east of the Study Area.

The predicted tilts also locally increase where the 11 kV powerline along Burrells Road is located above and adjacent to the coal block between the proposed LW712A and LW712B, and where the powerline along Remembrance Drive crosses the modified commencing (i.e. western) end of the proposed LW716. However, the predicted tilts in these locations are similar to or less than the maximum tilts that occur elsewhere along these powerlines including within and outside of the Study Area.

The predicted subsidence effects for the 11 kV powerlines along Donalds Range Road and the western end of Remembrance Drive reduce due to the proposed modifications. The reason is that these sections of powerline are located above the western ends of the proposed LW713 to LW716, based on the Previous Layout, but they are outside the mining area based on the Modified Layout.

The remaining 11 kV and low voltage powerlines are located outside the Study Area based on the 35° angle of draw. The maximum predicted subsidence effects for these powerlines, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout.

The assessed levels of potential impact for the 11 kV and low voltage powerlines, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for the powerlines, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.9. Telecommunications services

The telecommunications services are shown in Drawing No. MSEC1553-08.

There are underground copper telecommunications cables located along public roads in the Study Area including Burrells Road, Cummins Road, Donalds Range Road, Fairlea Road, Quirkes Lane and Remembrance Drive. The telecommunications cables service the residential properties along these roads and are owned and operated by Telstra.

There are telecommunications cables located above LW712A and the coal block between LW712A and LW712B and above the shortened western ends of LW714 to LW716, based on the Modified Layout. Telecommunications cables located above the western ends of LW713 to LW716 based on the Previous Layout will no longer be mined beneath.

There are no optical fibre cables within the Study Area.

The predicted profiles of total vertical subsidence, tilt and curvature along Burrells Road, Cummins Road, Donalds Range Road, Quirkes Lane and Remembrance Drive and therefore, the alignments of the telecommunications cables, are illustrated in Figs. A.06 to A.10, respectively, in Appendix A. The profiles based on the Previous Layout and Modified Layout are shown by the red lines and blue lines, respectively, in these figures.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature along Burrells Road, Cummins Road, Donalds Range Road, Quirkes Lane and Remembrance Drive and, therefore, the alignments of the copper telecommunications cables is provided in Table 3.6 (refer to Page 16). The values are the maximum predicted subsidence effects for the sections of cables within the Study Area due to the mining of the modified LW712 to LW716.

The maximum predicted subsidence effects for the copper telecommunications cables within the Study Area, based on the Modified Layout, are typically the same or slightly less than the maximum predicted values based on the Previous Layout.

The predicted subsidence effects for the copper telecommunications cables reduce where they are located above the shortened western ends of the proposed LW713 to LW716 and slightly reduce where they are located above the proposed coal block between LW712A and LW712B. The predicted tilts and curvatures slightly increase adjacent to the modified commencing ends of LW713 to LW716 and adjacent to the proposed coal block; however, these are less than the maximum predicted values elsewhere above the mining area.

The remaining copper telecommunications cables and optical fibre cables are located outside the Study Area based on the 35° angle of draw. The maximum predicted subsidence effects for these cables, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout.

The assessed levels of potential impact for the telecommunications services, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for these services, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.10. Houses

The houses are shown in Drawing No. MSEC1553-08.

There are 91 houses located within the Study Area based on the 35° angle of draw. A summary of the locations of the houses relative to the existing and proposed longwalls, based on the Previous Layout and the Modified Layout, is provided in Table 3.8.

Table 3.8 Locations of the houses in the Study Area relative to existing and proposed longwalls

Layout (Report No.)	Number of houses above existing LW710A, 711A, LW711B	Number of houses above proposed LW712 to LW716	Number of houses outside mining area
Previous Layout (MSEC1459)	6	48	37
Modified Layout (MSEC1553)	6	33	52

The total number of houses within the Study Area that are located above the mining area (i.e. both existing and proposed longwalls) is 54 based on the Previous Layout and 39 based on the Modified Layout. That is, there are 15 fewer houses above the mining area due to the proposed modifications.

The houses are based on those mapped as part of Report No. MSEC1459 (July 2025) which supported the Extraction Plan Application for LW712 to LW716. While additional structures may have been built within the Study Area since mapping of these structures, the potential impacts on these new structures are the same as the existing structures.

The maximum predicted values of total vertical subsidence, tilt and curvature for each of the houses within the Study Area are provided in Table B.01 for the Previous Layout and Table B.02 for the Modified Layout, both of which are included in Appendix B. The values in these tables are based on the maximum predicted subsidence effects within 20 m of the perimeter of each house due to the mining of LW702 to LW716.

A summary of the maximum predicted total subsidence effects for the houses within the Study Area, based on the Previous Layout and Modified Layout, is provided in Table 3.9. The values are the maximum predicted subsidence effects within 20 m of the mapped extents of the houses due to the mining of LW702 to LW716.

Table 3.9 Maximum predicted total vertical subsidence, tilt and curvatures for the houses within the Study Area due to mining of LW702 to LW716

Layout (Report No.)	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	1325	5.5	0.06	0.14
Modified Layout (MSEC1553)	1275	5.0	0.06	0.14

The maximum predicted subsidence effects for the houses within the Study Area, based on the Modified Layout, are the same or slightly less than the maximum predicted values based on the Previous Layout.

There are 15 houses (Refs. R03h01, R03h02, R05h01 to R07h01, R09h01, R18h01, R19h01, R31h01 to R36h01 and R40h01) that are located above the previous western ends of LW713 to LW716; however, they are outside the mining area based on the Modified Layout. There are also 7 houses (Refs.S03h01, S05h01, S05h02, S09a, S09h02, S12h01 and S12h02) located above the coal block between LW712A and LW712B based on the Modified Layout. The predicted subsidence effects at these 22 houses reduce due to the proposed modifications.

However, there are other houses located above and adjacent to the modified commencing (i.e. western) ends of LW713 to LW716 and outside and adjacent to the coal block between LW712A and LW712B, where the predicted tilts and/or curvatures slightly increase due to the proposed modifications. The predicted tilts increase by 0.5 mm/m to 2.0 mm/m at 8 houses (Refs. K03a, K05a, S04h01, S04h02, S05h01, S05h02, S20h01 and S20h02) and the predicted curvature increases by 0.01 km^{-1} at 1 house (Ref. S04h02). The predicted increases are small and the predicted final values are less than the maximum predicted values elsewhere above the mining area.

The distributions of the maximum predicted vertical subsidence for the houses within the Study Area are illustrated in Fig. 3.1 based on the Previous Layout (left-hand side) and Modified Layout (right-hand side).

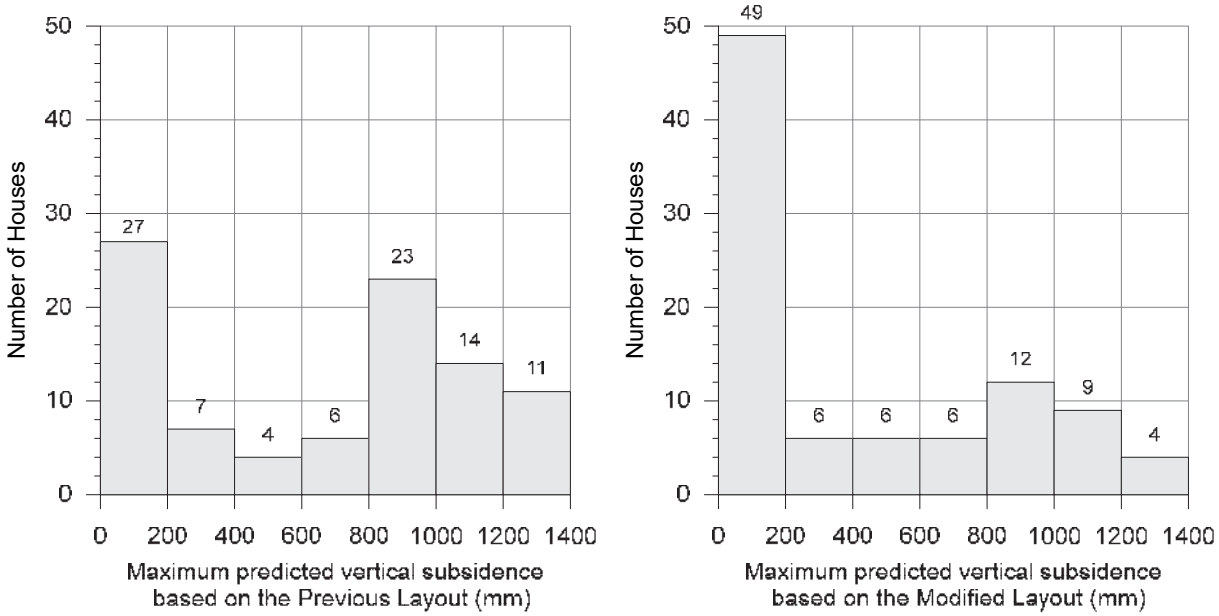


Fig. 3.1 Maximum predicted vertical subsidence for the houses within the Study Area based on the Previous Layout (left-hand side) and Modified Layout (right-hand side)

The overall levels of the predicted subsidence effects for the houses within the Study Area reduce due to the proposed modifications. Similarly, the overall levels of assessed impacts for these houses reduce.

The probabilities of impacts for the houses within the Study Area have been assessed using the method developed as part of ACARP Research Project C12015 (Waddington, 2009) which has been updated based on more recent observations of impacts in the Southern Coalfield. This method is described further in Appendix B of Report No. MSEC1459 which supported the Extraction Plan.

A summary of the overall distribution of the assessed impacts for the houses within the Study Area, based on the Previous Layout and Modified Layout, is provided in Table 3.10. The assessments have been conservatively based on all houses comprising brick structures on strip footings.

Table 3.10 Assessed impacts for the houses within the Study Area

Layout (Report No.)	Repair category			
	No Claim or R0	R1 or R2	R3 or R4	R5
Previous Layout (MSEC1459)	63 % ~ 73 %	18 % ~ 24 %	7 % ~ 11 %	2 % ~ 3 %
Modified Layout (MSEC1553)	72 % - 82 %	12 % - 18 %	4 % ~ 8 %	2 % - 3 %

The number of houses assessed to experience Category R1 to R4 impacts reduces due to the proposed modifications. While the number of houses assessed to experience Category R5 impacts does not change, the likelihood reduces but the change is within the rounding limit (i.e. within one decimal place). In consequence, the number of houses assessed to experience Nil or Category R0 impacts increases due to the proposed modifications.

The assessed levels of potential impact for the houses within the Study Area, based on the Modified Layout, are slightly less than those based on the Previous Layout. The assessments and recommended management strategies for the houses, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.11. Other structures

The structures are shown in Drawing No. MSEC1553-08.

There are other non-residential building structures (i.e. sheds, garages, etc.) and other structures (i.e. tanks and pools) that are located within the Study Area. The predicted subsidence effects for these structures are similar to the houses, as described in Section 3.10.

The predicted subsidence effects for these structures, based on the Modified Layout, are typically the same or slightly less than the predicted values based on the Previous Layout. The predicted tilts and curvatures slightly increase in some locations and slightly decrease in other locations. However, the overall level of predicted movement does not change due to the proposed modifications.

The assessed levels of potential impact for the non-residential structures within the Study Area, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for these structures, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

3.12. Farm dams

The farm dams are shown in Drawing No. MSEC1553-08.

There are 84 farm dams located within the Study Area based on the 35° angle of draw. A summary of the dams relative to the existing and proposed longwalls, based on the Previous Layout and the Modified Layout, is provided in Table 3.11. The dams are generally situated along the alignments of Navigation Creek and its tributaries.

Table 3.11 Locations of the dams in the Study Area relative to existing and proposed longwalls

Layout (Report No.)	Number of dams above existing LW710A, 711A, LW711B	Number of dams above proposed LW712 to LW716	Number of dams outside mining area
Previous Layout (MSEC1459)	8	50	26
Modified Layout (MSEC1553)	8	27	49

The total number of farm dams within the Study Area that are located above the mining area is 58 based on the Previous Layout and 35 based on the Modified Layout. That is, there are 23 fewer dams above the mining area due to the proposed modifications.

A summary of the maximum predicted total subsidence effects for the farm dams within the Study Area, based on the Previous Layout and Modified Layout, is provided in Table 3.12. The values are the maximum predicted subsidence effects within 20 m of the mapped extents of the dams due to the mining of LW702 to LW716.

Table 3.12 Maximum predicted total vertical subsidence, final tilt and curvatures for the farm dams within the Study Area due to mining of LW702 to LW716

Layout (Report No.)	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	1300	5.5	0.07	0.10
Modified Layout (MSEC1553)	1300	4.5	0.06	0.11

The maximum predicted subsidence effects for the farm dams within the Study Area, based on the Modified Layout, are the same or slightly less than the maximum predicted values based on the Previous Layout.

There are 23 farm dams that are located above the previous western ends of LW713 to LW716; however, they are outside the mining area based on the Modified Layout. The predicted subsidence effects at these dams reduce due to the proposed modifications.

There are other farm dams located above and adjacent to the modified commencing (i.e. western) ends of LW713 to LW716, where the predicted tilts and/or curvatures slightly increase due to the proposed modifications. However, the predicted increases are small and the predicted final values are less than the maximum predicted values elsewhere above the mining area.

The distributions of the maximum predicted vertical subsidence and tilt for the farms dams within the Study Area are illustrated in Fig. 3.2 and Fig. 3.3, respectively. The distributions based on the Previous Layout and the Modified Layout are shown on the left-hand side and right-hand side of these figures, respectively.

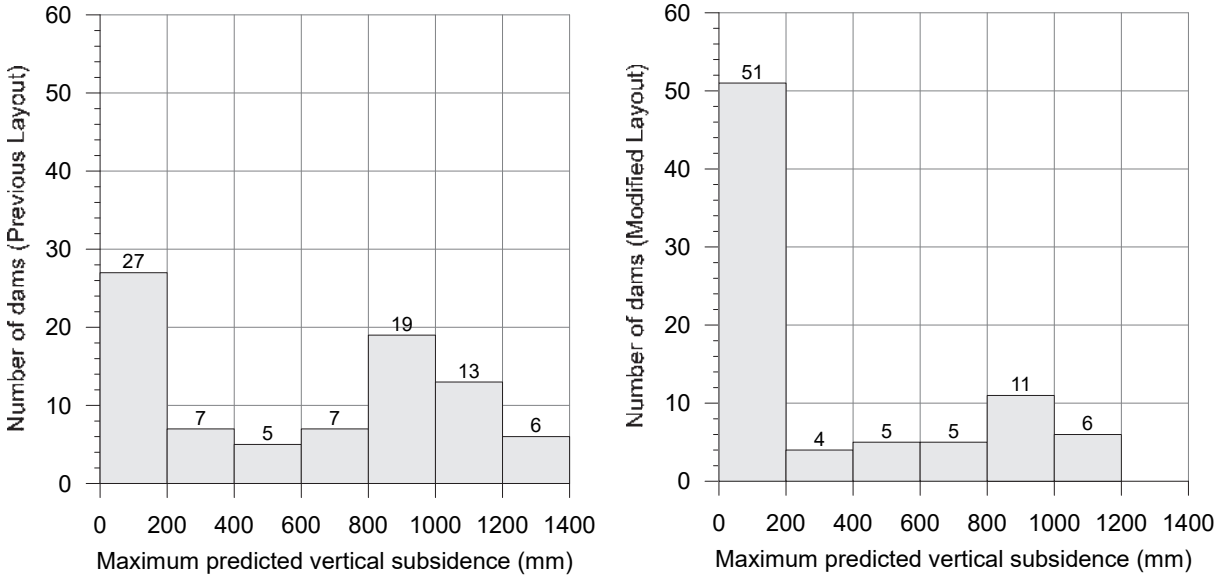


Fig. 3.2 Maximum predicted vertical subsidence for the dams within the Study Area based on the Previous Layout (left-hand side) and Modified Layout (right-hand side)

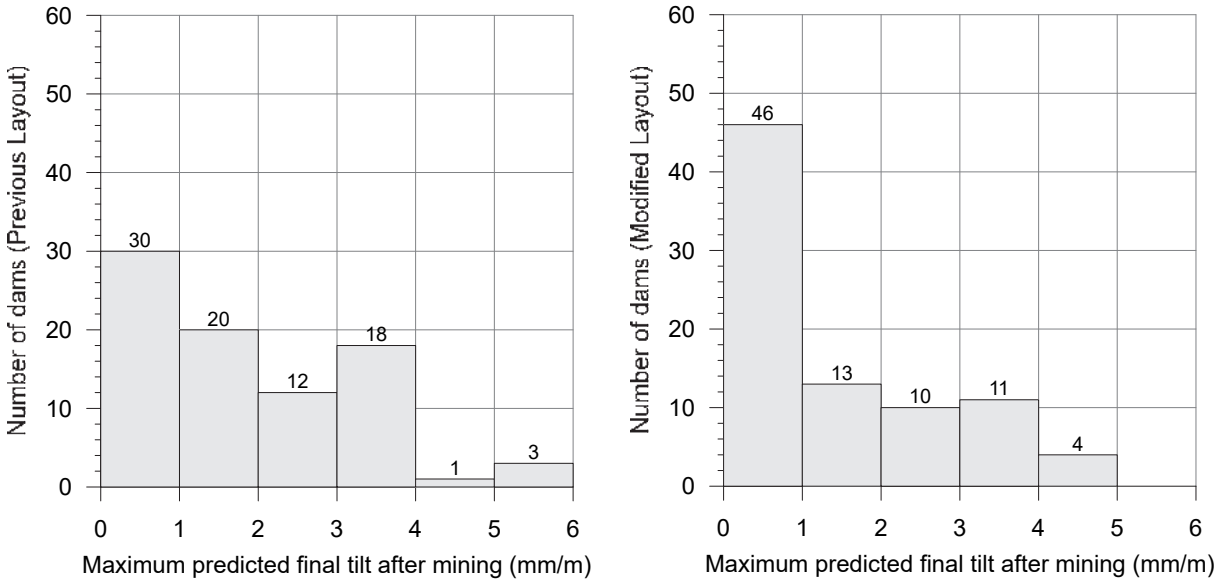


Fig. 3.3 Predicted final tilts for the dams within the Study Area based on the Previous Layout (left-hand side) and Modified Layout (right-hand side)

The changes in the predicted final tilts between the Previous Layout and the Modified Layout are greatest for the farm dams located above or adjacent to previous and modified commencing (i.e. western) ends of LW713 to LW716 and around the coal block between LW712A and LW712B. The predicted final tilts increase for some dams and decreases for other dams. However, the overall levels of predicted tilt are less for the Modified Layout than for the Previous Layout. That is, the final tilts are less than 1 mm/m at 46 of the dams (i.e. 55%) based on the Modified Layout compared with 30 dams (i.e. 36%) based on the Previous Layout, as illustrated in Fig. 3.3.

The assessed levels of potential impact for the farm dams, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for the dams, therefore, are the same as those previously provided in Report No. and MSEC1459 and the Extraction Plan.

3.13. Aboriginal heritage sites

The Aboriginal heritage sites are shown in Drawing No. MSEC1553-08.

There are two sites within the Study Area consisting of Sites 52-2-4226 and 52-2-4227 (i.e. open camp sites) and both located above the western end of the existing LW711.

A summary of the maximum predicted total subsidence effects for the Aboriginal heritage sites within the Study Area, based on the Previous Layout and Modified Layout, is provided in Table 3.13. The values are the maximum predicted subsidence effects within 20 m of the mapped extents of the sites due to the mining of LW702 to LW716.

Table 3.13 Maximum predicted total vertical subsidence, final tilt and curvatures for the Aboriginal heritage sites within the Study Area due to mining of LW702 to LW716

Layout (Report No.)	Site	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt (mm/m)	Maximum predicted total hogging curvature (km^{-1})	Maximum predicted total sagging curvature (km^{-1})
Previous Layout (MSEC1459)	52-2-4226	225	2.0	0.02	< 0.01
	52-2-4227	450	3.5	0.03	< 0.01
Modified Layout (MSEC1553)	52-2-4226	200	1.5	0.02	< 0.01
	52-2-4227	400	3.5	0.03	< 0.01

The maximum predicted subsidence effects for Sites 52-2-4426 and 52-2-4227, based on the Modified Layout, are the same or slightly less than the maximum predicted values based on the Previous Layout. These sites are located above the existing LW711 and therefore the majority of the predicted movements occur due to this longwall. There are slight reductions in the predicted subsidence effects due to the mining of LW712 and, to a lesser extent LW713, due to the shortened western ends of these longwalls.

The assessed levels of potential impact for the Aboriginal heritage sites, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for these sites, therefore, are the same as those previously provided in Report No. and MSEC1459 and the Extraction Plan.

3.14. Historic sites

The historic heritage sites are shown in Drawing No. MSEC1553-08.

Mt Hercules homestead ruins are located outside the mining area. The southern extent of the boundary is adjacent to the maingate of LW716, based on the Previous Layout, and is more than 800 m from the commencing (i.e. western) end of this longwall based on the Modified Layout. The predicted subsidence effects for Mt Hercules homestead ruins therefore reduce due to the proposed modifications.

The remaining historic heritage sites are located outside the Study Area. These include Slab Hut above the eastern ends of LW714 to LW716, and Dairy No.9 (EMAI Cottage 24) and Camden Park Estate and Belgenny Farm both located north-east of LW716. The predicted subsidence effects for these sites do not change due to the proposed modifications.

The assessed levels of potential impact for the historic sites, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for these sites, therefore, are the same as those previously provided in Report No. and MSEC1459 and the Extraction Plan.

3.15. Summary

ICHP is proposing to separate LW712 into two shorter longwalls, leaving a coal block between them, and to shorten the western ends of LW713 to LW716.

The maximum predicted total subsidence effects due to the mining of LW712 to LW716, based on the Modified Layout, are the same as the maximum predicted values based on the Previous Layout. However, the extent of vertical subsidence reduces due to the proposed modifications. The surface area located within the predicted cumulative 20 mm subsidence contour for LW712 to LW716 is 1348 ha based on the Previous Layout and 1166 ha based on the Modified Layout.

The predicted subsidence effects for the natural and built features reduce where they are located above the previous western ends of LW713 to LW716 but are located outside the mining area based on the modified western ends of these longwalls. Similarly, the predicted subsidence effects reduce for the natural and built features located above the coal block between LW712A and LW712B.

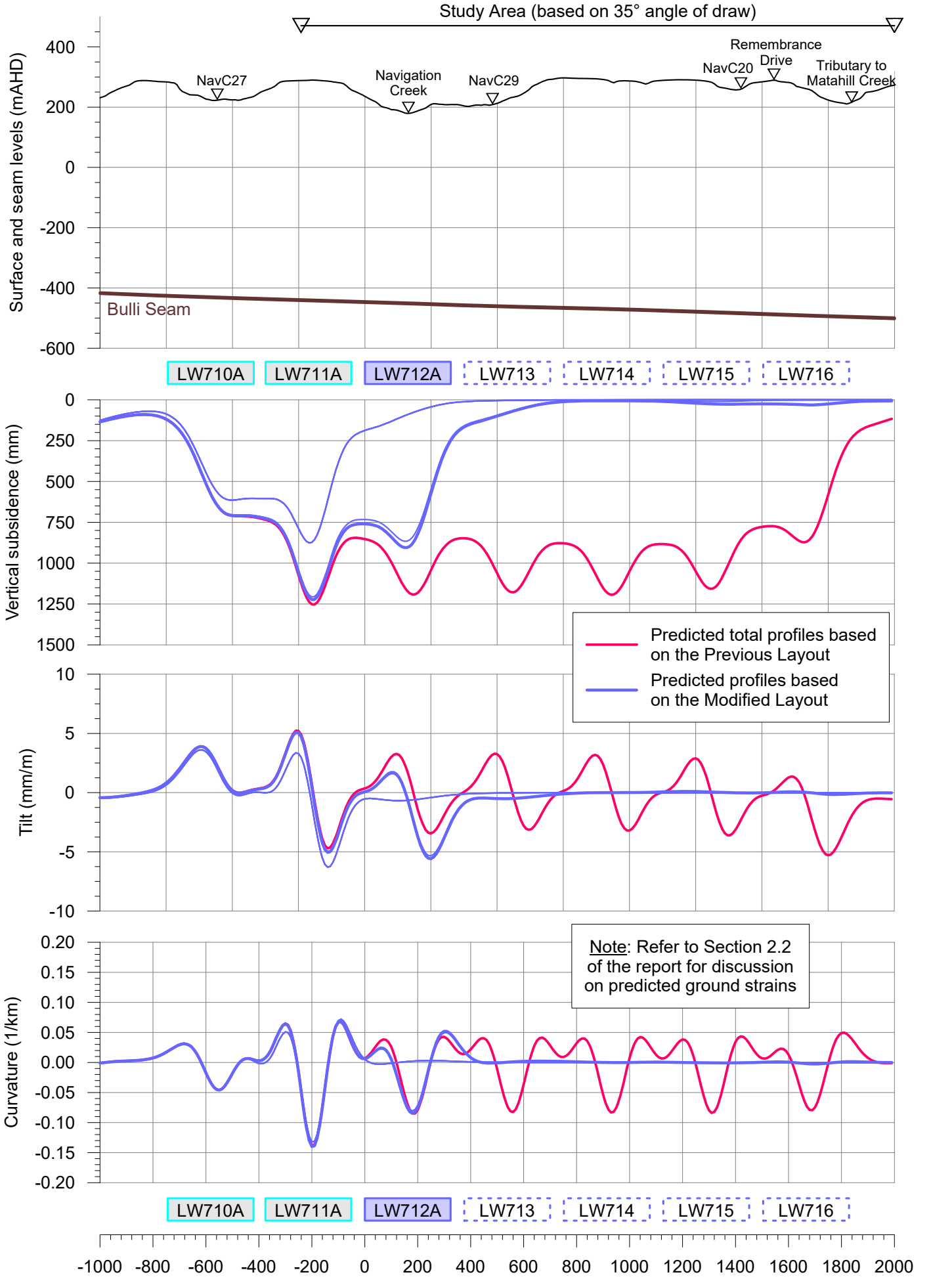
The predicted tilts and curvatures slightly increase for the natural and built features located above and adjacent to the modified commencing (i.e. western) ends of LW713 to LW716 and outside and adjacent to the coal pillar between LW712A and LW713B. However, the predicted increases are small and the predicted final values are less than the maximum predicted values elsewhere above the mining area.

The overall levels of the predicted subsidence effects for the natural and built features within the Study Area reduce due to the proposed modifications.

The assessed levels of potential impact for natural and built features, based on the Modified Layout, are the same or slightly less than those based on the Previous Layout. The assessments and recommended management strategies for the surface features, therefore, are the same as those previously provided in Report No. MSEC1459 and the Extraction Plan.

APPENDIX A. FIGURES

Predicted profiles of total vertical subsidence, tilt and curvature along Prediction Line 1 due to mining in Area 7



msec

Fig. A.01

Predicted profiles of total vertical subsidence, tilt and curvature along Prediction Line 2 due to mining in Area 7

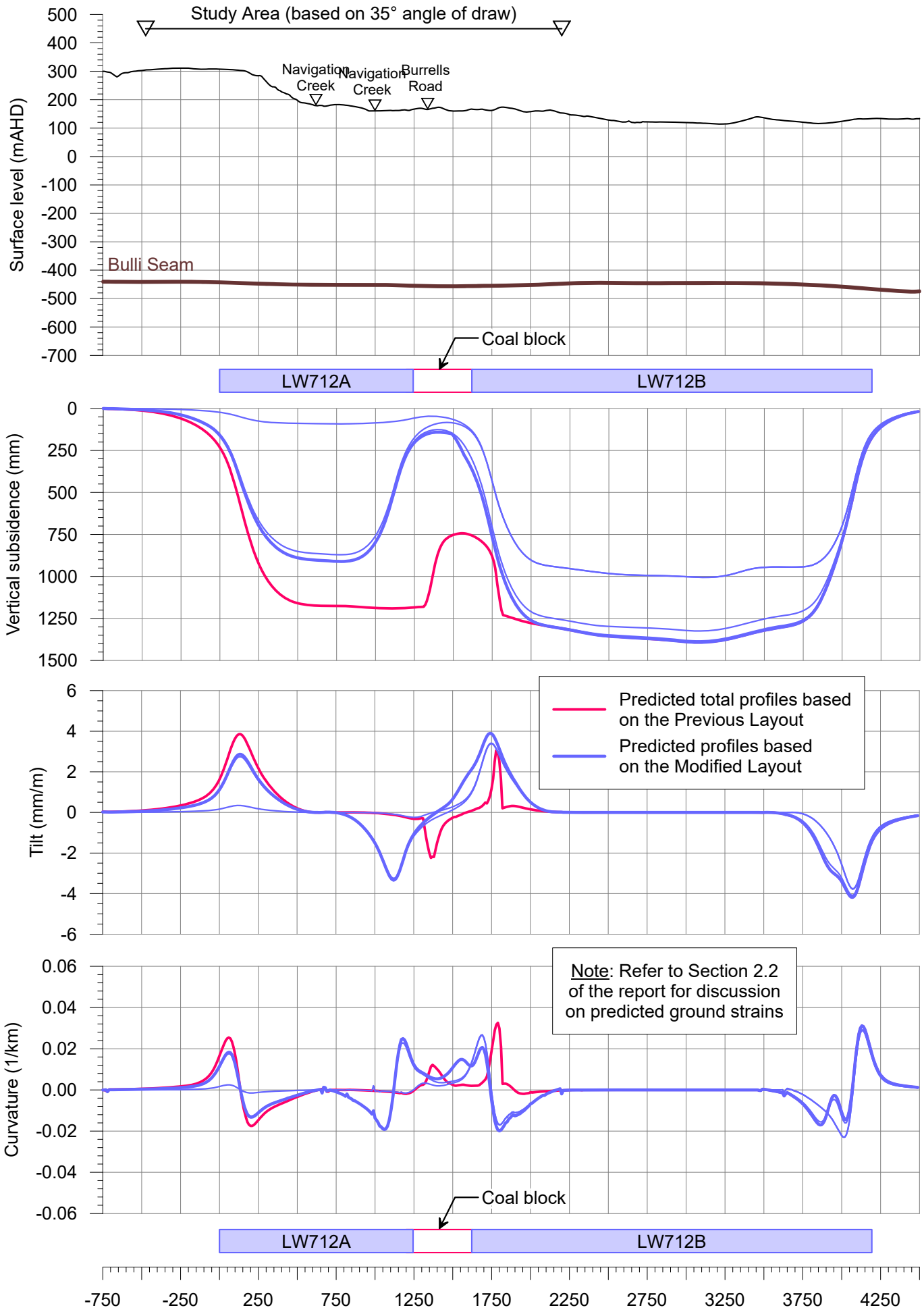
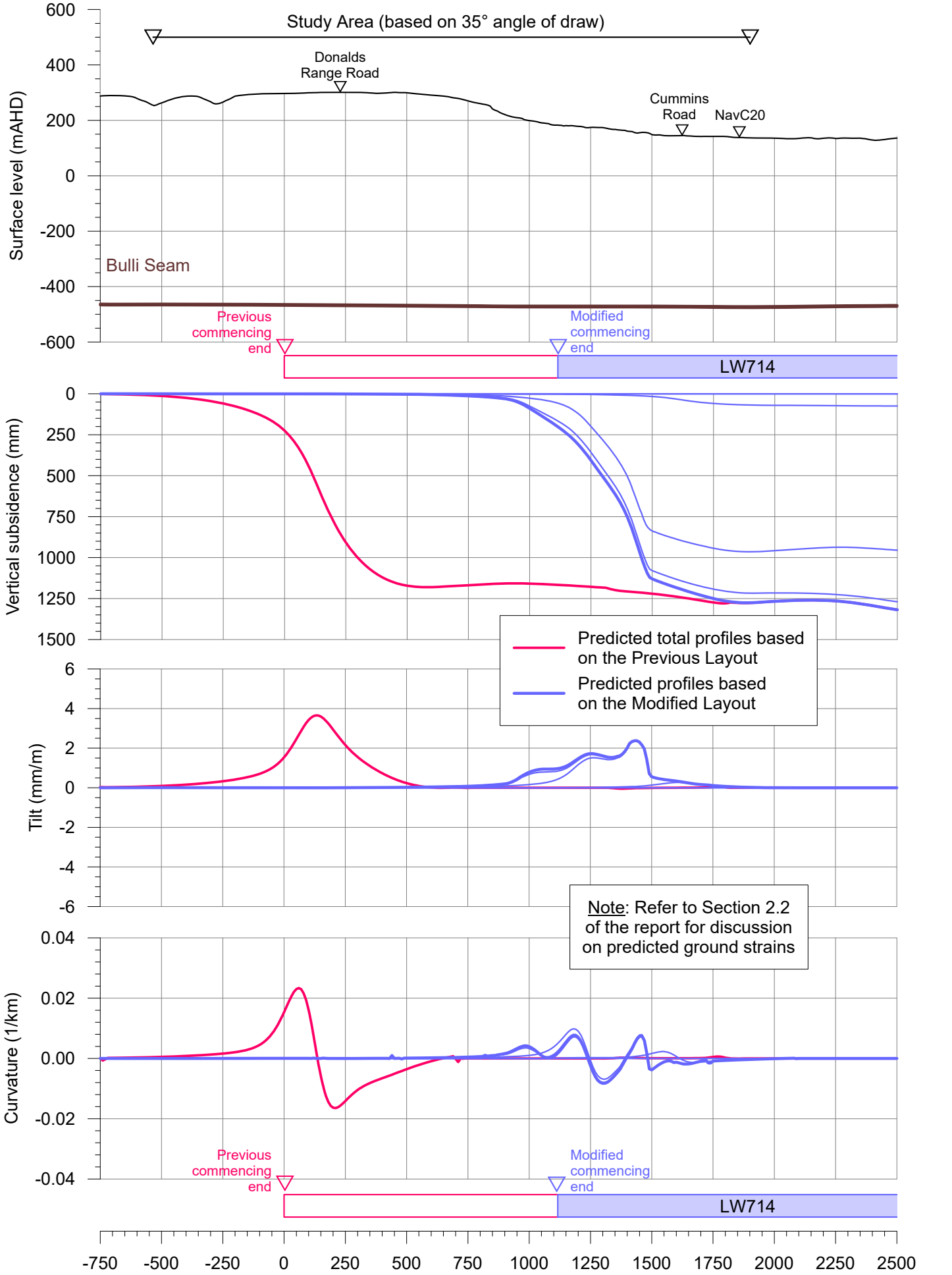


Fig. A.02

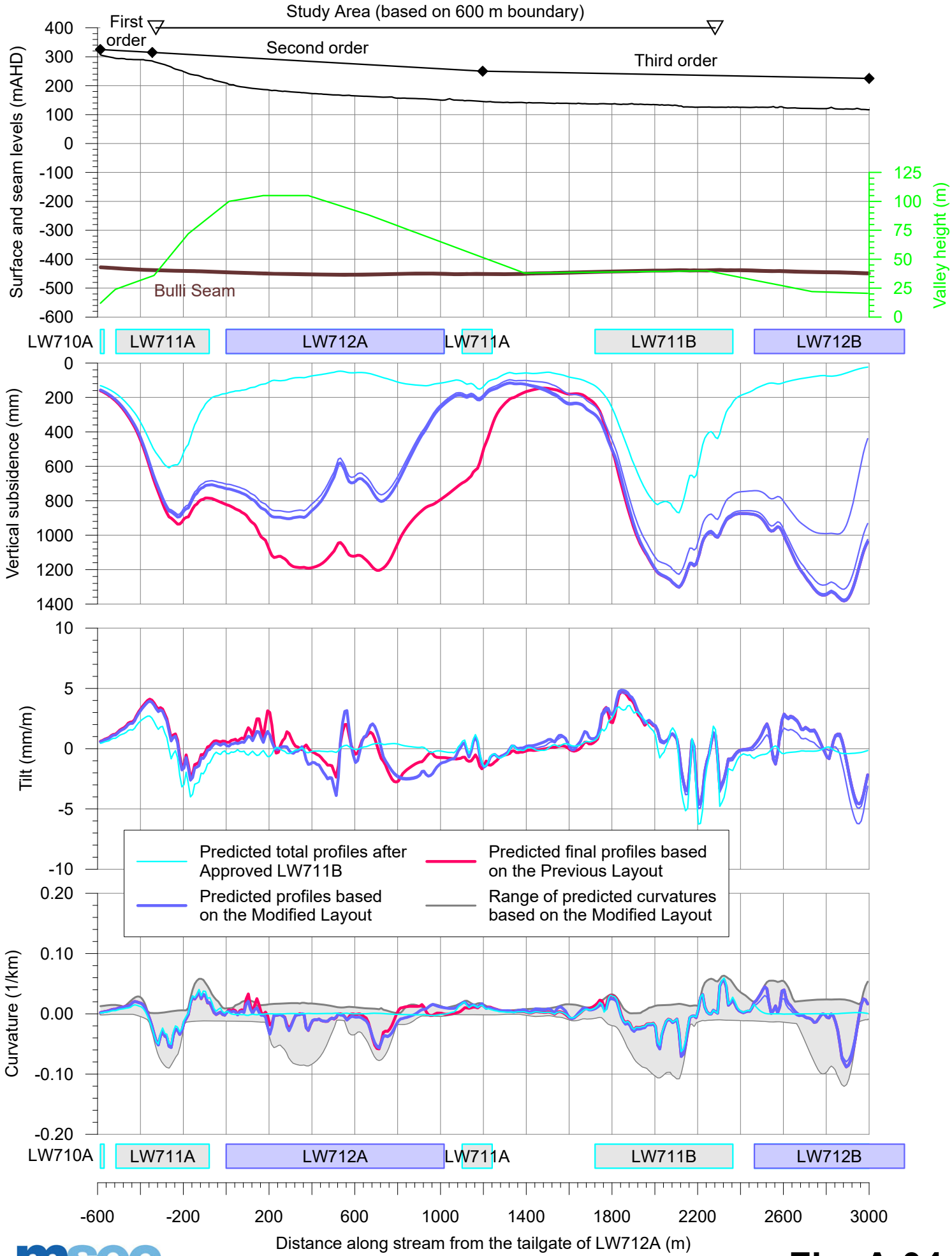
Predicted profiles of total vertical subsidence, tilt and curvature along Prediction Line 3 due to mining in Area 7



msec

Fig. A.03

Predicted profiles of total vertical subsidence, tilt and curvature along Navigation Creek due to mining in Appin Area 7



msec

Fig. A.04

Predicted profiles of vertical subsidence, tilt and curvature along Tributary NavC20 due to mining in Appin Area 7

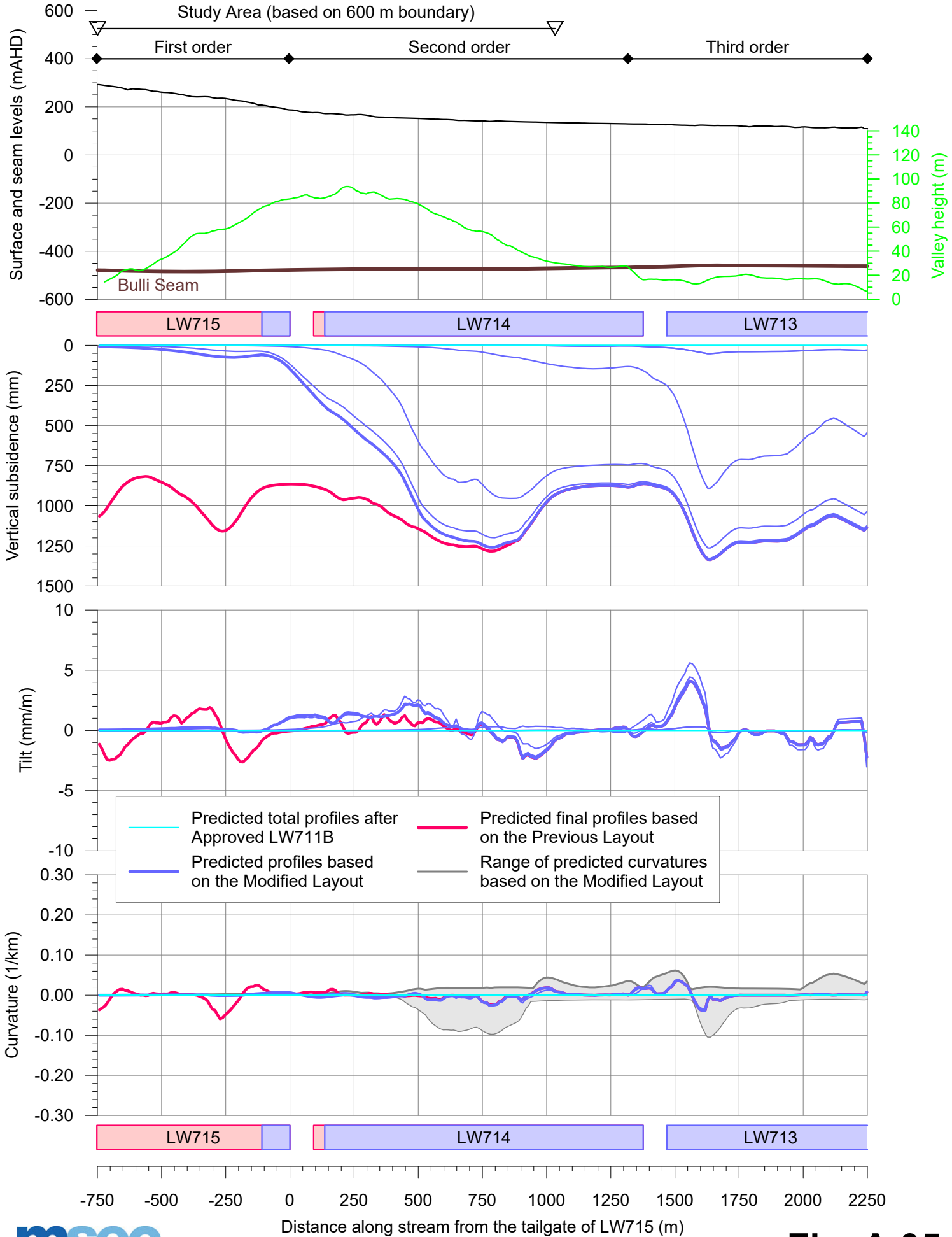
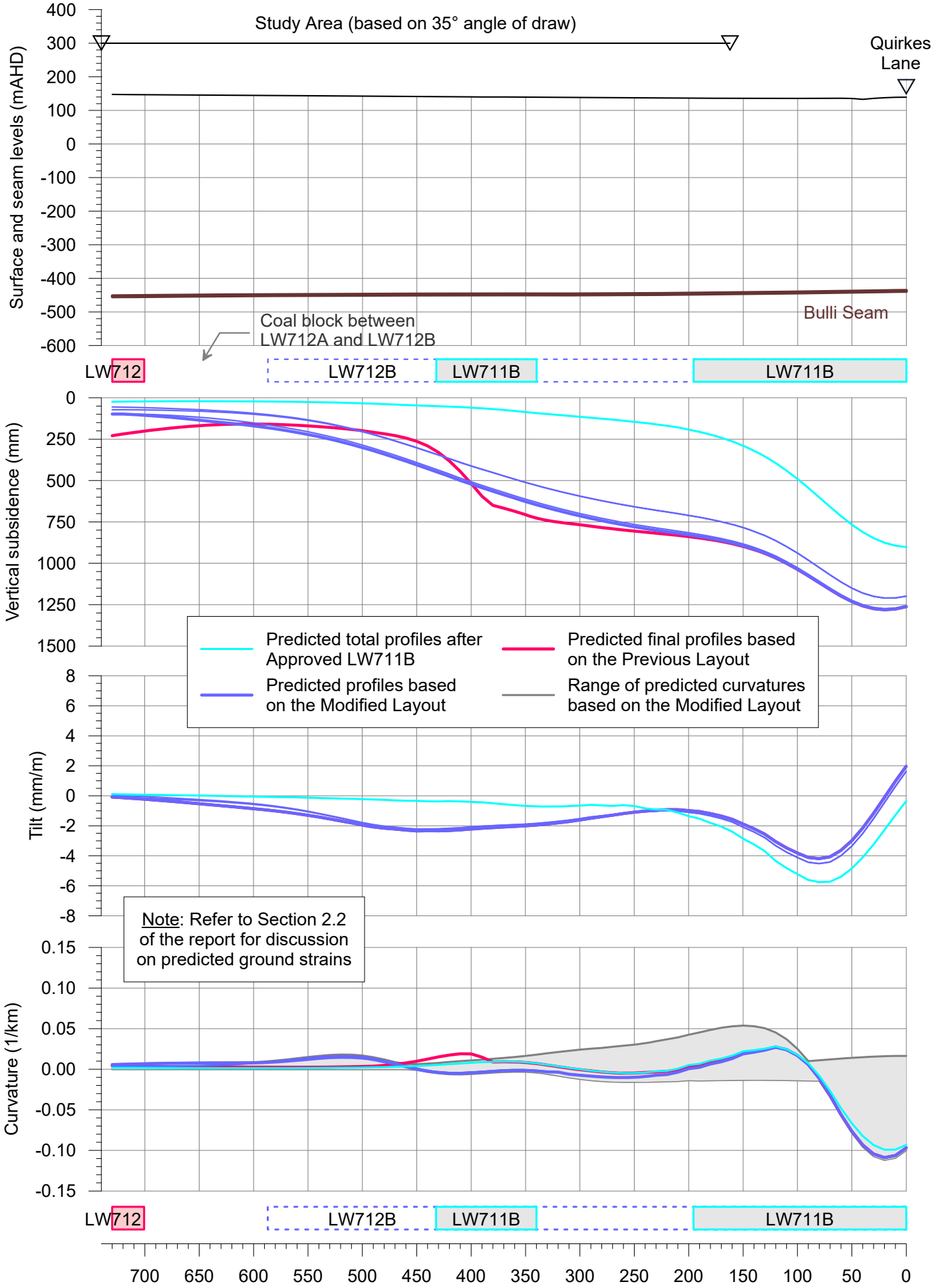


Fig. A.05

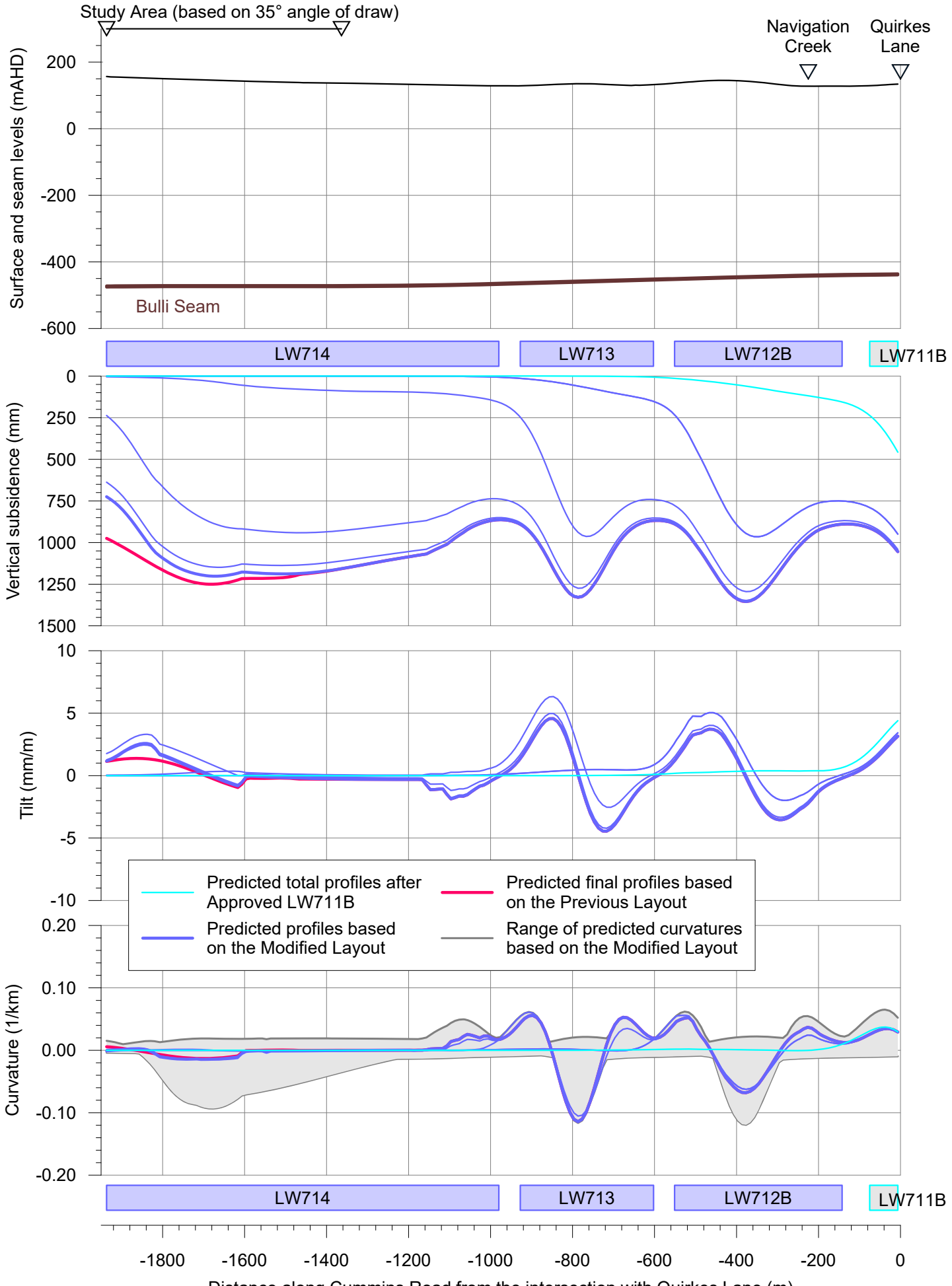
Predicted profiles of total vertical subsidence, tilt and curvature along Burrells Road due to mining in Appin Area 7



msec

Fig. A.06

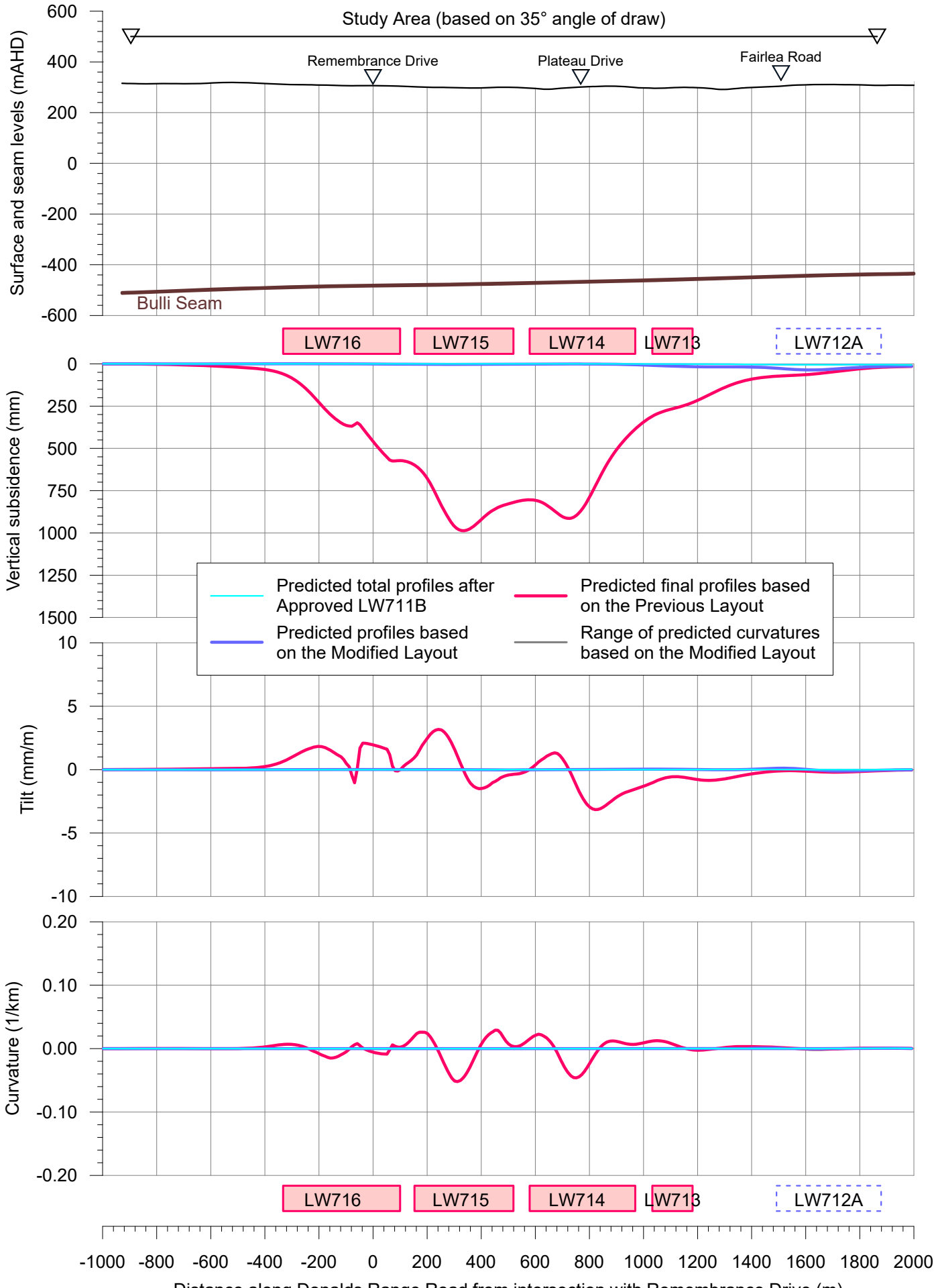
Predicted profiles of total vertical subsidence, tilt and curvature along Cummins Road due to mining in Appin Area 7



msec

Fig. A.07

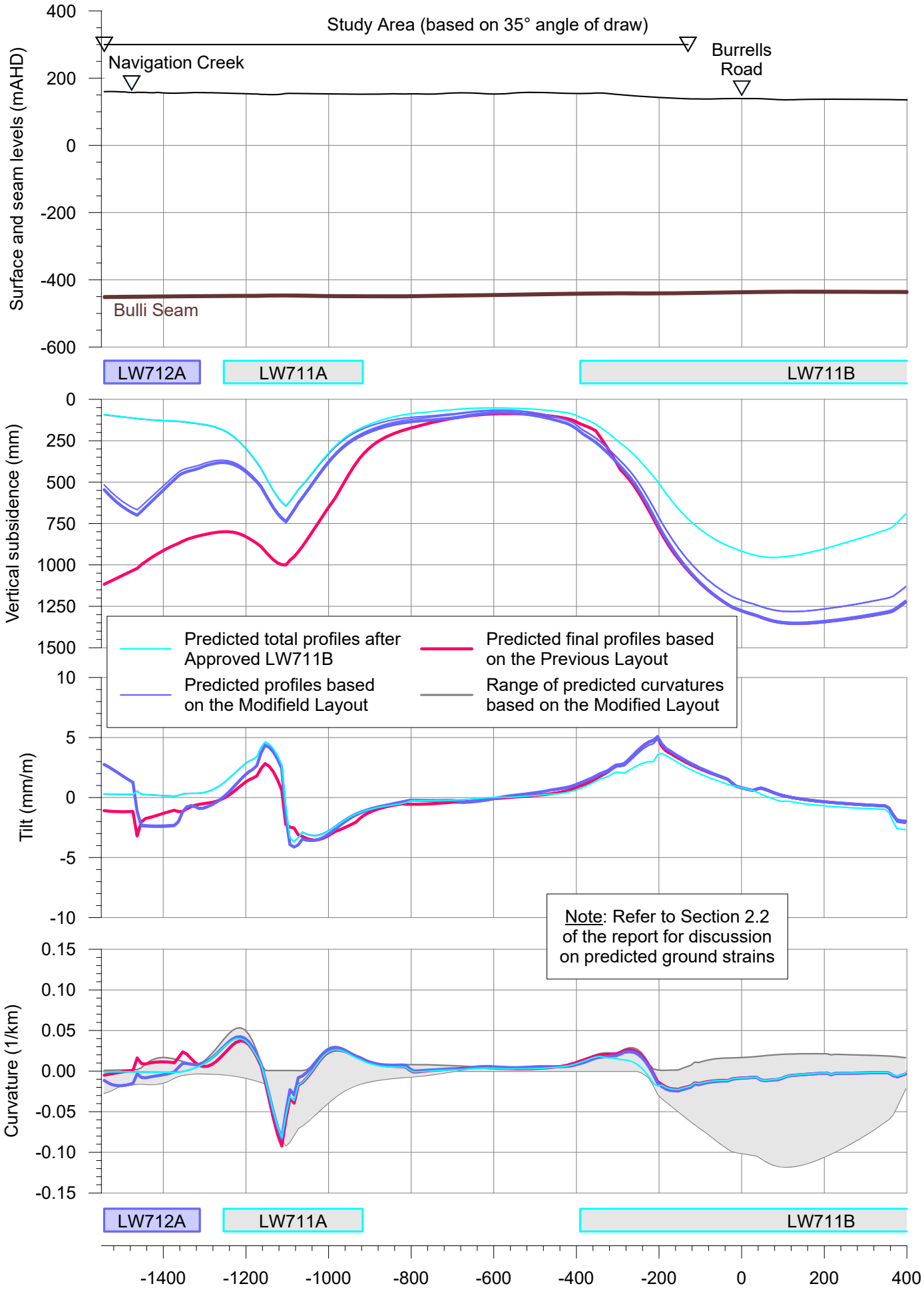
Predicted profiles of total vertical subsidence, tilt and curvature along Donalds Range Road due to mining in Appin Area 7



msec

Fig. A.08

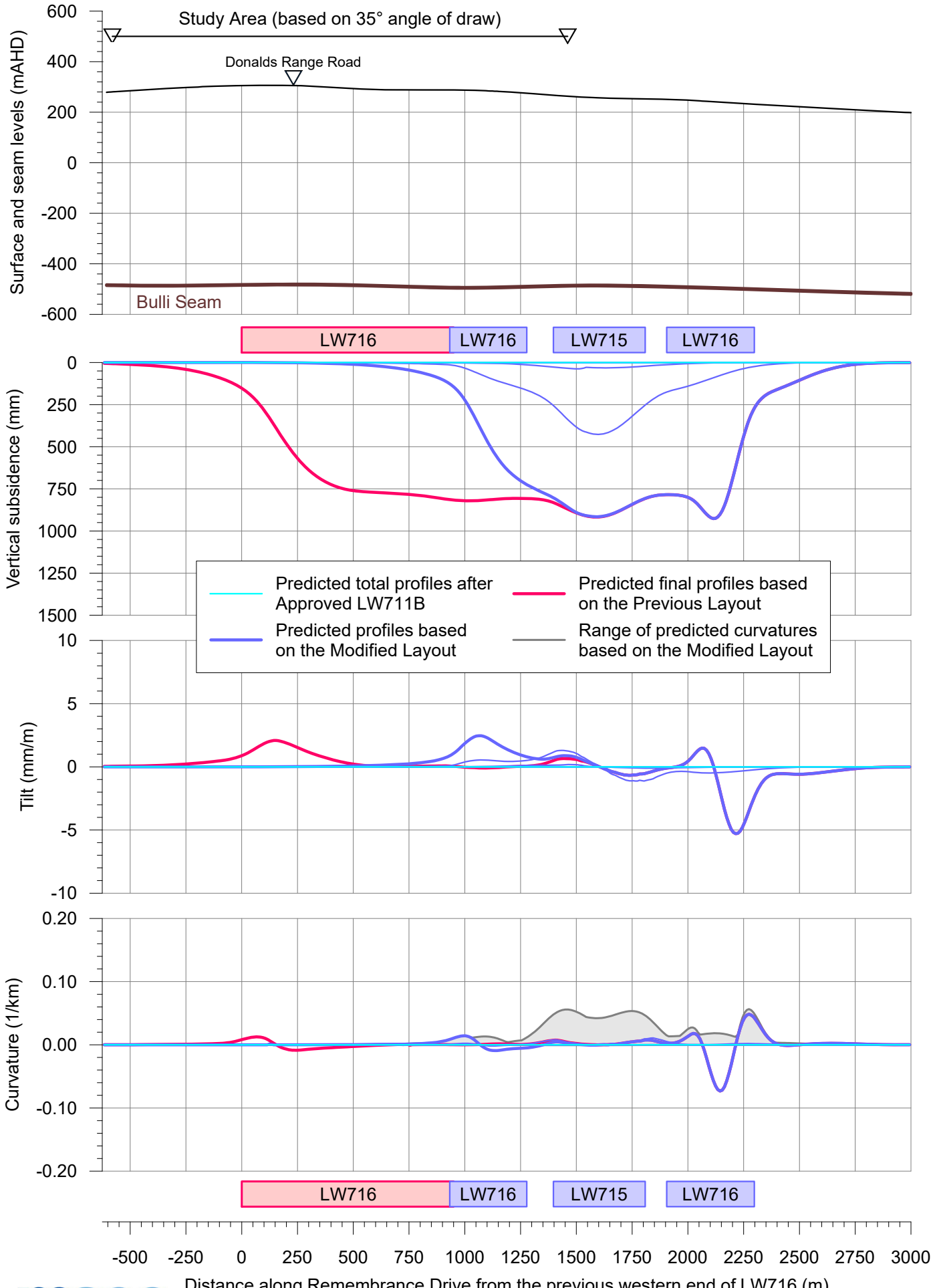
Predicted profiles of total vertical subsidence, tilt and curvature along Quirkes Lane due to mining in Area 7



msec

Fig. A.09

Predicted profiles of total vertical subsidence, tilt and curvature along Remembrance Drive due to mining in Appin Area 7



msec

Fig. A.10

APPENDIX B. TABLES

Table B.01 - Predicted subsidence effects for the houses based on the Previous Layout

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW716 (mm)	Predicted total tilt after LW716 (mm/m)	Predicted total hogging curvature after LW716 (1/km)	Predicted total sagging curvature after LW716 (1/km)	Predicted Probability of Nil or Category R0 Impact for Houses (%)	Predicted Probability of Category R1 or R2 Impact for Houses (%)	Predicted Probability of Category R3 and R4 Impact for Houses (%)	Predicted Probability of Category R5 Impact for Houses (%)
F20h01	287762	6217694	House	110	< 0.5	< 0.01	< 0.01	88.8	8.6	2.4	0.2
F31a	287789	6217790	House	140	0.5	< 0.01	< 0.01	90.1	7.7	2.0	0.2
F43a	288017	6217834	House	425	3.5	0.03	< 0.01	67.2	21.8	9.4	1.7
F52h01	287830	6218392	House	1150	4.0	0.06	0.02	51.2	29.8	14.7	4.3
F52h02	287890	6218373	House	1275	4.5	0.02	0.10	45.1	33.4	15.3	6.1
K02a	288027	6218183	House	850	1.0	0.04	0.01	62.2	24.4	11.0	2.4
K03a	287915	6218126	House	800	1.5	0.03	< 0.01	68.6	20.9	8.9	1.6
K04a	288019	6218054	House	975	3.5	0.03	0.03	62.5	24.2	10.9	2.3
K04h01	288063	6218078	House	1075	3.5	0.04	0.04	56.9	27.1	12.8	3.3
K05a	287877	6217972	House	450	2.0	0.03	0.01	69.0	20.7	8.8	1.5
O06h01	286881	6217363	House	1250	5.5	0.04	0.14	43.8	34.1	15.5	6.6
O08h01	286784	6217319	House	1225	5.0	0.03	0.13	43.9	34.0	15.5	6.6
O14h01	286141	6217179	House	100	0.5	< 0.01	< 0.01	91.7	6.6	1.5	0.2
O15h01	286234	6217453	House	400	3.5	0.03	0.02	70.2	20.0	8.4	1.4
O16h01	285965	6217416	House	90	0.5	< 0.01	< 0.01	91.9	6.5	1.4	0.2
O19h01	286267	6217200	House	225	2.0	0.02	< 0.01	77.9	15.4	5.9	0.9
O21h01	286000	6217328	House	80	< 0.5	< 0.01	< 0.01	92.8	5.9	1.1	0.2
O21h02	285981	6217329	House	80	< 0.5	< 0.01	< 0.01	93.0	5.8	1.1	0.2
O21r15	286007	6217358	House	100	0.5	< 0.01	< 0.01	91.8	6.6	1.4	0.2
O22h01	286159	6217327	House	150	1.0	< 0.01	< 0.01	86.6	10.1	3.0	0.3
P44h01	285835	6217231	House	30	< 0.5	< 0.01	< 0.01	94.4	4.8	0.6	0.1
P45h01	285877	6217373	House	50	< 0.5	< 0.01	< 0.01	93.5	5.5	0.9	0.1
P46h01	285786	6217437	House	40	< 0.5	< 0.01	< 0.01	94.2	4.9	0.7	0.1
P47h01	285628	6217482	House	< 20	< 0.5	< 0.01	< 0.01	94.8	4.6	0.5	0.1
R01h01	286371	6217570	House	975	3.0	< 0.01	0.07	49.4	30.8	15.0	4.7
R02h01	286259	6217551	House	625	4.0	0.02	0.04	58.2	26.4	12.3	3.1
R03h01	286247	6217744	House	650	2.5	0.02	0.01	75.9	16.6	6.5	1.0
R03h02	286227	6217764	House	650	3.0	0.02	0.01	71.5	19.2	8.0	1.3
R04h01	286107	6217577	House	225	2.0	0.02	< 0.01	77.0	16.0	6.1	0.9
R05h01	286154	6217711	House	425	3.0	0.02	< 0.01	77.0	15.9	6.1	0.9
R06h01	286138	6217766	House	475	3.5	0.02	< 0.01	76.2	16.4	6.4	1.0
R07h01	286160	6217885	House	825	4.0	< 0.01	0.06	51.7	29.6	14.5	4.2
R09h01	286322	6217891	House	1025	3.0	0.04	0.05	55.1	28.0	13.3	3.6
R10h01	285887	6217582	House	70	< 0.5	< 0.01	< 0.01	92.5	6.1	1.2	0.2
R10h02	285909	6217561	House	70	< 0.5	< 0.01	< 0.01	92.5	6.1	1.2	0.2
R11h01	285767	6217642	House	60	< 0.5	< 0.01	< 0.01	93.7	5.3	0.9	0.1
R12h01	285599	6217647	House	30	< 0.5	< 0.01	< 0.01	94.5	4.8	0.6	0.1
R13h01	285530	6217684	House	< 20	< 0.5	< 0.01	< 0.01	94.7	4.6	0.6	0.1
R16h01	285932	6217845	House	200	1.5	0.01	< 0.01	80.5	13.9	5.0	0.6
R17h01	285852	6218004	House	170	1.0	0.01	< 0.01	83.7	12.0	3.9	0.4
R18h01	285867	6218118	House	300	2.5	0.02	0.02	72.7	18.5	7.5	1.2
R19h01	286090	6218597	House	1000	2.5	0.04	0.01	61.5	24.7	11.3	2.5
R25h01	285048	6219264	House	< 20	< 0.5	< 0.01	< 0.01	95.3	4.2	0.4	0.1
R26h01	285130	6219185	House	< 20	< 0.5	< 0.01	< 0.01	95.2	4.3	0.4	0.1
R27h01	285176	6219130	House	< 20	< 0.5	< 0.01	< 0.01	95.1	4.4	0.4	0.1
R27h02	285186	6219097	House	< 20	< 0.5	< 0.01	< 0.01	95.1	4.4	0.4	0.1
R28h01	285298	6218990	House	20	< 0.5	< 0.01	< 0.01	93.0	5.8	1.1	0.2
R28h02	285287	6219067	House	< 20	< 0.5	< 0.01	< 0.01	94.5	4.8	0.6	0.1
R31h01	286133	6218586	House	975	2.5	0.04	0.01	60.9	25.1	11.4	2.6
R32h01	286273	6218322	House	1175	3.0	0.02	0.08	47.1	32.2	15.1	5.5
R33h01	286358	6218305	House	1075	3.0	0.04	0.02	58.8	26.1	12.1	3.0
R34h01	286499	6218263	House	875	< 0.5	0.04	0.01	61.5	24.7	11.2	2.5

Table B.01 - Predicted subsidence effects for the houses based on the Previous Layout

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW716 (mm)	Predicted total tilt after LW716 (mm/m)	Predicted total hogging curvature after LW716 (1/km)	Predicted total sagging curvature after LW716 (1/km)	Predicted Probability of Nil or Category R0 Impact for Houses (%)	Predicted Probability of Category R1 or R2 Impact for Houses (%)	Predicted Probability of Category R3 and R4 Impact for Houses (%)	Predicted Probability of Category R5 Impact for Houses (%)
R35h01	286281	6218174	House	875	1.0	0.03	0.01	67.0	21.9	9.4	1.7
R36h01	286164	6218120	House	775	1.5	0.02	0.01	75.6	16.8	6.6	1.0
R37h01	286192	6218006	House	900	3.0	0.04	0.02	59.2	25.9	12.0	2.9
R40h01	286285	6219169	House	900	2.0	0.02	0.09	46.3	32.8	15.2	5.8
R41h01	286681	6219327	House	900	1.5	0.03	0.04	61.2	24.9	11.4	2.6
S01h01	287848	6218090	House	700	2.5	0.04	< 0.01	62.0	24.5	11.1	2.4
S02h01	287734	6218066	House	325	3.0	0.04	< 0.01	56.3	27.4	13.0	3.4
S03h01	287611	6218034	House	375	4.0	0.04	< 0.01	57.6	26.7	12.5	3.2
S04h01	287686	6218267	House	975	2.0	0.03	0.09	46.4	32.6	15.2	5.7
S04h02	287655	6218267	House	900	1.5	0.01	0.06	50.0	30.4	15.0	4.5
S05h01	287545	6218230	House	825	1.0	0.02	0.05	54.3	28.4	13.6	3.8
S05h02	287523	6218236	House	825	1.0	0.02	0.03	68.6	20.9	8.9	1.6
S09a	287314	6218064	House	1200	4.0	0.02	0.12	44.2	33.9	15.4	6.5
S09h02	287314	6218083	House	1200	4.0	0.03	0.12	44.3	33.9	15.4	6.5
S10h01	287155	6218025	House	1175	3.5	0.03	0.07	48.2	31.5	15.1	5.2
S11h01	286987	6217783	House	1075	3.5	0.04	0.03	60.9	25.1	11.5	2.6
S12h01	287353	6217976	House	1125	5.5	0.06	0.07	48.1	31.6	15.1	5.2
S12h02	287387	6217976	House	1000	5.5	0.06	0.03	50.3	30.2	15.0	4.4
S14h01	287638	6217928	House	180	< 0.5	0.01	< 0.01	81.4	13.4	4.7	0.6
S14h02	287663	6217945	House	160	< 0.5	0.01	< 0.01	80.4	13.9	5.0	0.7
S14h03	287687	6217946	House	160	< 0.5	0.01	< 0.01	81.0	13.6	4.8	0.6
S15h01	287494	6218552	House	1300	4.0	0.02	0.14	43.9	34.0	15.5	6.6
S16h01	287526	6218742	House	925	1.0	0.06	< 0.01	51.4	29.7	14.7	4.2
S17h01	287344	6218817	House	1200	3.5	0.04	0.07	48.4	31.5	15.1	5.1
S18h01	287112	6218816	House	1225	3.5	0.02	0.09	46.5	32.6	15.2	5.7
S18h02	287083	6218813	House	1200	3.5	0.02	0.08	47.4	32.0	15.1	5.4
S18h03	287056	6218803	House	1200	3.5	0.02	0.08	47.5	32.0	15.1	5.4
S20h01	286451	6219119	House	825	< 0.5	0.02	0.01	76.6	16.2	6.3	0.9
S21h01	286831	6218885	House	900	1.0	0.03	0.01	64.5	23.2	10.3	2.0
S22h01	286958	6218853	House	925	2.0	0.05	< 0.01	53.1	29.0	14.0	4.0
S22h02	286930	6218868	House	875	1.0	0.05	0.01	53.7	28.6	13.8	3.9
S23h01	287047	6218932	House	875	1.0	0.05	0.01	55.0	28.0	13.3	3.6
S24h01	287142	6218955	House	925	2.0	0.05	< 0.01	52.7	29.1	14.2	4.0
S24h02	287121	6218962	House	900	1.0	0.05	0.01	53.9	28.5	13.7	3.8
S25h01	287221	6218929	House	1100	4.0	0.05	0.01	52.5	29.2	14.2	4.1
S25h02	287251	6218928	House	1150	4.0	0.05	0.04	53.4	28.8	13.9	3.9
S43h01	287601	6218797	House	900	1.0	0.05	0.01	54.1	28.5	13.7	3.8
S44h01	287627	6218612	House	1325	3.5	0.02	0.13	44.1	33.9	15.5	6.5
S45h01	286971	6219185	House	1175	4.0	0.03	0.09	46.2	32.8	15.2	5.8
			Maximum	**1325**	**5.5**	**0.06**	**0.14**				

Table B.02 - Predicted subsidence effects for the houses based on the Modified Layout

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW716 (mm)	Predicted total tilt after LW716 (mm/m)	Predicted total hogging curvature after LW716 (1/km)	Predicted total sagging curvature after LW716 (1/km)	Predicted Probability of Nil or Category R0 Impact for Houses (%)	Predicted Probability of Category R1 or R2 Impact for Houses (%)	Predicted Probability of Category R3 and R4 Impact for Houses (%)	Predicted Probability of Category R5 Impact for Houses (%)
F20h01	287762	6217694	House	100	< 0.5	< 0.01	< 0.01	88.2	9.0	2.5	0.3
F31a	287789	6217790	House	150	1.0	< 0.01	< 0.01	86.3	10.3	3.1	0.3
F43a	288017	6217834	House	425	3.5	0.03	< 0.01	68.6	20.9	8.9	1.6
F52h01	287830	6218392	House	1075	4.0	0.05	0.02	52.7	29.1	14.2	4.0
F52h02	287890	6218373	House	1225	4.0	0.01	0.09	45.7	33.1	15.2	6.0
K02a	288027	6218183	House	825	1.0	0.04	0.02	62.2	24.4	11.0	2.4
K03a	287915	6218126	House	725	2.0	0.02	0.01	70.5	19.8	8.3	1.4
K04a	288019	6218054	House	950	3.5	0.03	0.03	62.5	24.2	10.9	2.3
K04h01	288063	6218078	House	1075	4.0	0.04	0.04	56.9	27.1	12.8	3.3
K05a	287877	6217972	House	500	2.5	0.02	0.02	78.8	14.9	5.5	0.8
O06h01	286881	6217363	House	1225	5.0	0.04	0.14	43.8	34.1	15.5	6.6
O08h01	286784	6217319	House	1200	5.0	0.02	0.13	43.9	34.0	15.5	6.6
O14h01	286141	6217179	House	90	0.5	< 0.01	< 0.01	91.7	6.6	1.5	0.2
O15h01	286234	6217453	House	300	2.5	0.02	0.02	76.6	16.2	6.3	1.0
O16h01	285965	6217416	House	60	< 0.5	< 0.01	< 0.01	91.8	6.6	1.4	0.2
O19h01	286267	6217200	House	200	1.5	0.02	< 0.01	79.1	14.7	5.4	0.8
O21h01	286000	6217328	House	60	< 0.5	< 0.01	< 0.01	93.2	5.6	1.0	0.1
O21h02	285981	6217329	House	50	< 0.5	< 0.01	< 0.01	93.1	5.7	1.1	0.2
O21r15	286007	6217358	House	60	< 0.5	< 0.01	< 0.01	91.9	6.5	1.4	0.2
O22h01	286159	6217327	House	110	0.5	< 0.01	< 0.01	88.5	8.8	2.4	0.3
P44h01	285835	6217231	House	< 20	< 0.5	< 0.01	< 0.01	94.7	4.6	0.5	0.1
P45h01	285877	6217373	House	30	< 0.5	< 0.01	< 0.01	93.4	5.5	0.9	0.1
P46h01	285786	6217437	House	< 20	< 0.5	< 0.01	< 0.01	94.5	4.7	0.6	0.1
P47h01	285628	6217482	House	< 20	< 0.5	< 0.01	< 0.01	95.1	4.3	0.4	0.1
R01h01	286371	6217570	House	725	3.5	< 0.01	0.07	49.4	30.8	15.0	4.7
R02h01	286259	6217551	House	425	3.5	0.01	0.04	58.7	26.1	12.2	3.0
R03h01	286247	6217744	House	140	1.0	0.02	< 0.01	75.9	16.6	6.5	1.0
R03h02	286227	6217764	House	120	0.5	< 0.01	< 0.01	86.4	10.2	3.1	0.3
R04h01	286107	6217577	House	100	1.0	< 0.01	< 0.01	85.6	10.8	3.3	0.3
R05h01	286154	6217711	House	80	0.5	< 0.01	< 0.01	86.4	10.3	3.1	0.3
R06h01	286138	6217766	House	70	0.5	< 0.01	< 0.01	92.1	6.4	1.3	0.2
R07h01	286160	6217885	House	70	< 0.5	< 0.01	< 0.01	93.8	5.2	0.8	0.1
R09h01	286322	6217891	House	120	< 0.5	< 0.01	< 0.01	93.0	5.8	1.1	0.2
R10h01	285887	6217582	House	< 20	< 0.5	< 0.01	< 0.01	93.5	5.4	0.9	0.1
R10h02	285909	6217561	House	20	< 0.5	< 0.01	< 0.01	93.2	5.6	1.0	0.1
R11h01	285767	6217642	House	< 20	< 0.5	< 0.01	< 0.01	95.2	4.3	0.4	0.1
R12h01	285599	6217647	House	< 20	< 0.5	< 0.01	< 0.01	95.3	4.2	0.4	0.1
R13h01	285530	6217684	House	< 20	< 0.5	< 0.01	< 0.01	95.4	4.2	0.4	0.1
R16h01	285932	6217845	House	< 20	< 0.5	< 0.01	< 0.01	94.4	4.8	0.6	0.1
R17h01	285852	6218004	House	< 20	< 0.5	< 0.01	< 0.01	95.1	4.3	0.4	0.1
R18h01	285867	6218118	House	< 20	< 0.5	< 0.01	< 0.01	95.2	4.3	0.4	0.1
R19h01	286090	6218597	House	< 20	< 0.5	< 0.01	< 0.01	94.9	4.5	0.5	0.1
R25h01	285048	6219264	House	< 20	< 0.5	< 0.01	< 0.01	95.4	4.1	0.3	0.1
R26h01	285130	6219185	House	< 20	< 0.5	< 0.01	< 0.01	95.4	4.1	0.3	0.1
R27h01	285176	6219130	House	< 20	< 0.5	< 0.01	< 0.01	95.4	4.1	0.3	0.1
R27h02	285186	6219097	House	< 20	< 0.5	< 0.01	< 0.01	95.4	4.1	0.3	0.1
R28h01	285298	6218990	House	< 20	< 0.5	< 0.01	< 0.01	95.4	4.1	0.3	0.1
R28h02	285287	6219067	House	< 20	< 0.5	< 0.01	< 0.01	95.4	4.1	0.3	0.1
R31h01	286133	6218586	House	< 20	< 0.5	< 0.01	< 0.01	94.9	4.5	0.5	0.1
R32h01	286273	6218322	House	< 20	< 0.5	< 0.01	< 0.01	94.2	5.0	0.7	0.1
R33h01	286358	6218305	House	< 20	< 0.5	< 0.01	< 0.01	94.3	4.9	0.7	0.1
R34h01	286499	6218263	House	< 20	< 0.5	< 0.01	< 0.01	93.2	5.7	1.0	0.1

Table B.02 - Predicted subsidence effects for the houses based on the Modified Layout

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW716 (mm)	Predicted total tilt after LW716 (mm/m)	Predicted total hogging curvature after LW716 (1/km)	Predicted total sagging curvature after LW716 (1/km)	Predicted Probability of Nil or Category R0 Impact for Houses (%)	Predicted Probability of Category R1 or R2 Impact for Houses (%)	Predicted Probability of Category R3 and R4 Impact for Houses (%)	Predicted Probability of Category R5 Impact for Houses (%)
R35h01	286281	6218174	House	< 20	< 0.5	< 0.01	< 0.01	93.4	5.5	0.9	0.1
R36h01	286164	6218120	House	< 20	< 0.5	< 0.01	< 0.01	93.7	5.3	0.8	0.1
R37h01	286192	6218006	House	40	< 0.5	< 0.01	< 0.01	93.4	5.5	1.0	0.1
R40h01	286285	6219169	House	150	1.0	< 0.01	0.01	81.8	13.1	4.6	0.6
R41h01	286681	6219327	House	850	1.5	0.02	0.03	63.1	24.0	10.7	2.2
S01h01	287848	6218090	House	600	2.5	0.02	0.01	76.7	16.1	6.2	0.9
S02h01	287734	6218066	House	325	2.5	0.02	< 0.01	73.2	18.2	7.4	1.2
S03h01	287611	6218034	House	180	1.5	0.01	< 0.01	83.2	12.3	4.1	0.4
S04h01	287686	6218267	House	850	4.0	0.03	0.06	50.6	30.1	14.9	4.3
S04h02	287655	6218267	House	675	3.5	0.03	0.03	66.4	22.2	9.6	1.7
S05h01	287545	6218230	House	400	2.5	0.02	< 0.01	76.5	16.2	6.3	1.0
S05h02	287523	6218236	House	350	2.0	0.02	< 0.01	76.5	16.3	6.3	1.0
S09a	287314	6218064	House	180	1.0	< 0.01	< 0.01	84.7	11.4	3.6	0.3
S09h02	287314	6218083	House	160	1.0	< 0.01	< 0.01	85.9	10.6	3.2	0.3
S10h01	287155	6218025	House	450	4.0	0.02	0.03	65.7	22.6	9.9	1.8
S11h01	286987	6217783	House	875	2.0	0.03	0.03	63.6	23.7	10.6	2.2
S12h01	287353	6217976	House	200	1.0	0.01	< 0.01	82.9	12.5	4.2	0.5
S12h02	287387	6217976	House	170	1.0	< 0.01	< 0.01	85.5	10.9	3.4	0.3
S14h01	287638	6217928	House	130	< 0.5	< 0.01	< 0.01	86.6	10.1	3.0	0.3
S14h02	287663	6217945	House	150	0.5	< 0.01	< 0.01	86.3	10.3	3.1	0.3
S14h03	287687	6217946	House	170	1.0	< 0.01	< 0.01	86.0	10.5	3.2	0.3
S15h01	287494	6218552	House	1075	3.5	< 0.01	0.09	46.1	32.8	15.2	5.8
S16h01	287526	6218742	House	900	1.0	0.05	0.01	53.4	28.8	13.9	3.9
S17h01	287344	6218817	House	1175	4.0	0.04	0.07	48.3	31.5	15.1	5.1
S18h01	287112	6218816	House	1075	3.5	0.02	0.09	45.5	33.2	15.3	6.0
S18h02	287083	6218813	House	950	3.0	0.02	0.07	48.4	31.5	15.1	5.1
S18h03	287056	6218803	House	875	2.5	0.01	0.06	50.0	30.4	15.0	4.5
S20h01	286451	6219119	House	300	2.5	0.01	< 0.01	80.7	13.7	4.9	0.6
S21h01	286831	6218885	House	650	1.5	0.04	0.01	62.0	24.5	11.1	2.4
S22h01	286958	6218853	House	700	1.0	0.02	0.01	74.5	17.4	7.0	1.1
S22h02	286930	6218868	House	700	1.0	0.02	0.01	76.9	16.0	6.2	0.9
S23h01	287047	6218932	House	825	1.0	0.04	< 0.01	58.6	26.2	12.2	3.0
S24h01	287142	6218955	House	875	1.5	0.06	0.01	51.9	29.5	14.5	4.2
S24h02	287121	6218962	House	850	0.5	0.05	0.01	53.8	28.6	13.7	3.9
S25h01	287221	6218929	House	1075	3.5	0.05	0.01	53.0	29.0	14.0	4.0
S25h02	287251	6218928	House	1125	3.5	0.05	0.04	53.9	28.5	13.7	3.8
S43h01	287601	6218797	House	900	1.0	0.05	0.01	54.7	28.1	13.4	3.7
S44h01	287627	6218612	House	1275	3.0	0.01	0.11	44.5	33.8	15.4	6.4
S45h01	286971	6219185	House	1175	4.0	0.03	0.09	45.5	33.2	15.3	6.0
			Maximum	**1275**	**5.0**	**0.06**	**0.14**				

APPENDIX C. DRAWINGS

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APPIN COLLIERY
MODIFIED LW7112 TO LW716
GENERAL LAYOUT

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-01	A

LEGEND
- MODIFIED LAYOUT
- PREVIOUS LAYOUT

GDA2020

Amended Extraction Plan Area

Study Area based on 600m Boundary

Study Area based on 35° Angle of Draw

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710B
LW 710A
LW 709
LW 708B
LW 708A
LW 707B
LW 707A
LW 706

910m
910m
1120m
1485m
375m

REMEMBRANCE DR
DAWSONS RD
FINNS ROAD
MENANGLE ROAD
DONALDS RANGE RD
OLD RAZORBACK RD
CUMMINS RD
CARROLLS ROAD
QUIRKES LANE
PLATEAU DR
BURRELLS RD
HAWKEY ROAD
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD

Matahil Ck
Navigation Ck
Apps Gully
Foot Onslow Ck

6220000
6219000
6218000
6217000

286000
287000
288000
289000
290000

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SURFACE LEVEL CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-02	A

LEGEND
MODIFIED LAYOUT
PREVIOUS LAYOUT

GDA2020

SURFACE LEVEL CONTOURS ARE IN m AHD

SCALE 0m 250m 500m

Study Area based on 35° Angle of Draw

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

Section 1
Section 2
Section 3

DONALDS RANGE RD
REMEMBRANCE DR
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD
DAWSONS RD
Navigation Ck
Hooks Gully

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BULLI SEAM FLOOR CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-03	A

LEGEND
MODIFIED LAYOUT
PREVIOUS LAYOUT

GDA2020

SEAM FLOOR CONTOURS ARE IN m AHD

SCALE 0m 250m 500m

Study Area based on 35° Angle of Draw

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

Section 1
Section 2
Section 3

REMEMBRANCE DR
DAWSONS RD
DONALDS RANGE RD
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD
Matahill Ck
Apps Gully
Navigation Ck

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BULLI SEAM THICKNESS CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-04	A

LEGEND
MODIFIED LAYOUT
PREVIOUS LAYOUT

GDA2020

SEAM THICKNESS CONTOURS ARE IN METRES

0m 250m 500m
SCALE

Study Area based on 35° Angle of Draw

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

Section 1
Section 2
Section 3

REMEMBRANCE DR
DONALDS RANGE RD
DAWSONS RD
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD
Matahil Ck
Apps Gully
Navigation Ck

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BULLI SEAM DEPTH OF COVER CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-05	A

LEGEND
MODIFIED LAYOUT
PREVIOUS LAYOUT

GDA2020

DEPTH OF COVER CONTOURS ARE IN METRES

SCALE 0m 250m 500m

Study Area based on 35° Angle of Draw

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

Section 1
Section 3
Section 2

REMEMBRANCE DR
DONALDS RANGE RD
DAWSONS RD
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD
Woronora Ck
Waratah Gully Ck

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MODIFIED LW7112 TO LW716
STREAMS

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-06	A

LEGEND
- MODIFIED LAYOUT
- PREVIOUS LAYOUT
- WATERCOURSES
- 5M SURFACE LEVEL CONTOURS

GDA2020

SCALE 0m 250m 500m

Study Area based on 600m Boundary

Study Area based on 35° Angle of Draw

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

MatC19 MatC17 MatC18 MatC20 MatC21 MatC22 MatC23 MatC24 MatC25 Matahil Ck

NavC14.5 NavC17 NavC19 NavC20 NavC20a NavC23 NavC25 NavC26 NavC27 NavC28 NavC29 NavC30 NavC31 NavC32 NavC33

NR20a2 NR20a2b NR20a3 NR20c NR20b1 NR20d

REMEMBRANCE DR
DAWSONS RD
DONALDS RANGE RD
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD
Navigation Ck
Apps Gully
AG5
AG4

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APPIN COLLIERY
MODIFIED LW7112 TO LW716
CLIFFS, MINOR CLIFFS & STEEP SLOPES

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-07	A

LEGEND
- MODIFIED LAYOUT
- PREVIOUS LAYOUT
- WATERCOURSES
- 5M SURFACE LEVEL CONTOURS
- STEEP SLOPES1:3 to1:2
- STEEP SLOPES1:2 to 1:1.5
- STEEP SLOPES1:1.5 to 1:1
- STEEP SLOPES GREATER THAN 1:1 to 2:1
- MINOR CLIFFS
- CLIFFS

GDA2020

Study Area based on 600m Boundary

Study Area based on 35° Angle of Draw

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

MCL01 MCL02 MCL03 MCL04 MCL05 MCL06 MCL07 MCL08 MCL09
RR-CL1 RR-CL2 RR-CL3 RR-CL4 RR-CL5 RR-CL6 RR-CL7 RR-CL8 MCL14

REMEMBRANCE DR
DONALDS RANGE RD
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD
DAWSONS RD
Apps Gully
Navigation Ck
Matahil Ck
AG4
AG5

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APPIN COLLIERY
MODIFIED LW7112 TO LW716
BUILT FEATURES AND HERITAGE SITES

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-08	A

LEGEND
- MODIFIED LAYOUT
- PREVIOUS LAYOUT
- HOUSES
- COMMERCIAL STRUCTURES
- PUBLIC AMENITIES & UTILITIES
- RURAL STRUCTURES
- POOLS
- DAMS
- ABORIGINAL HERITAGE SITES
- HISTORIC SITES
- 66kV POWERLINES
- 22kV POWERLINES
- 11kV POWERLINES OH
- 11kV POWERLINES UG
- LV POWERLINES
- OPTICAL FIBRE CABLES
- COPPER CABLES

SCALE 0m 250m 500m

GDA2020

Study Area based on 35° Angle of Draw

LW 716 LW 715 LW 714 LW 713 LW 712B LW 712A LW 711B LW 711A LW 710A LW 905 LW 904

66kV Powerline

REMEMBRANCE DR
DONALDS RANGE RD
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
STONEBROOK MEADOWS RD
TOP RIDGE RD
GIBRALTAR DR
DAWSONS RD

Mt Hercules homestead ruins, well, trees and slab garage
Dairy No.9 (AMAI Cottage 24)
Slab Hut
Matahill Ck
Apps Gully
Navigation Ck

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APPIN COLLIERY
MODIFIED LW7112 TO LW716
PREDICTED ADDITIONAL SUBSIDENCE
CONTOURS DUE TO LW712 TO LW716

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-09	A

LEGEND
SUBSIDENCE CONTOUR COLOUR SCALE (mm)
1600
1400
1200
1000
800
600
400
200
100
50
20

NOTE:
The value of the Subsidence Contours, from the outside to the inside of the panels, are 20mm, 50mm, 100mm, 200mm, and so forth, in 100mm increments.

0m 250m 500m
SCALE

Predicted subsidence contours based on the Modified Layout

Predicted 20mm subsidence contour based on the Previous Layout

Prediction Line 1

Prediction Line 2

Prediction Line 3

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

DAWSONS RD
REMEMBRANCE DR
DONALDS RANGE RD
CUMMINS RD
PLATEAU DR
BURRELL ST
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD

Matahil Ck
Apps Gully
Navigation Ck

LEGEND
MODIFIED LAYOUT
PREVIOUS LAYOUT

N
GDA2020

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APPIN COLLIERY
MODIFIED LW7112 TO LW716
PREDICTED TOTAL SUBSIDENCE CONTOURS
AFTER LW716

DATE:	SCALE:	DRAWING No:	Rev No
7 Aug 2026	as shown	MSEC1553-10	A

LEGEND
SUBSIDENCE CONTOUR COLOUR SCALE (mm)
1600
1400
1200
1000
800
600
400
200
100
50
20

NOTE:
The value of the Subsidence Contours, from the outside to the inside of the panels, are 20mm, 50mm, 100mm, 200mm, and so forth, in 100mm increments.

0m 250m 500m
SCALE

Predicted subsidence contours based on the Modified Layout

Predicted 20mm subsidence contour based on the Previous Layout

Prediction Line 1

Prediction Line 2

Prediction Line 3

LW 716
LW 715
LW 714
LW 713
LW 712B
LW 712A
LW 711B
LW 711A
LW 710A
LW 905
LW 904

DAWSONS RD
REMEMBRANCE DR
DONALDS RANGE RD
CUMMINS RD
PLATEAU DR
BURRELLS RD
QUIRKES LANE
FAIRLEA RD
GIBRALTAR DR
STONEBROOK MEADOWS RD
TOP RIDGE RD

Matahil Ck
Apps Gully
Navigation Ck

LEGEND
MODIFIED LAYOUT
PREVIOUS LAYOUT

N
GDA2020