REPORT: SUBSIDENCE PREDICTIONS AND IMPACT ASSESSMENTS

msec
mine subsidence
ENGINEERING CONSULTANTS

ILLAWARRA METALLURGICAL COAL:

Appin – Longwalls 709, 710A, 710B, 711 and 905

Subsidence Predictions and Impact Assessments for the Natural and Built Features due to the Extraction of the Proposed Longwalls 709, 710A, 710B, 711 and 905 at Appin Colliery

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Report produced to: support the Extraction Plan Application for the proposed Longwalls 709, 710A, 710B, 711 and 905 at Appin Colliery to be issued to the Department of Planning, Industry and Environment.

Previous reports: MSEC342 (Rev. C) – *The prediction of subsidence parameters and the assessment of mine subsidence impacts on natural features and surface infrastructure resulting from the extraction of proposed Longwalls 705 to 710 at Appin Colliery in support of the SMP Application*, dated 27 June 2008.

MSEC404 (Revision D) – *The prediction of subsidence parameters and the assessment of mine subsidence impacts on natural features and surface infrastructure resulting from the Bulli Seam Operations in support of the Part 3A Application*, dated 19 August 2009.

MSEC448 (Rev. B) – *Appin Colliery – Longwalls 901 to 904 – Subsidence predictions and impact assessments for natural features and surface infrastructure in support of the Extraction Plan*, dated 15 June 2012.

Background reports available at *www.minesubsidence.com*[1]:

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)

[1] Direct link: http://www.minesubsidence.com/index_files/page0004.htm

Illawarra Metallurgical Coal (IMC), a wholly owned subsidiary of South32 Limited (South32), operates Appin Colliery, which is in the Southern Coalfield of New South Wales. The colliery is currently operating in two mining areas, referred to as Area 7 and Area 9.

IMC is preparing an Extraction Plan (EP) Application for Longwalls 709, 710A, 710B, 711 and 905 (LW709 to LW711 and LW905) in the Bulli Seam. This subsidence report provides information to support the EP Application which will be submitted to the Department of Planning, Industry and Environment.

The predicted subsidence effects for the existing, approved and proposed longwalls in Appin Areas 7 and 9 have been obtained using the Incremental Profile Method (IPM). The IPM has been calibrated for the local conditions using the available ground movement monitoring data from Appin Colliery and other nearby collieries.

The maximum predicted total subsidence effects are 1550 mm vertical subsidence, 7 mm/m tilt (i.e. 0.7 %, or 1 in 143), 0.08 km^{-1} hogging curvature (i.e. minimum radius of curvature of 13 km) and 0.15 km^{-1} sagging curvature (i.e. minimum radius of curvature of 7 km). The maximum predicted strains (excluding valley-related effects) are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

The *Study Area* has been defined, as a minimum, as the surface area enclosed by the: 35° angle of draw line from the extents of the proposed LW709 to LW711 and LW905; and the predicted additional 20 mm subsidence contour due to the extraction of the proposed longwalls. The features that are located within but not limited to 600 m of the proposed longwalls and are predicted to experience far-field or valley-related effects and could be sensitive to these movements have also been included in the assessments provided in this report.

The assessments provided in this report should be read in conjunction with the assessments provided in the reports by other specialist consultants on the project. The main findings from this report are as follows:

- The Nepean River is located to the south and to the east of the proposed LW709 to LW711 and LW905. The thalweg (i.e. centreline) of the Nepean River is located at a minimum distance of 1.5 km from the proposed longwalls.

  The river is predicted to experience vertical subsidence, upsidence and closure of less than 20 mm. It is considered unlikely, therefore, that the Nepean River would experience adverse physical impacts due to the mining-induced movements from LW709 to LW711 and LW905. Gas release zones have been observed along the river during the mining of longwalls in Areas 7 and 9. Further gas release zones could develop due to the mining of the proposed longwalls.

- Third order streams within the Study Area comprise sections of Foot Onslow Creek, Harris Creek, Navigation Creek and Navigation Creek Tributary 1. The total length of the third order sections of the creeks above the mining area is 4.2 km and the total length within the Study Area is 6.8 km. There are also first and second order creeks and tributaries located across the Study Area.

  There are no predicted reversals of stream grade due to the proposed mining. It is considered unlikely, therefore, that there would be large-scale adverse changes in the levels of ponding or scouring of the banks along the creeks and tributaries within the Study Area due to the mining-induced tilt. It is possible that localised increased ponding could develop in some locations, where the natural grades are small, and upstream of the chain pillars and the edges of the mining area.

  Fracturing of the uppermost bedrock can occur along the streams that are located directly above or adjacent to the proposed mining area. Surface water flow diversions could occur along the creeks and tributaries that are located directly above the mining area. It is unlikely, however, that there would be a net loss of water from the catchment.

  Further assessments of the potential impacts on surface water are provided in the reports by the specialist surface water and groundwater consultants on the project.

- There are 7 cliffs that have been identified within the Study Area. The cliffs are located along Razorback Range in the western part of the Study Area and have formed in the sandstone members of the Wianamatta Group. The cliffs within the Study Area have lengths ranging between 25 m and 90 m and maximum heights ranging between 12 m and 20 m.

  There are three cliffs that are located directly above the proposed LW710A and LW905. These cliffs could experience fracturing and, where the exposed rock face is marginally stable, could result in cliff instabilities. It has been estimated that between 3 % and 5 % of the total length, or between 1 % and 3 % of the total face area of cliffs located above the mining area would experience adverse impacts.

  There are four other cliffs that are located within the Study Area but are outside the proposed mining area. It is possible that isolated rock falls could occur at these cliffs, but it is expected that on average this would represent less than 1 % of the total length or total face area of the cliffs.

- Rock outcrops are located across the Study Area, primarily along the Razorback Range and the incised creeks and tributaries. The extraction of the proposed longwalls is likely to result in fracturing of the rock outcrops and, where the rock is marginally stable, this could then result in instabilities. Previous experience in the Southern Coalfield indicates that the percentage of rock outcrops that are likely to be impacted by mining is very small, representing less than 3 % of the total surface area.
- The steep slopes within the Study Area have been identified along Razorback Range above LW710A, the western end of LW711 and above LW905. The surface soils for the steep slopes along Razorback Range have formed from the Wianamatta Group. The steep slopes along Razorback Range exhibit natural soil erosion.

  Mining beneath the steep slopes is expected to result in increased horizontal movements in the downslope direction, causing tension cracks to appear at the tops and along the sides of the slopes and compression ridges to form at the bottoms of the slopes. The crack widths are expected to be typically between 25 mm and 50 mm; however, larger cracks in the order of 100 mm to 150 mm or greater could also develop.

  There are built features located on and above the steep slopes along Razorback Range, including local roads, powerlines, telecommunications cables, houses, rural structures and survey control marks. It is recommended that monitoring and management strategies are developed for these built features, to identify localised and anomalous movements and to manage the potential impacts.
- The Main Southern Railway is located to the east of the proposed longwalls. The railway is situated immediately adjacent to the south-eastern corner of LW709 and it is 0.4 km from LW710B and 0.9 km from LW711, at its closest points. The infrastructure associated with the railway includes cuttings, embankments and culverts.

  The predicted additional subsidence for the railway due to the mining of the proposed longwalls is 150 mm. Only low level additional subsidence effects are predicted since the railway is located outside the proposed mining area.

  Monitoring and management plans have been developed for the mining of LW703 to LW708B, LW901 and LW902 directly beneath the railway. It is expected that the Main Southern Railway can be maintained in safe and serviceable conditions using the same strategies used for these existing longwalls.
- The M31 Hume Motorway is located 470 m from the south-eastern corner of LW709, at its closest point to the proposed longwalls. At this distance, the motorway is predicted to experience less than 20 mm vertical subsidence and it is not predicted to experience measurable tilts, curvatures or strains.

  It is anticipated therefore that the M31 Hume Motorway would not experience adverse impacts due to the mining of the proposed longwalls. It is expected that the motorway can be maintained in safe and serviceable conditions during the mining period using the same management strategies adopted for the existing longwalls at Appin Colliery.
- The Nepean Twin Bridges are located 2.5 km south of LW905, at their closest point to the proposed longwalls. The bridges will experience additional low-level far-field horizontal movements due to the mining of the proposed longwalls.

  Monitoring and management plans have been developed for the mining of LW701 to LW708B and LW901 to LW903. It is expected that the Nepean Twin Bridges can be maintained in safe and serviceable conditions using the same strategies used for these existing longwalls.
- Local roads are located across the Study Area and they are predicted to experience the full range of subsidence effects. It is expected that the local roads that are located directly above the proposed longwalls could experience cracking and heaving of the road surfaces. Previous experience of mining beneath local roads in the Southern Coalfield indicates that these impacts can be managed with the implementation of suitable management strategies.

  Hawkey Road traverses a ridgeline of Razorback Range above the maingate of the proposed LW905. Top Ridge Road, Gibraltar Drive and other local roads are located at the top of Razorback Range above the proposed LW710A and the western end of the proposed LW711. It is recommended that ground movement and visual monitoring are carried out along these roads during active subsidence to identify increased or irregular movements and to manage potential impacts.
- Moreton Park Road Bridge (North) and Moreton Park Road Bridge (South) are located 1.5 km and 0.6 km, respectively, from the proposed longwalls. The bridges will experience additional low-level far-field horizontal movements due to the mining of the proposed longwalls. Monitoring and management plans have been developed for the mining of LW701 to LW708B. It is expected that the bridges can be maintained in safe and serviceable conditions using the same strategies used for these existing longwalls.

- There is no potable water, sewerage or gas infrastructure located within the Study Area. There is infrastructure located outside the Study Area; however, it is not predicted to experience measurable conventional subsidence effects. It is not anticipated, therefore, that adverse impacts would occur to this infrastructure.

  A local sewer network is proposed to be constructed in the Menangle region in the next one to two years. The new infrastructure would need to be designed and constructed to accommodate mine subsidence effects prescribed by Subsidence Advisory NSW.

- There are 66 kV, 11 kV and low voltage powerlines located within the Study Area. Previous experience from the Southern Coalfield indicates that the powerlines could experience some minor impacts. It is expected that the remedial measures would include some adjustments of the cable catenaries, pole tilts and the consumer cables, as has been undertaken in the past, but any other impacts are expected to be relatively infrequent and easily repaired.

- The telecommunications infrastructure comprises direct buried optical fibre cables, underground copper cables and a telecommunications tower. Monitoring and management plans have been developed for the mining of LW703 to LW708B, LW901 and LW902 directly beneath the optical fibre and copper telecommunications cables. It is expected that these cables can be maintained in serviceable conditions using these same strategies.

  The telecommunications tower is located outside and adjacent to the maingate of LW905. It is recommended that the predicted subsidence effects for the telecommunications tower is provided to the infrastructure owner so that a detailed structural analysis can be undertaken of the tower and its associated infrastructure.

- There are 581 rural structures identified within the Study Area, which includes sheds, garages, gazebos, pergolas, greenhouses, playhouses, shade structures and other non-residential building structures. There is extensive experience of mining directly beneath rural building structures in the Southern Coalfield which indicates that the incidence of impacts on these structures is very low. It is expected, therefore, that these structures would remain safe and serviceable and that any impacts could be remediated using well established building techniques.

- There are 239 farm dams identified within the Study Area. Based on previous experience from the Southern Coalfield, it is expected that the incidence of impacts on the farm dams would be low. Cracking or leakage of water in the farm dam walls could be identified from visual inspections and repaired, as required.

- There are nine Aboriginal heritage sites located within the Study Area or within 600 m of the proposed longwalls, all of which are open sites. Surface cracking could occur near the sites that are located directly above the proposed longwalls. It is unlikely that the artefacts and deposits themselves would be impacted by surface cracking. It is possible, however, that if remediation of the surface were required after mining, that these works could potentially impact the Aboriginal heritage sites.

- The survey marks located directly above the proposed mining area could experience the full range of predicted movements. The survey control marks in the vicinity of the proposed longwalls could also experience small vertical subsidence and far-field horizontal movements. It may be necessary on the completion of the proposed longwalls, when the ground has stabilised, to re-establish any state survey control marks that are required for future use.

- There are 177 houses identified within the Study Area, of which, 30 are located directly above the existing longwalls, 76 are located above the proposed longwalls and 71 are located outside the mining area. The potential impacts on the houses have been assessed using the method developed as part of ACARP Research Project C12015, which is described in Appendix B.

  All houses within the Study Area are expected to remain safe and serviceable throughout the mining period, provided that they are in sound structural condition prior to mining. IMC has extensive experience of mining beneath houses at Appin and West Cliff Collieries. It has developed and acted in accordance with risk management plans to manage potential impacts to residential structures during the mining of LW701 to LW708 and LW901 to LW903.

  There are 8 houses located at the top of Razorback Range and directly above or adjacent to the proposed LW710A and the western end of the proposed LW711. These houses could experience increased effects due to the potential for non-conventional ground movements.

  A Landslide Risk Assessment has been carried out and the key conclusion is that the "*results of the preliminary investigations indicate that the structures located on the identified steep slopes should be able to be effectively managed, using the techniques and management tools available and previously employed in similar geotechnical circumstances, to permit Appin Mine to extract the proposed longwalls*" (GHD, 2021d).

Geotechnical inspections have been carried out for three of the properties located at the top of Razorback Range (Refs. O02, O17 and O18) and they found that "*the [landslide] risk levels assessed for current conditions, upon which mining related impact are imposed, remain unchanged from the currently existing risk levels*" (GHD 2021a, 2021b and 2021c). The other "*residential sites that require appraisals can be conducted on a longwall-by-longwall basis*" so that "*the hazards can be managed through each subordinate longwall's Structures Management Plan*" (GHD, 2021d).

Monitoring has been established for the houses located at the top of Razorback Range for the mining of LW904, which includes ground monitoring lines and Global Navigation Satellite System (GNSS) units located above the mining area and on the side of Razorback Range. Further monitoring is proposed on the private properties, subject to the approval of the individual property owners. Further ground monitoring lines and GNSS units will be established for LW709 to LW711 and LW905 as part of the Structures Management Plans for these proposed longwalls.

The assessments provided in this report indicate that the assessed levels of impact on the natural and built features can be managed by the preparation and implementation of appropriate management strategies. It should be noted, however, that more detailed assessments of some natural and built features have been undertaken by other specialist consultants, and the findings in this report should be read in conjunction with the findings in all other relevant reports.

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Tables

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

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Figures

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

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Drawings

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

Drawing No.	*Description*	*Rev.*
MSEC1117-01	General layout and monitoring	A
MSEC1117-02	Surface level contours	A
MSEC1117-03	Bulli Seam floor contours	A
MSEC1117-04	Bulli Seam thickness contours	A
MSEC1117-05	Bulli Seam depth of cover contours	A
MSEC1117-06	Geology	A
MSEC1117-07	Streams	A
MSEC1117-08	Cliffs and steep slopes	A
MSEC1117-09	Railways and roads	A
MSEC1117-10	Electrical infrastructure	A
MSEC1117-11	Telecommunications infrastructure	A
MSEC1117-12	Water and gas infrastructure	A
MSEC1117-13	Building structures	A
MSEC1117-14	Other built features	B
MSEC1117-15	Predicted additional subsidence contours due to LW709 to LW711 and LW905	A
MSEC1117-16	Predicted total subsidence contours due to LW702 to LW711 and LW901 to LW905	A

1.1. Background

Illawarra Metallurgical Coal (IMC), a wholly owned subsidiary of South32 Limited (South32), operates Appin Colliery, which is in the Southern Coalfield of New South Wales (NSW). The colliery is currently operating in two mining areas, referred to as Area 7 and Area 9.

IMC previously submitted a Part 3A Application for the extraction of future longwalls within the Bulli Seam including in Appin Areas 7 and 9. Report No. MSEC404 (Rev. D) was issued in August 2009 in support of that application. A Preferred Project Report (PPR) under the *Environmental Planning and Assessment Act 1979* (EP&A Act) was prepared following a request by the Director-General of the NSW Department of Planning, Infrastructure and Environment (DPIE). The key changes made via the PPR comprised the excision of mining domains known as North Cliff, Area 2 and Area 3 (part only). DPIE granted IMC approval under the EPA Act on the 22 December 2011 (08_0150).

IMC has completed the mining of Longwalls 701 to 708A (LW701 to LW708A) in Area 7 and is currently mining Longwall 708B (LW708B). The colliery also has approval to mine Longwalls 709 and 710 (LW709 and LW710). The subsidence predictions and assessed impacts for these longwalls are provided in Report No. MSEC342 (Rev. C), which supported the Subsidence Management Plan Applications. Updated subsidence predictions and impact assessments are provided in Reports Nos. MSEC825 (Rev. A), MSEC878 (Rev. A) and MSE973 (Rev. A), which supported the Modification Applications.

IMC has also completed the mining of Longwalls 901 and 902 (LW901 and LW902) in Area 9 and is currently mining Longwall 903 (LW903). The mine also has Extraction Plan approval to mine Longwall 904 (LW904). The subsidence predictions and assessed impacts for these longwalls are provided in Report No. MSEC448 (Rev. B), which supported the Extraction Plan Application. Updated subsidence predictions and impact assessments are provided in Reports Nos. MSEC743 (Rev. A), MSEC829 (Rev. A) and MSEC1005 (Rev. A), which supported the Modification Applications.

Mine Subsidence Engineering Consultants (MSEC) has now been engaged by IMC to prepare subsidence predictions and impact assessments for LW709 to LW711 and LW905. LW710 has been subdivided into two panels (LW710A and LW710B) and LW711 has been extended across both Areas 7 and 9.

The longwalls in Areas 7 and 9 have been modified from the layout of the *EA Base Plan Longwalls* which was indicated in the Part 3A Application. The longwall layout indicated in the Part 3A Application and in Report No. MSEC404 is referred to as the *Part 3A Layout* in this report. The currently proposed longwall layout in Areas 7 and 9 is referred to as the *Extraction Plan Layout* in this report.

The comparison between the longwalls based on the Part 3A Layout and the Extraction Plan Layout is provided in Fig. 1.1. The proposed LW709 to LW711 and LW905 are located within the *Extent of Longwall Mining Areas* as defined in the Part 3A Application and Report No. MSEC404.

The eastern ends of LW709, LW710B and LW711 have been shortened from the extents indicated in the Part 3A Layout. LW710A and the western end of LW711 are located in Area 9, within its *Extent of Longwall Mining Area*.

The existing, approved and proposed LW901 to LW905 have been rotated 24° clockwise compared with the longwalls indicated in the Part 3A Layout and Report No. MSEC404. The western end of LW905 has been shortened to accommodate the proposed LW710A and the extended LW711.

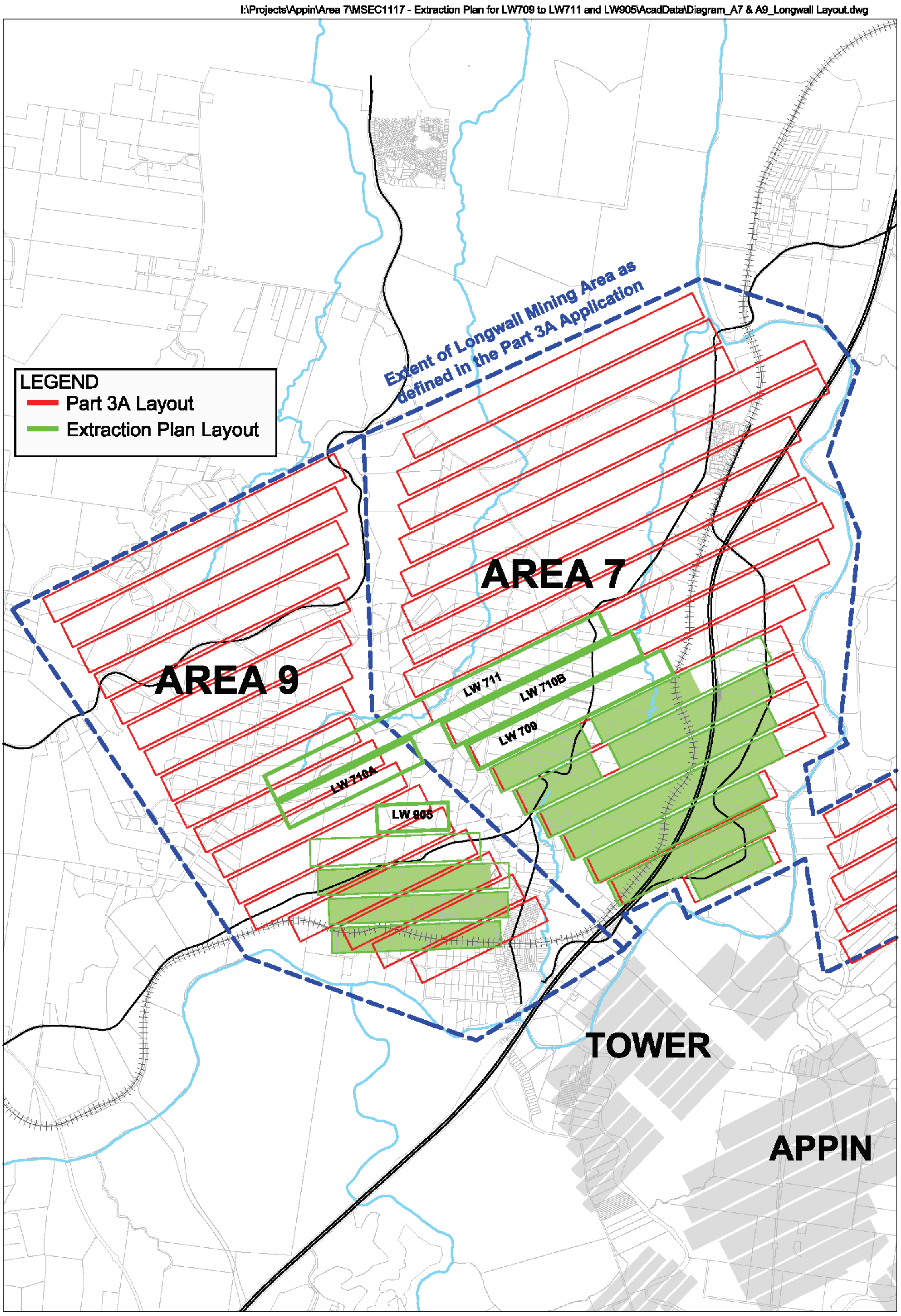
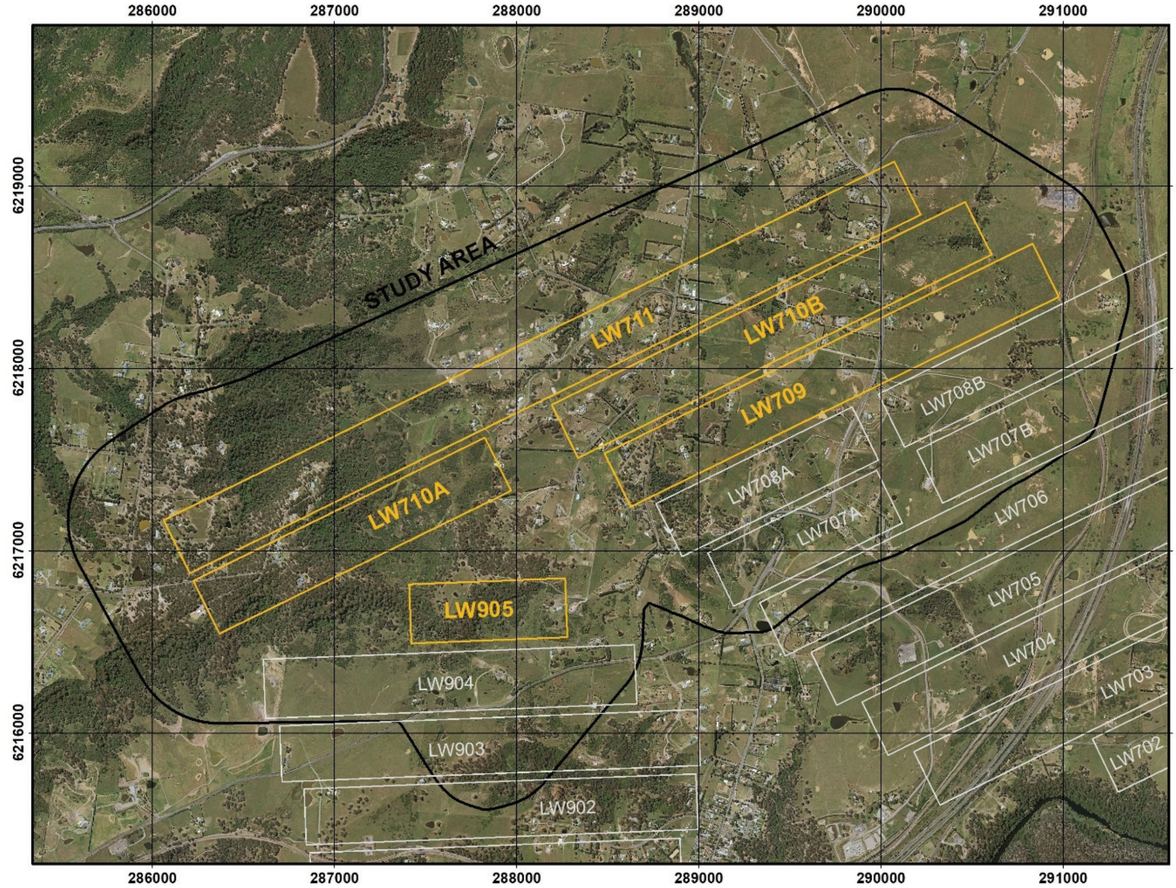


Fig. 1.1 Existing, approved and proposed longwalls in Areas 7 and 9

The existing, approved and proposed longwalls in Areas 7 and 9 are also shown in Drawing No. MSEC1117-01, in Appendix E. The longwalls and the Study Area, as defined in Section 2.1, have been overlaid on an aerial photograph of the area, and are shown in Fig. 1.2.



Courtesy of IMC

Fig. 1.2 Aerial showing LW709 to LW711 and LW905 and the Study Area

IMC is preparing an Extraction Plan Application for the proposed LW709 to LW711 and LW905 in Areas 7 and 9. MSEC has been commissioned by IMC to:

- prepare subsidence predictions for the proposed longwalls, including the cumulative movements due to the previously extracted and approved longwalls in Areas 7 and 9;
- identify the natural and built features in the vicinity of the proposed longwalls;
- provide subsidence predictions for each of these features;
- prepare impact assessments, in conjunction with other specialist consultants, for each of the natural and built features; and
- recommend management strategies and monitoring.

This report has been prepared to support the Extraction Plan Application for the proposed LW709 to LW711 and LW905 which will be submitted to the DPIE. In some cases, this report will refer to other sources of information on specific natural and built features. This report, therefore, should be read in conjunction with the other relevant reports associated with this application.

Chapter 1 provides background information on the study, including the mining geometry, surface and seam and overburden lithology.

Chapter 2 defines the Study Area and provides a summary of the natural and built features identified within this area.

Chapter 3 provides an overview of the methods that have been used to predict the mine subsidence effects resulting from the extraction of the existing, approved and proposed longwalls.

Chapter 4 provides the maximum predicted subsidence effects resulting from the extraction of the existing, approved and proposed longwalls.

Chapters 5 and 6 provide the descriptions, predictions and impact assessments for each of the natural and built features that have been identified within the Study Area. Recommendations for each of these features are also provided, which have been based on the predictions and impact assessments.

1.2. Mining geometry

The layout of the proposed LW709 to LW711 and LW905 are shown in Drawing No. MSEC1117-01, in Appendix E. A summary of the dimensions for these longwalls is provided in Table 1.1. The longwalls are proposed to be extracted from the Bulli Seam.

Table 1.1 Geometry of the proposed LW709 to LW711 and LW905

Longwall	Overall void length including installation heading (m)	Overall void width including first workings (m)	Overall tailgate chain pillar width (m)
LW709	2615	324	45
LW710A	1787	324	-
LW710B	2529	324	45
LW711	4469	324	45
LW905	858	324	54

The lengths of longwall extraction excluding the installation headings are approximately 9 m less than the overall void length provided in the above table. The longwall face widths excluding the first workings are 315 m. The longwalls will be extracted from west to east within the Bulli Seam.

1.3. Surface and seam levels

The levels of the natural surface and the Bulli Seam are illustrated along Section 1 and Section 2 in Fig. 1.3 and Fig. 1.4, respectively. The locations of these sections are shown in Drawings Nos. MSEC1117-02 to MSEC1117-04. The definition of the Study Area is provided in Section 2.1.

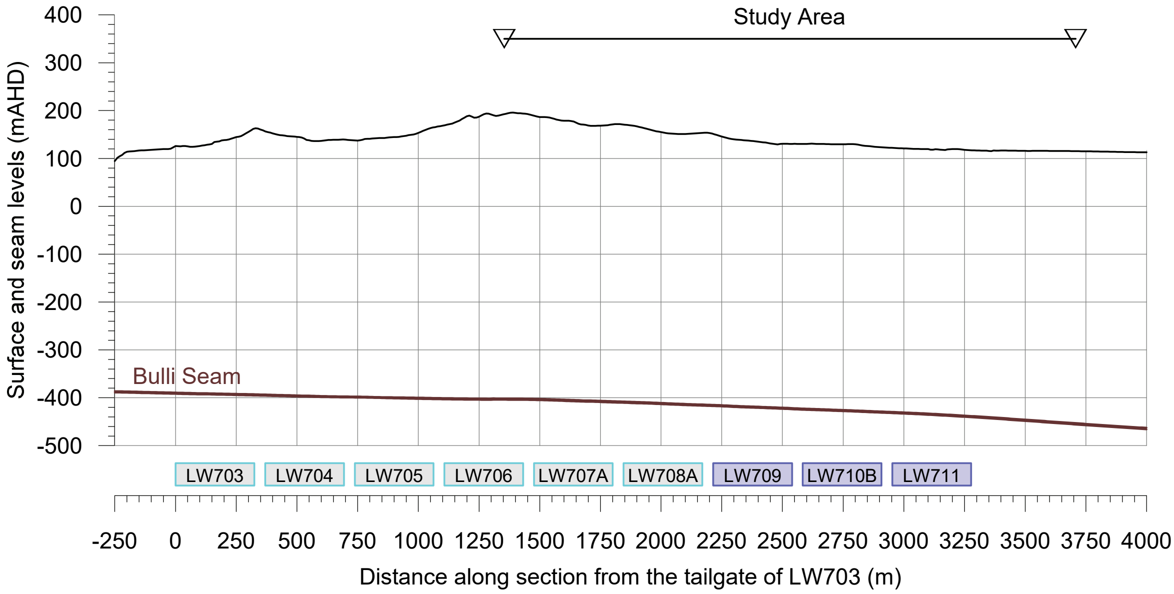


Fig. 1.3 Surface and seam levels along Section 1

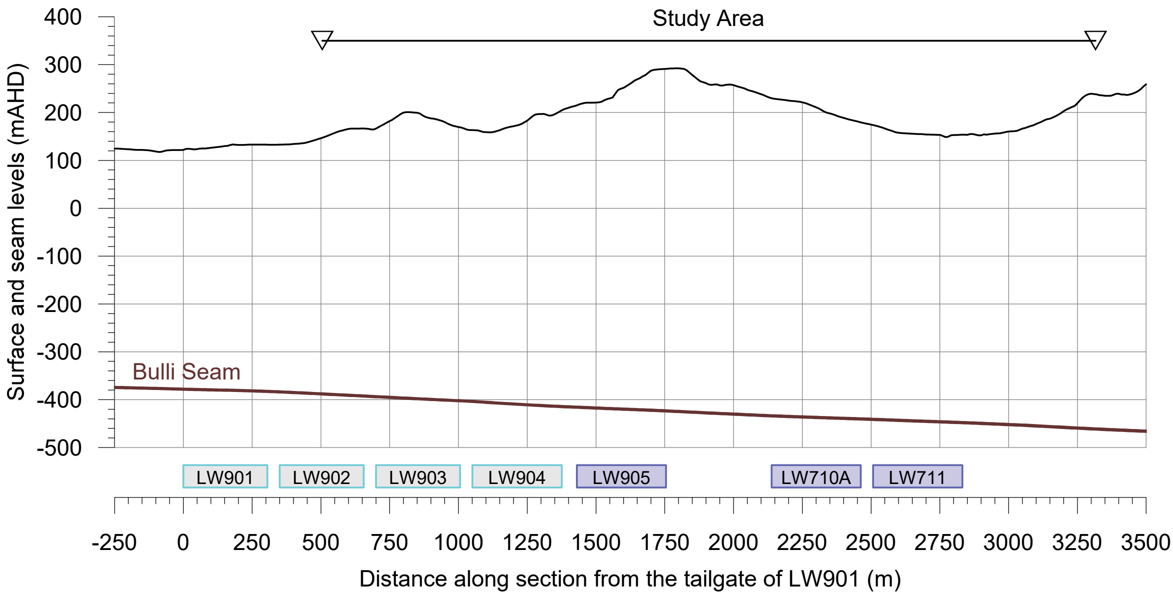


Fig. 1.4 Surface and seam levels along Section 2

The surface level contours are shown in Drawing No. MSEC1117-02. The proposed longwalls are located to the north and west of the Nepean River. The western ends of LW710A, LW711 and LW905 mine beneath Razorback Range. The streams above the proposed mining area generally flow in north and north-easterly directions and drain into the Nepean River several kilometres to the north. The streams above the existing and approved longwalls generally flow in a southerly direction and also drain into the Nepean River.

The surface levels directly above the proposed longwalls vary between 100 metres above Australian Height Datum (mAHD) and 320 mAHD. The lowest surface level occurs along Foot Onslow Creek where it crosses the finishing (i.e. eastern) end of LW710B. The highest surface level occurs at the top of Razorback Range above the western end of LW710A.

The seam floor contours, seam thickness contours and depth of cover contours for the Bulli Seam are shown in Drawings Nos. MSEC1117-03, MSEC1117-04 and MSEC1117-05, respectively. The seam generally dips from the south towards the north, with an average grade across the mining area of approximately 2.0 %, or 1 in 50.

The depths of cover to the Bulli Seam directly above the proposed longwalls vary between 530 m and 750 m. The minimum depth of cover occurs along Foot Onslow Creek where it crosses the finishing (i.e. eastern) end of LW709. The maximum depth of cover occurs along the Razorback Range above the western end of LW711.

The thickness of the Bulli Seam within the extents of the proposed LW709 to LW711 and LW905 vary between 2.8 m and 3.3 m. The proposed longwalls will extract the full seam thickness.

1.4. Geological details

Appin Colliery lies in the southern part of the Permo-Triassic Sydney Basin, within which the main coal bearing sequence is the Illawarra Coal Measures, of Late Permian age. The Illawarra Coal Measures contain several seams, the uppermost of which is the Bulli Seam. A typical stratigraphic section for Appin Area 9, through the Razorback Range, is shown in Fig. 1.5 (Source: IMC).

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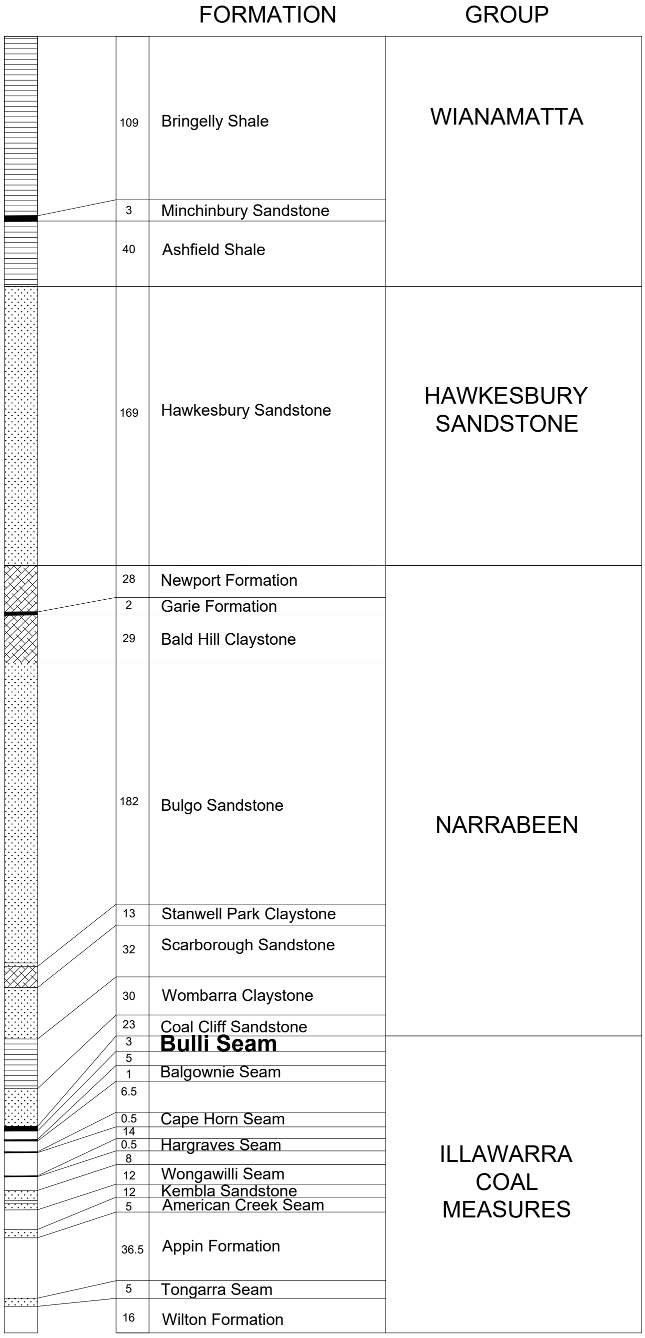

Fig. 1.5 Typical stratigraphic section for Appin Colliery through Razorback Range (Source: IMC)

All of the sediments that form the overburden to the Bulli Seam belong to the Hawkesbury Tectonic Stage, which comprises three stratigraphic divisions. The lowest division is the Narrabeen Group, which is subdivided into a series of interbedded sandstone and claystone units. It ranges in age from Lower to Middle Triassic and varies in thickness with a median of 310 m.

Overlying the Narrabeen Group is the Hawkesbury Sandstone Group, which is a series of bedded sandstone units which dates from the Middle Triassic and has a median thickness of 170 m. Above the Hawkesbury Sandstone is the Wianamatta Group, which consists of shales and siltstones with a variable thickness within the Study Area, ranging from less than 10 m to 200 m.

The major sandstone units are interbedded with shale and claystone units. The major sandstone units are the Scarborough, the Bulgo and the Hawkesbury Sandstones. The rocks exposed in the Nepean River valley belong to the Hawkesbury Sandstone Group. The creeks and drainage lines within the Study Area traverse the Wianamatta Group Shale to where they enter the Nepean River valley. Within the Narrabeen Group, the claystones and shales generally exist in discrete but thinner beds of less than 15 m thickness, or are interbedded as thin bands within the sandstone.

The major claystone units are the Bald Hill and Stanwell Park Claystones, which lie above and below the Bulgo Sandstone at the base of the Hawkesbury Sandstone. The claystones vary in thickness and, in some places, are more than 25 m thick.

The geological structures which have been identified at seam level are shown in Drawing No. MSE1117-06.

There are to NNW-SSE orientated *zones of geological structure* that cross Appin Areas 7 and 9. These zones comprise series of dykes with thicknesses up to approximately 3.5 m and minor faults with displacements up to approximately 3 m. Longwalls 707 and 708 have been split into four shorter panels (i.e. LW707A, LW707B, LW708A and LW708B) to avoid this zone.

The proposed LW709, LW710B and LW711 cross one of the *zones of geological structure* and LW905 is located on the eastern side of the other zone. Increased vertical subsidence is not anticipated in these locations, as it was not observed when LW703 to LW706 and LW901 to LW903 previously mined through these zones. Localised irregular surface movements (i.e. compressive strain and heaving) were observed near these zones; however, these appear to be due to surface topography (i.e. drainage lines and cuttings) rather than the geological structures. In any case, the surface features located above and near the *zones of geological structure* have been assessed for potential localised irregular ground movements.

Elsewhere, minor faults with displacements up to approximately 1 m cross the proposed LW709 to LW711 and LW905. Increased subsidence or localised irregular movements are not anticipated in these locations, as it was when longwalls previously mined through similar geological structures in Appin Areas 7 and 9. Surface features have been assessed for potential anomalous irregular movements, as the predicted strains are based on statistical analyses of monitoring data that comprises these effects.

The surface lithology within the Study Area is illustrated in Fig. 1.6, which shows the proposed longwalls overlaid on Geological Series Sheets 9029, published in 1999 by the NSW Department of Planning and Environment Division of Resources and Geoscience, formerly the Department of Primary Industries (DPI).

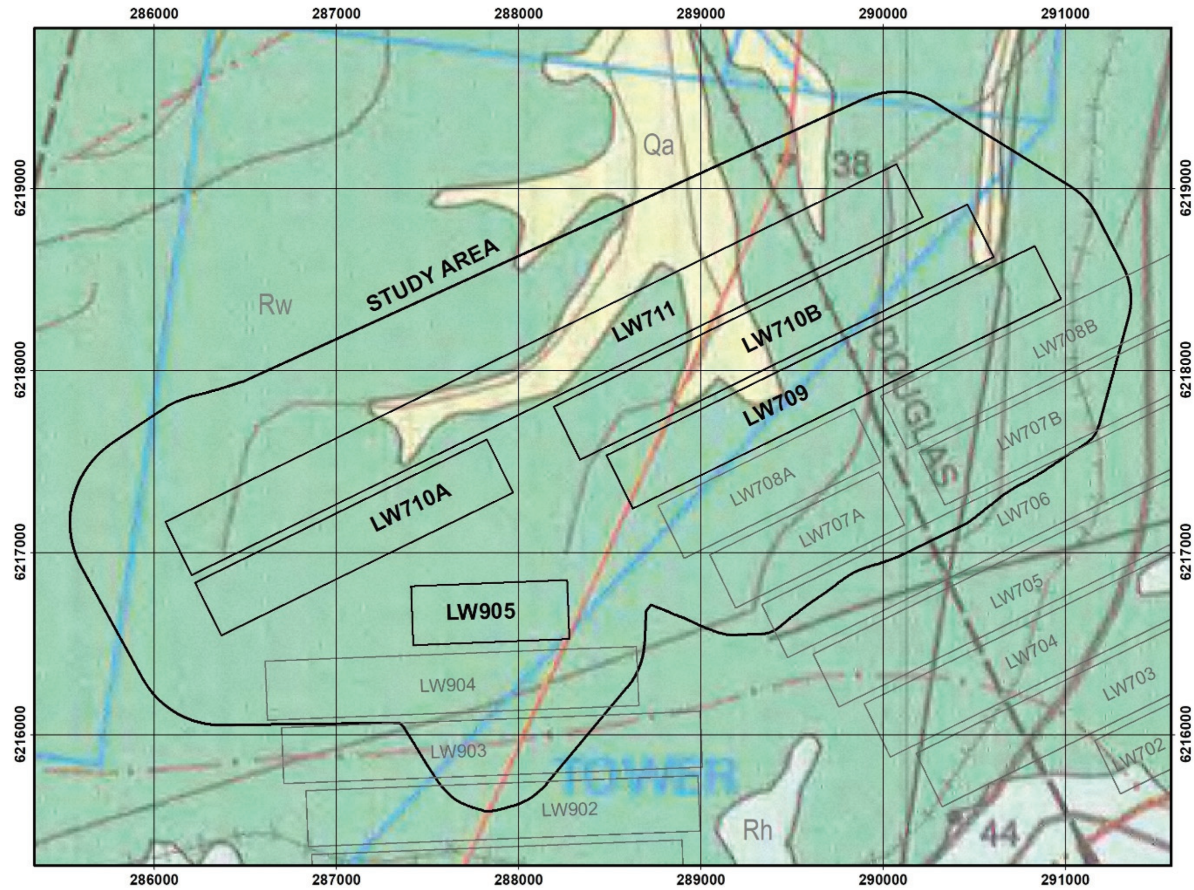

Fig. 1.6 Surface lithology within the Study Area (DPI Geological Series Sheets 9029)

The surface lithology above the proposed longwalls generally comprises the Wianamatta Group (Rw), with Quaternary Alluvium (Qa) exposed along Navigation Creek and its tributaries in the northern part of the Study Area.

2.1. Definition of the Study Area

The *Study Area* is defined as the surface area that could be affected by the extraction of the proposed LW709 to LW711 and LW905. Two areas have been considered in this report, being the *Study Area based on the 35° angle of draw and predicted 20 mm subsidence contour* and the *Study Area based on the 600 m boundary*.

The Study Area based on the 35° angle of draw and predicted 20 mm subsidence contour represents the minimum extent for the assessments for the conventional ground movements, i.e. vertical subsidence and its associated effects. Low level conventional ground movements can extend beyond this area. The natural and built features located outside this area, which could experience these low level movements and could be sensitive to these movements, have also been included in the assessments provided in this report.

The Study Area based on the 600 m boundary represents the minimum extent of the assessments for the valley-related effects. This distance is based on the recommendations from the Southern Coalfield Inquiry (DPIE, 2008) for the risk management zones. The natural and built features located outside the 600 m boundary, which could experience valley-related effects and could be sensitive to these movements, have also been included in the assessments provided in this report.

The extent of the Study Area based on the 35° angle of draw and predicted 20 mm subsidence contour has been calculated by combining the areas bounded by the following limits:

- The 35° angle of draw line from the extent of the proposed LW709 to LW711 and LW905; and
- The predicted limit of vertical subsidence, taken as the additional 20 mm subsidence contour, due to the mining of LW709 to LW711 and LW905 only.

The depths of cover contours for the Bulli Seam are shown in Drawing No. MSEC1117-05. The depths of cover directly above the proposed LW709 to LW711 and LW905 vary 530 m and 750 m. The 35° angle of draw line, therefore, has been determined by drawing a line that is a horizontal distance varying between 370 m and 525 m around the extents of the proposed longwall voids.

The predicted limit of vertical subsidence, taken as the predicted additional 20 mm subsidence contour due to the mining of LW709 to LW711 and LW905, has been determined using the calibrated Incremental Profile Method (IPM), which is described in Chapter 3. The predicted additional subsidence contours, including the 20 mm subsidence contour, are shown in Drawing No. MSEC1117-15, in Appendix E.

The predicted additional 20 mm subsidence contour extends beyond the 35° angle of draw above the previous longwalls in Areas 7 and 9. Elsewhere, the contour is located inside the angle of draw. The Study Area based on the 35° angle of draw line and predicted 20 mm subsidence contour is shown in Drawing No. MSEC1117-01, in Appendix E.

The features that are located within 600 m of the proposed LW709 to LW711 and LW905 (referred to as the 600 m boundary) and are predicted to experience valley-related effects and could be sensitive to these movements have been included in the assessments provided in this report. These features include streams, cliffs and Aboriginal heritage sites.

There are additional features that are located outside the 600 m boundary that could experience either far-field horizontal or valley-related effects. The surface features that could be sensitive to such movements have been identified and have also been included in the assessments provided in this report. These features include the road bridges and survey control marks.

2.2. Natural and built features within the Study Area

A summary of the natural and built features located within the Study Area is provided in Table 2.1. The locations of these features are shown in Drawings Nos. MSEC1117-07 to MSEC1117-14, in Appendix E. The descriptions, predictions and impact assessments for the natural and built features are provided in Chapters 5 and 6. The section number references are provided in Table 2.1.

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Table 2.1 Natural and built features within the Study Area

Item	Within Study Area	Section number reference
NATURAL FEATURES		
Catchment Areas or Declared Special Areas	✓	5.1
Rivers or Creeks	✓	5.2 & 5.3
Aquifers or Known Groundwater Resources	✓	5.4
Springs	×	
Sea or Lake	×	
Shorelines	×	
Natural Dams	×	
Cliffs or Pagodas	✓	5.5 & 5.6
Steep Slopes	✓	5.7
Escarpments	✓	5.8
Land Prone to Flooding or Inundation	×	
Swamps, Wetlands or Water Related Ecosystems	✓	5.10
Threatened or Protected Species	✓	5.11
National Parks	×	
State Forests	×	
State Conservation Areas	×	
Natural Vegetation	✓	5.11
Areas of Significant Geological Interest	×	
Any Other Natural Features Considered Significant	×	
PUBLIC UTILITIES		
Railways	✓	6.1
Roads (All Types)	✓	6.2 & 6.3
Bridges	✓	6.4 & 6.5
Tunnels	×	
Culverts	✓	6.6
Water, Gas or Sewerage Infrastructure	✓	6.7 to 6.9
Liquid Fuel Pipelines	×	
Electricity Transmission Lines or Associated Plants	✓	6.10
Telecommunication Lines or Associated Plants	✓	6.11
Water Tanks, Water or Sewage Treatment Works	×	
Dams, Reservoirs or Associated Works	×	
Air Strips	×	
Any Other Public Utilities	×	
PUBLIC AMENITIES		
Hospitals	×	
Places of Worship	×	
Schools	×	
Shopping Centres	×	
Community Centres	×	
Office Buildings	×	
Swimming Pools	×	
Bowling Greens	×	
Ovals or Cricket Grounds	×	
Race Courses	×	
Golf Courses	×	
Tennis Courts	×	
Any Other Public Amenities	×	

Item	Within Study Area	Section number reference
FARM LAND AND FACILITIES		
Agricultural Utilisation or Agricultural Suitability of Farm Land	✓	6.12
Farm Buildings or Sheds	✓	6.13
Tanks	✓	6.14
Gas or Fuel Storages	×	
Poultry Sheds	×	
Glass Houses	×	
Hydroponic Systems	×	
Irrigation Systems	×	
Fences	✓	6.15
Farm Dams	✓	6.16
Wells or Bores	✓	6.17
Any Other Farm Features	×	
INDUSTRIAL, COMMERCIAL AND BUSINESS ESTABLISHMENTS		
Factories	×	
Workshops	×	
Business or Commercial Establishments or Improvements	✓	6.18
Gas or Fuel Storages or Associated Plants	×	
Waste Storages or Associated Plants	×	
Buildings, Equipment or Operations that are Sensitive to Surface Movements	×	
Surface Mining (Open Cut) Voids or Rehabilitated Areas	×	
Mine Infrastructure Including Tailings Dams or Emplacement Areas	×	
Any Other Industrial, Commercial or Business Features	×	
AREAS OF ARCHAEOLOGICAL OR HERITAGE SIGNIFICANCE	✓	6.20
ITEMS OF ARCHITECTURAL SIGNIFICANCE	×	
PERMANENT SURVEY CONTROL MARKS	✓	6.21
RESIDENTIAL ESTABLISHMENTS		
Houses	✓	6.22
Flats or Units	×	
Caravan Parks	×	
Retirement or Aged Care Villages	×	
Associated Structures such as Workshops, Garages, On-Site Waste Water Systems, Water or Gas Tanks, Swimming Pools or Tennis Courts	✓	6.23
Any Other Residential Features	×	
ANY OTHER ITEM OF SIGNIFICANCE	×	
ANY KNOWN FUTURE DEVELOPMENTS	×	

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3.0 OVERVIEW OF MINE SUBSIDENCE AND THE METHODS USED TO PREDICT THE SUBSIDENCE EFFECTS FOR THE EXISTING AND PROPOSED LONGWALLS

3.1. Introduction

The following sections provide overviews of conventional and non-conventional mine subsidence effects and the methods that have been used to predict these movements. Further information is also provided in the background reports entitled *Introduction to Longwall Mining and Subsidence* and *General Discussion on Mine Subsidence Ground Movements* which can be obtained from *www.minesubsidence.com*.

3.2. Overview of conventional subsidence effects

The normal ground movements resulting from the extraction of longwalls are referred to as conventional or systematic subsidence movements. These movements are described by the following parameters:

- **Subsidence** usually refers to vertical displacement of a point, but subsidence of the ground actually includes both vertical and horizontal displacements. These horizontal displacements in some cases, where the subsidence is small beyond the longwall goaf edges, can be greater than the vertical subsidence. Subsidence is usually expressed in units of *millimetres (mm)*.
- **Tilt** is the change in the slope of the ground as a result of differential subsidence and is calculated as the change in subsidence between two points divided by the distance between those points. Tilt is, therefore, the first derivative of the subsidence profile. Tilt is usually expressed in units of *millimetres per metre (mm/m)*. A tilt of 1 mm/m is equivalent to a change in grade of 0.1 %, or 1 in 1000.
- **Curvature** is the second derivative of subsidence, or the rate of change of tilt, and is calculated as the change in tilt between two adjacent sections of the tilt profile divided by the average length of those sections. Curvature is usually expressed as the inverse of the **Radius of Curvature** with the units of *1/kilometres* (km^{-1}), but the values of curvature can be inverted, if required, to obtain the radius of curvature, which is usually expressed in *kilometres (km)*.
- **Strain** is the relative differential horizontal movements of the ground. **Normal strain** is calculated as the change in horizontal distance between two points on the ground, divided by the original horizontal distance between them. Strain is typically expressed in units of *millimetres per metre (mm/m)*. **Tensile Strains** occur where the distances between two points increase and **Compressive Strains** occur when the distances between two points decrease. So that ground strains can be compared between different locations, they are typically measured over bay lengths that are equal to the depth of cover between the surface and seam divided by 20.

  Whilst mining-induced normal strains are measured along monitoring lines, ground shearing can also occur both vertically and horizontally across the directions of monitoring lines. Most of the published mine subsidence literature discusses the differential ground movements that are measured along subsidence monitoring lines; however, differential ground movements can also be measured across monitoring lines using 3D survey monitoring techniques.
- **Horizontal shear deformation** across monitoring lines can be described by various parameters including horizontal tilt, horizontal curvature, mid-ordinate deviation, angular distortion and shear index. It is not possible, however, to determine the horizontal shear strain across a monitoring line using 2D or 3D monitoring techniques. High deformations along monitoring lines (i.e. normal strains) are generally measured where high deformations have been measured across the monitoring line (i.e. shear deformations), and vice versa.

The **incremental** subsidence, tilts, curvatures and strains are the additional effects which result from the extraction of each longwall. The **cumulative** subsidence, tilts, curvatures and strains are the accumulated effects which result from the extraction of a series of longwalls. The **total** subsidence, tilts, curvatures and strains are the final effects at the completion of a series of longwalls. The **travelling** tilts, curvatures and strains are the transient movements as the longwall extraction face mines directly beneath a given point.

3.3. Far-field movements

The measured horizontal movements at survey marks which are located beyond the longwall goaf edges and over solid unmined coal areas are often much greater than the observed vertical movements at those marks. These movements are often referred to as *far-field movements*.

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Far-field horizontal movements tend to be bodily movements towards the extracted goaf area and are accompanied by very low levels of strain. These movements generally do not result in impacts on natural features or built environments, except where they are experienced by large structures which are very sensitive to differential horizontal movements.

In some cases, higher levels of far-field horizontal movements have been observed where steep slopes or surface incisions exist nearby, as these features influence both the magnitude and the direction of ground movement patterns. Similarly, increased horizontal movements are often observed around sudden changes in geology or where blocks of coal are left between longwalls or near other previously extracted series of longwalls. In these cases, the levels of observed subsidence can be slightly higher than normally predicted, but these increased movements are generally accompanied by very low levels of tilt and strain.

Far-field horizontal movements and the method used to predict such movements are described further in Section 4.5.

3.4. Overview of non-conventional subsidence movements

Conventional subsidence profiles are typically smooth in shape and can be explained by the expected caving mechanisms associated with overlying strata spanning the extracted void. Normal conventional subsidence movements due to longwall extraction are easy to identify where longwalls are regular in shape, the extracted coal seams are relatively uniform in thickness, the geological conditions are consistent and surface topography is relatively flat.

As a general rule, the smoothness of the profile is governed by the depth of cover and lithology of the overburden, particularly the near-surface strata layers. Where the depth of cover is high, say greater than 400 m, the observed subsidence profiles along monitoring lines are generally smooth. Where the depth of cover is shallow, say less than 100 m, the observed subsidence profiles along monitoring lines are generally irregular. Very irregular subsidence movements are observed with much higher tilts, curvatures and strains at very shallow depths of cover where the collapsed zone above the extracted longwalls extends up to or near to the surface.

Irregular subsidence movements are occasionally observed at the deeper depths of cover along an otherwise smooth subsidence profile. The cause of these irregular subsidence movements can be associated with:

- sudden or abrupt changes in geological conditions;
- steep topography; and
- valley-related mechanisms.

Non-conventional movements due to geological conditions, steep topography and valley-related effects are discussed in the following sections.

3.4.1. Non-conventional subsidence movements due to changes in geological conditions

Most non-conventional ground movements are a result of the reaction of near-surface strata to increased horizontal compressive stresses due to mining operations. Some of the geological conditions that influence these irregular subsidence movements are the blocky nature of near-surface sedimentary strata layers and the presence of unknown faults, dykes or other geological structures, cross bedded strata, thin and brittle near-surface strata layers and pre-existing natural joints. The presence of these geological features near the surface can result in a bump in an otherwise smooth subsidence profile and these bumps are usually accompanied by locally increased tilts, curvatures and strains.

Even though it may be possible to explain most observed non-conventional ground movements, there remain some observed irregular ground movements that cannot be explained with available information. The term “anomaly” is therefore reserved for those non-conventional ground movement cases that were not expected to occur and cannot be explained by any of the above possible causes.

It is not possible to predict the locations and magnitudes of non-conventional anomalous movements. In some cases, approximate predictions for the non-conventional ground movements can be made where the underlying geological or topographic conditions are known in advance. It is expected that these methods will improve as further knowledge is gained through ongoing research and investigation.

In this report, non-conventional ground movements are being included statistically in the predictions and impact assessments, by basing these on the frequency of past observed occurrence of both the conventional and non-conventional ground movements and impacts. The analysis of strains provided in Section 4.3 includes those resulting from both conventional and non-conventional anomalous movements. The impact assessments for the natural and built features, which are provided in Chapters 5 and 6, include historical impacts resulting from previous longwall mining which have occurred as the result of both conventional and non-conventional subsidence movements.

3.4.2. Non-conventional subsidence movements due to steep topography

Non-conventional movements can also result from increased horizontal movements in the downslope direction where longwalls are extracted beneath steep slopes. In these cases, elevated tensile strains develop near the tops and on the sides of the steep slopes and elevated compressive strains develop near the bases of the steep slopes. The potential impacts resulting from the increased horizontal movements include the development of tension cracks at the tops and on the sides of the steep slopes and compression ridges at the bottoms of the steep slopes.

Further discussions on the potential for downslope movements for the steep slopes within the Study Area are provided in Section 5.7.

3.4.3. Valley-related effects

The streams within the Study Area will be affected by valley-related effects, which are commonly observed in the Southern Coalfield. Valley bulging movements are a natural phenomenon, resulting from the formation and ongoing development of the valley, as illustrated in Fig. 3.1. The potential for these natural movements is influenced by the geomorphology of the valley.

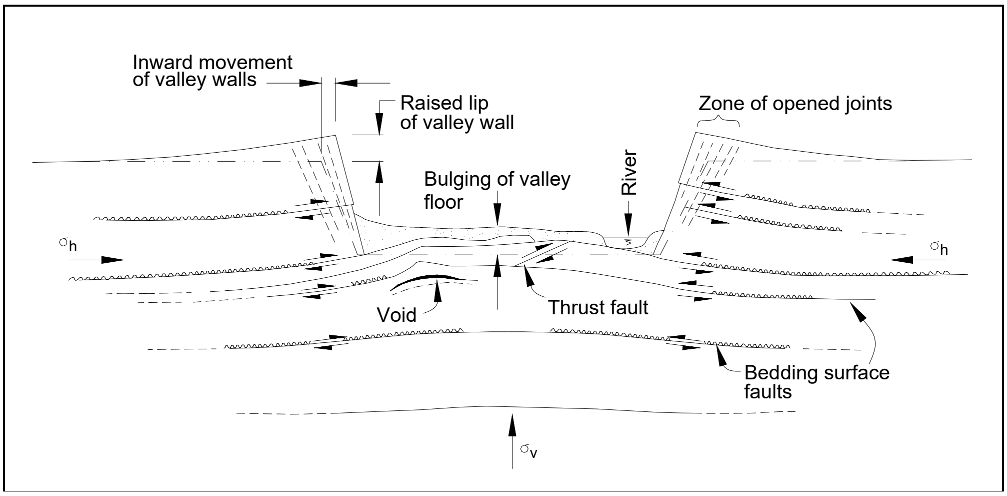

Fig. 3.1 Valley formation in flat-lying sedimentary rocks (after Patton and Hendren 1972)

Valley-related effects can be caused by or accelerated by mine subsidence as the result of a number of factors, including the redistribution of horizontal in situ stresses and downslope movements. Valley-related effects are normally described by the following parameters:

- **Upsidence** is the reduced subsidence, or the relative uplift within a valley which results from the dilation or buckling of near-surface strata at or near the base of the valley. The magnitude of upsidence, which is typically expressed in the units of *millimetres (mm)*, is the difference between the observed subsidence profile within the valley and the conventional subsidence profile which would have otherwise been expected in flat terrain.
- **Closure** is the reduction in the horizontal distance between the valley sides. The magnitude of closure, which is typically expressed in the units of *millimetres (mm)*, is the greatest reduction in horizontal distance between any two points on the opposing valley sides.
- **Compressive Strains** occur within the bases of valleys as a result of valley closure and upsidence movements. **Tensile Strains** also occur in the sides and near the tops of the valleys as a result of valley closure movements. The magnitudes of these strains, which are typically expressed in the units of *millimetres per metre (mm/m)*, are calculated as the changes in horizontal distance over a standard bay length, divided by the original bay length.

The predicted valley-related effects for the streams above and near the existing longwalls in Appin Areas 7 and 9 were determined using the empirical method outlined in ACARP Research Project No. C9067 (Waddington and Kay, 2002), referred to as the 2002 ACARP method.

More recently, the empirical prediction method has been refined based on further research undertaken as part of ACARP Research Project No. C18015 (Kay and Waddington, 2014), referred to as the 2014 ACARP method. This method only provides predictions for valley closure and not for upsidence.

The predictions based on the 2002 ACARP method can be directly compared with the predictions provided in previous MSEC subsidence reports for the approved and completed longwalls in Appin Areas 7 and 9 and with other case studies. The assessments provided in this report, therefore, have been based on the predictions obtained using the 2002 ACARP method.

The predicted strains resulting from valley-related effects for the streams in the Study Area have been determined using the ground monitoring data for longwalls that have previously mined beneath or near to streams in the Southern Coalfield, including at Appin Colliery. Refer to the impact assessments for the streams in Chapter 5 for further details.

Further details can be obtained from the background report entitled *General Discussion on Mine Subsidence Ground Movements* which can be obtained at *www.minesubsidence.com*.

3.5. The Incremental Profile Method

The predicted conventional subsidence effects for the existing and proposed longwalls have been determined using the Incremental Profile Method (IPM), which has been developed by MSEC. The method is an empirical model based on a large database of observed monitoring data from previous mining within the Southern, Newcastle, Hunter and Western Coalfields of NSW.

The database consists of detailed subsidence monitoring data from collieries in NSW including: Angus Place, Appin, Baal Bone, Bellambi, Beltana, Blakefield South, Bulli, Chain Valley, Clarence, Coalcliff, Cooranbong, Cordeaux, Corrimal, Cumnock, Dartbrook, Delta, Dendrobium, Eastern Main, Ellalong, Fernbrook, Glennies Creek, Gretley, Invincible, John Darling, Kemira, Lambton, Liddell, Mandalong, Metropolitan, Mt. Kembla, Munmorah, Nardell, Newpac, Newstan, Newvale, Newvale 2, South Bulga, South Bulli, Springvale, Stockton Borehole, Teralba, Tahmoor, Tower, Wambo, Wallarah, Western Main, Ulan, United, West Cliff, West Wallsend, and Wyee.

The database consists of the measured incremental subsidence profiles, which are the additional subsidence profiles resulting from the extraction of each longwall within a series of longwalls. It can be seen from the normalised incremental subsidence profiles within the database, that the observed shapes and magnitudes are reasonably consistent where the mining geometry and local geology are similar.

Subsidence predictions made using the IPM use the database of measured incremental subsidence profiles, the longwall geometries, local surface and seam information and geology. The method tends to over-predict the conventional subsidence effects (i.e. is slightly conservative) where the mining geometry and geology are within the range of the empirical database. The predictions can be further tailored to local conditions where observed monitoring data is available close to the mining area.

Further details on the IPM are provided in the background report entitled *General Discussion on Mine Subsidence Ground Movements* which can be obtained from *www.minesubsidence.com*.

3.6. Calibration of the IPM

The use of the IPM at the Appin Colliery has been continually reviewed and refined based on the latest available ground movement monitoring data. The subsidence model has been reviewed after the completion of each longwall as part of the End of Panel reports.

The subsidence predictions for LW701 to LW704, LW705 to LW710 and LW901 to LW904 are provided in Reports Nos. MSEC209 (Rev. E), MSEC342 (Rev. C) and MSEC448 (Rev. B), respectively. The predictions for these approved longwalls were obtained using the standard IPM for the Southern Coalfield based on monitoring data from the Bulli Seam, including from Appin, Tahmoor, Tower and West Cliff Collieries.

The standard IPM has been reviewed based on the latest monitoring data from Appin Colliery. The data from Area 7 include the ARTC monitoring line, Early Warning monitoring line, HW2 East monitoring line, HW2 West monitoring line, Menangle Road monitoring line, Moreton Park Road monitoring line and Telstra monitoring line. The data from Area 9 include the ARTC monitoring line and Menangle Road monitoring line.

The measured normalised incremental profiles for the monitoring lines are shown as the green lines in Fig. 3.2. The incremental profiles represent the additional movements due to the mining of each longwall projected onto a line transverse to the active longwall. The magnitudes have been normalised by dividing by the maximum value so that the profile varies between zero and 1.0. The distances have been normalised by dividing by the width of the active longwall, with zero representing its centreline. The longitudinal and oblique monitoring lines have not been included in this figure as the distances cannot be normalised.

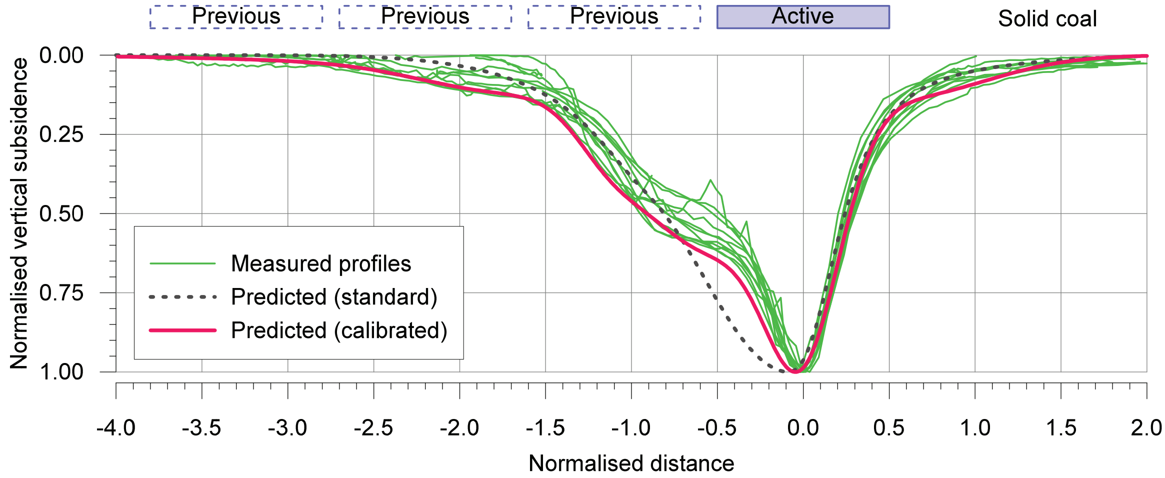

Fig. 3.2 Normalised vertical subsidence versus normalised distance

The predicted normalised incremental profile obtained using the standard IPM is shown by the dashed grey line in Fig. 3.2. The standard model over-predicts the vertical subsidence above the active longwall tailgate and under-predicts the vertical subsidence above the previous longwalls.

The measured profiles of vertical subsidence comprise a number of components. These include sagging of the overburden strata above the longwall void, compression of the chain pillars, compression of the solid coal abutments, compression of the immediate floor and roof and reactivation of previously mined areas.

A review of the predicted incremental vertical subsidence profile obtained from the standard IPM has found that it over-predicts the component of pillar compression and under-predicts the components of sag subsidence, reactivation of previously mined areas and abutment compression.

The model has been calibrated using the latest monitoring data from Appin Colliery to improve the predictions of each of the components and, hence, the incremental profile of vertical subsidence. The predicted normalised incremental profile obtained from the calibrated IPM is shown by the solid red line in Fig. 3.2. It is considered that the calibrated model more closely matches the measured movements when compared with the standard IPM.

A comparison between the maximum measured and maximum predicted incremental vertical subsidence for the monitoring lines at Appin Colliery is provided in Fig. 3.3. The predictions are based on the standard IPM. The measured and predicted values represent the additional movements due to the mining of each longwall.

The measured and predicted values are reasonably similar (i.e. close to the 1:1 relationship) at the upper end of the range (i.e. top-right corner of Fig. 3.3). The standard IPM provides more conservative predictions where the measured values are towards the lower end of the range (i.e. bottom of Fig. 3.3). The measured vertical subsidence in Area 7 is also generally greater than the measured vertical subsidence in Area 9. This could be partly due to the less extensive monitoring above Area 9.

The maximum measured incremental vertical subsidence values are less than the maximum predicted incremental vertical subsidence or are within +15 % or +50 mm of the maximum predicted values. This is considered to be in the accuracy of subsidence prediction methodologies (DeBono *et al.*, 2014).

The calibrated IPM therefore has not been modified for the prediction of maximum incremental vertical subsidence. That is, the prediction curves for maximum incremental vertical subsidence for the calibrated IPM are the same as the standard model.

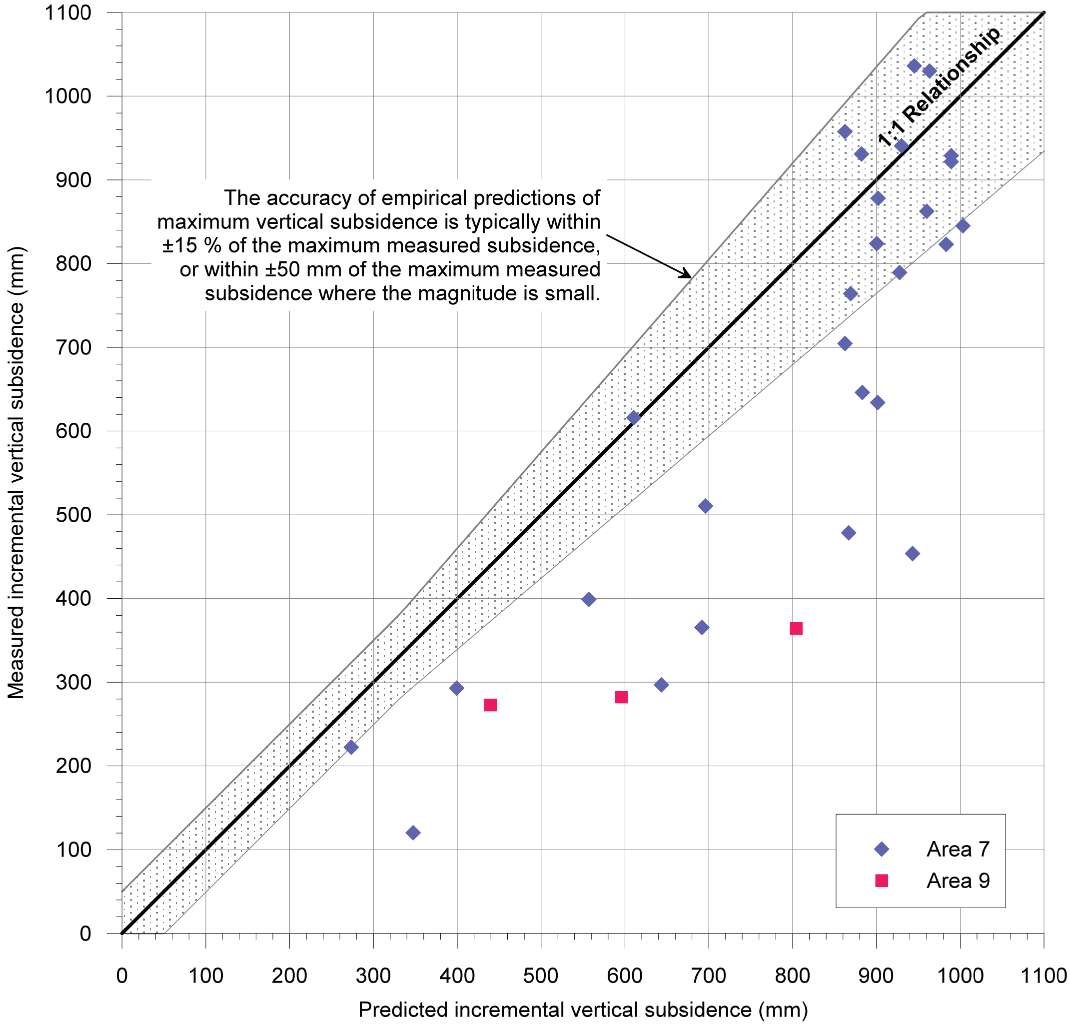

Fig. 3.3 Comparison of maximum measured and maximum predicted (standard IPM) incremental vertical subsidence for the monitoring lines at Appin Colliery

Comparisons of the measured and predicted profiles of total vertical subsidence are provided along the: ARTC monitoring line in Fig. 3.4; Early Warning monitoring line in Fig. 3.5; HW2 East monitoring line in Fig. 3.6; HW2 West monitoring line in Fig. 3.7; Moreton Park Road monitoring line in Fig. 3.8; and the Telstra monitoring line in Fig. 3.9.

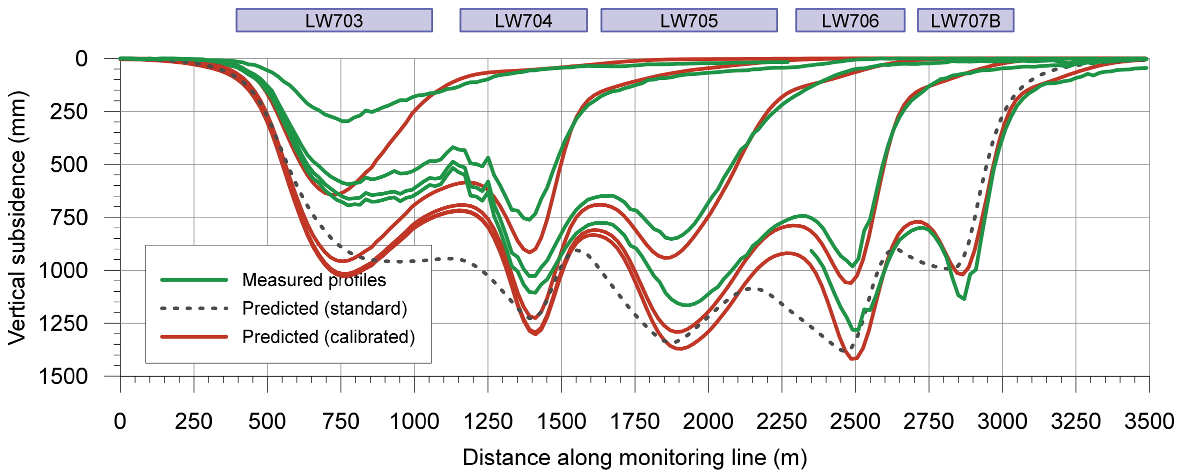

Fig. 3.4 Measured and predicted total vertical subsidence for the ARTC monitoring line

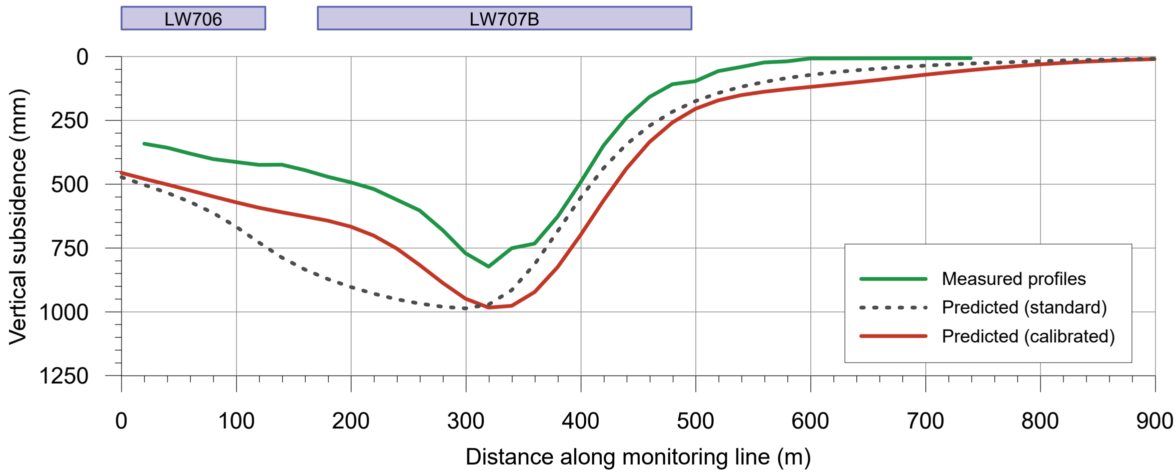

Fig. 3.5 Measured and predicted total vertical subsidence for the Early Warning monitoring line

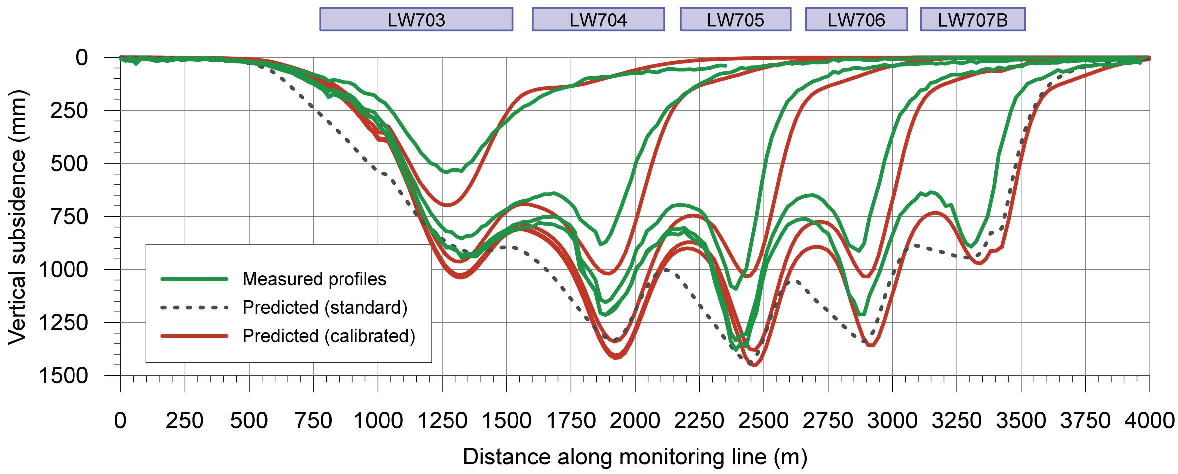

Fig. 3.6 Measured and predicted total vertical subsidence for the HW2 East monitoring line

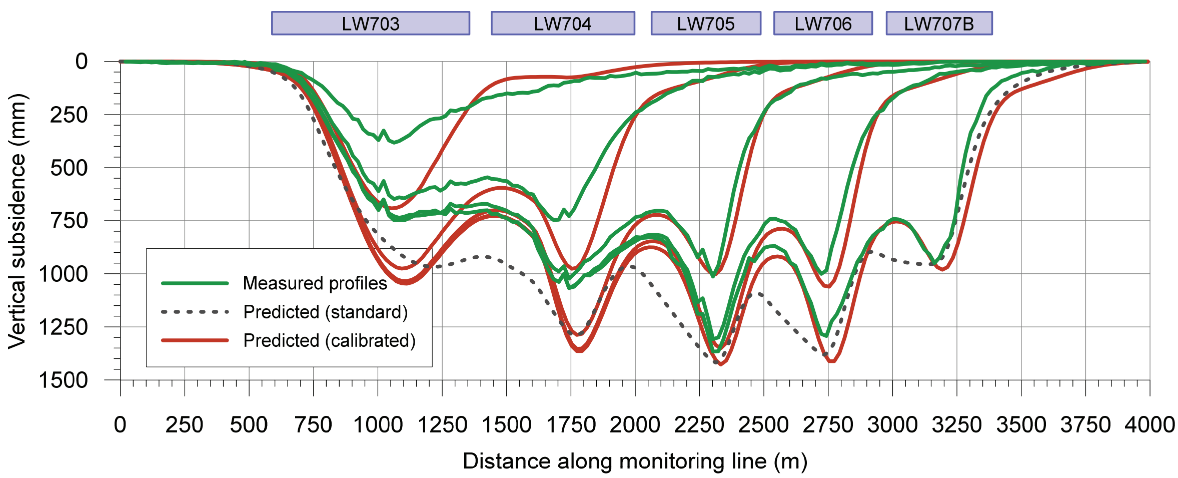

Fig. 3.7 Measured and predicted total vertical subsidence for the HW2 West monitoring line

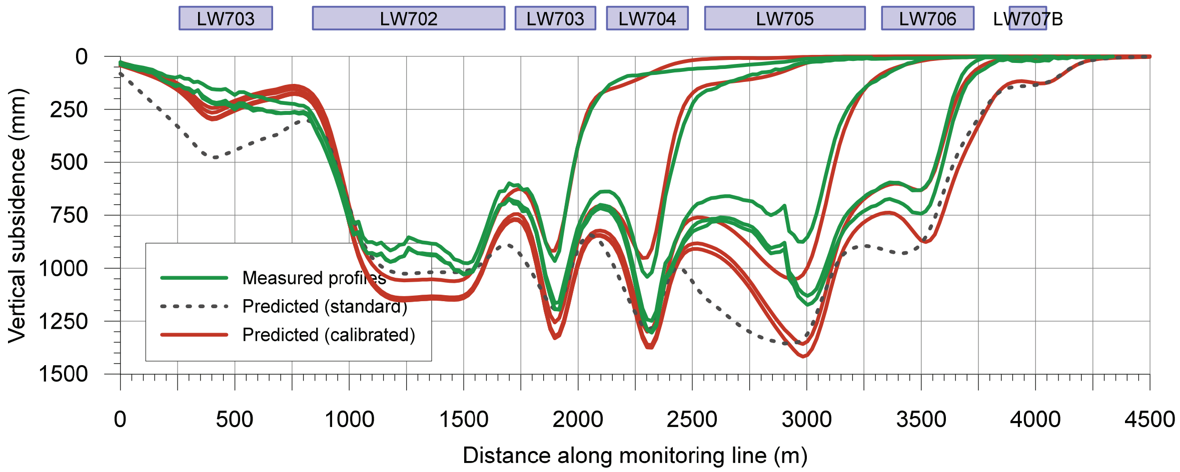

Fig. 3.8 Measured and predicted total vertical subsidence for the Moreton Park Road monitoring line

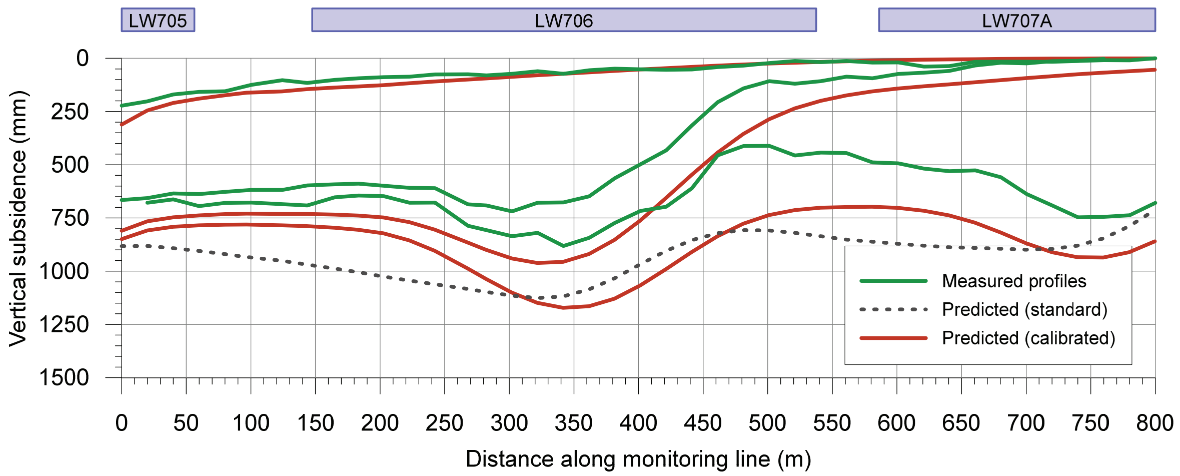

Fig. 3.9 Measured and predicted total vertical subsidence for the Telstra monitoring line

It is considered that the calibrated IPM provides reasonable predictions for the monitoring lines at Appin Colliery. The profiles more closely match the maximum measured vertical subsidence above each of the longwalls and the lesser vertical subsidence above each of the chain pillars.

3.7. Reliability of the calibrated IPM

A comparison between the maximum measured and maximum predicted total vertical subsidence for the monitoring lines at Appin Colliery is provided in Fig. 3.10. The predictions are based on the calibrated IPM. The measured and predicted values represent the total movements after the mining of each longwall.

The maximum measured total vertical subsidence values are less than the maximum predicted total values.

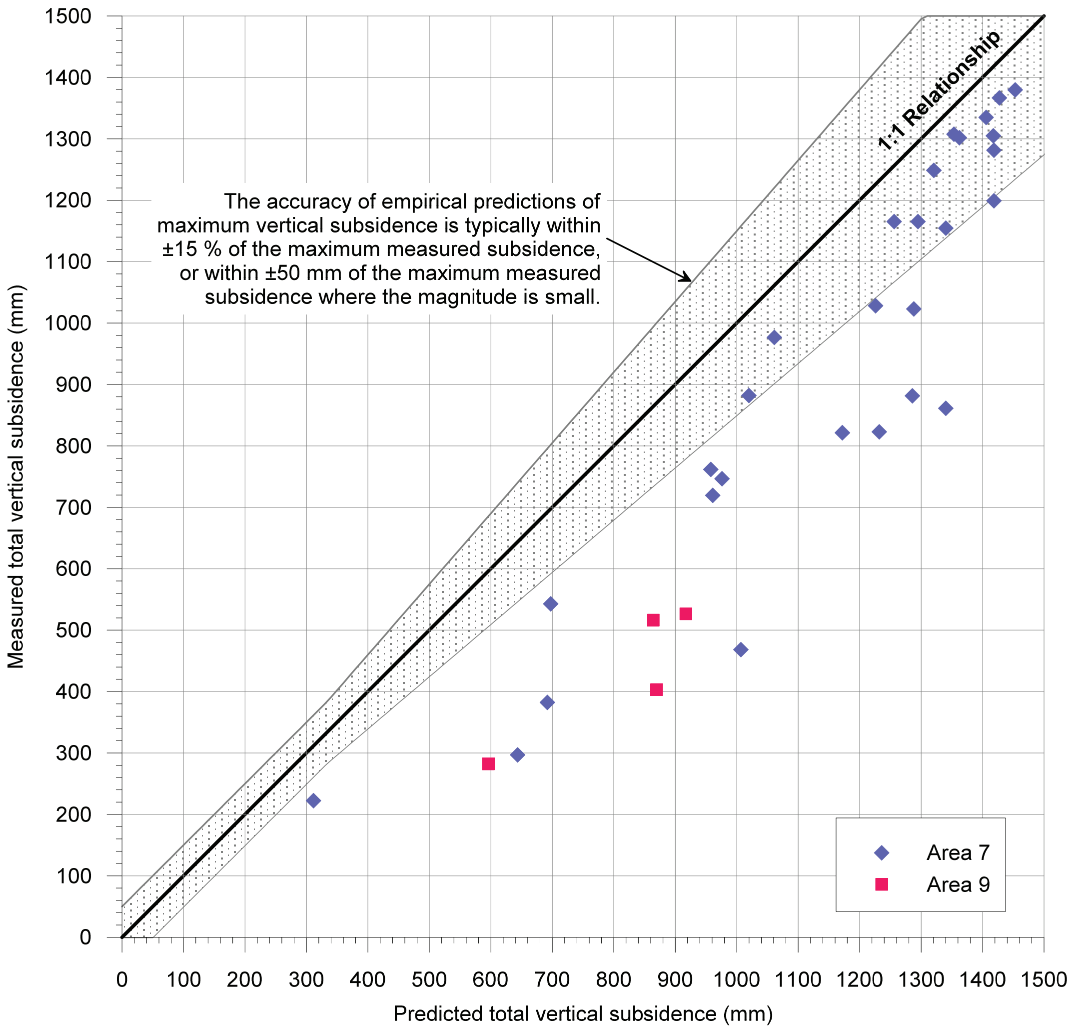

Fig. 3.10 Comparison of maximum measured and maximum predicted (calibrated IPM) total vertical subsidence for the monitoring lines at Appin Colliery

The distribution of the ratio of the maximum measured to maximum predicted total vertical subsidence for the monitoring lines is illustrated on the left-side of Fig. 3.11. A gamma distribution has been fitted to the data and this is also shown on the left-side of this figure. The probabilities of exceedance based on the fitted gamma distribution are shown in the right-side of Fig. 3.11.

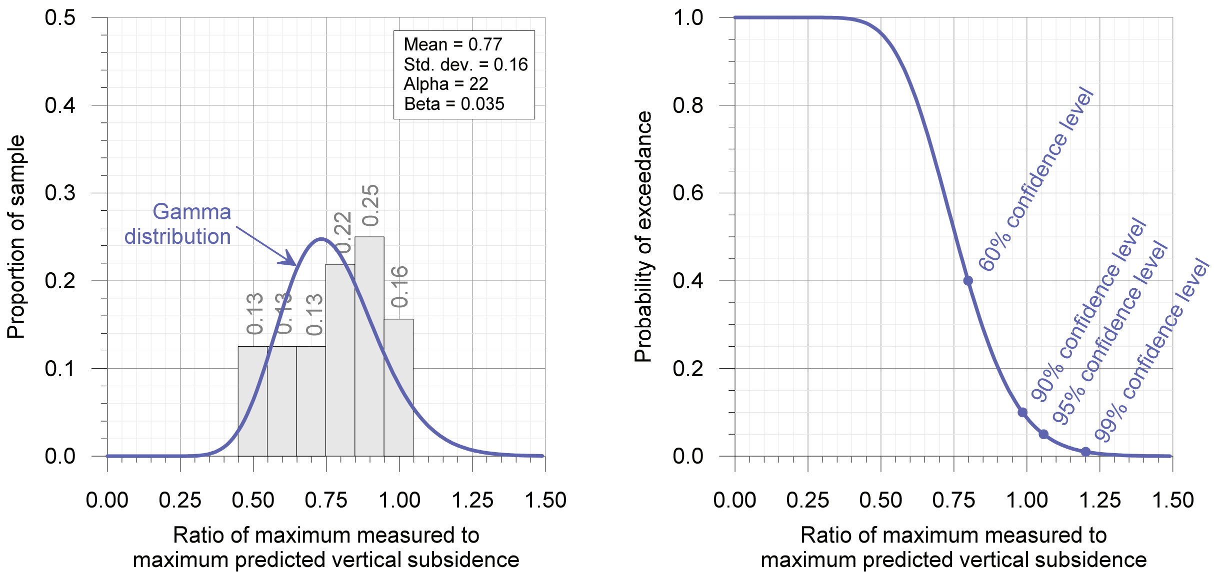

Fig. 3.11 Distribution of the ratio of maximum measured to maximum predicted total vertical subsidence for the monitoring lines at Appin Colliery

The ratios of maximum measured to maximum predicted total vertical subsidence vary between 0.46 and 0.97. That is, the maximum measured total vertical subsidence varies between 46 % and 97 % of the maximum predicted total values based on the calibrated IPM.

The mean ratio of the maximum measured to maximum predicted total vertical subsidence for the monitoring lines is 0.77. The maximum measured vertical subsidence therefore is on average 77 % of the maximum predicted values based on the calibrated IPM.

The 90 % confidence level represents a ratio of maximum measured to maximum predicted total vertical subsidence of approximately 1.0. That is, there is a probability of approximately 10 % that the maximum measured total vertical subsidence will exceed the maximum predicted value based on the calibrated IPM.

The 95 % and 99 % confidence levels represent ratios of maximum measured to maximum predicted total vertical subsidence of 1.06 and 1.20, respectively. That is, there are probabilities of 5 % and 1 % that the maximum measured total vertical subsidence will exceed the maximum predicted values by 6 % and 20 %, respectively.

A comparison of the mining geometry for the proposed LW709 to LW711 and LW905 with that for the existing and approved longwalls in Appin Areas 7 and 9 is provided in Table 3.1.

Table 3.1 Comparison of the mine geometry for the longwalls at Appin Colliery

Parameter	Proposed LW709 to LW711 and LW905		LW702 to LW708 and LW901 to LW904	
	Range	Average	Range	Average
Longwall width	325	325	305 / 325	320
Depth of cover	530 ~ 750	615	495 ~ 610	545
W/H ratio	0.44 ~ 0.61	0.53	0.50 ~ 0.64	0.59
Extraction height	2.8 ~ 3.3	3.1	2.4 ~ 3.4	3.0

The void width for each of the proposed LW709 to LW711 and LW905 of 325 m is the same as the void width for each of the existing and approved LW702 to LW708B and LW904. However, LW901 to LW903 have a narrower void width of 305 m. The comparisons of measured and predicted vertical subsidence found that the calibrated IPM is more conservative for the narrower longwalls in Area 9.

The average depth of cover for the proposed LW709 to LW711 and LW905 of 615 m is greater than the average value for LW702 to LW708B and LW901 to LW904 of 545 m. The depths of cover above the western ends of the proposed longwalls are greater than the existing and approved longwalls, as they mine further beneath Razorback Range.

The average width-to-depth ratio for the proposed LW709 to LW711 and LW905 of 0.53 is therefore less than the average ratio for LW702 to LW708B and LW901 to LW904 of 0.59. The predicted vertical subsidence for the proposed longwalls is therefore less than that for the existing and approved longwalls. However, this difference is small since the longwalls are all in a similar part of the subcritical range.

The average mining heights for the proposed LW709 to LW711 and LW905 of 3.1 m is similar to but slightly greater than the average mining height for LW702 to LW708B and LW901 to LW904 of 3.0 m. However, there is a narrow range of mining heights for the proposed longwalls when compared with the existing and approved longwalls.

It is considered appropriate, therefore, to adopt the calibrated IPM for the proposed LW709 to LW711 and LW905. It is anticipated that the calibrated model will provide reasonable, if not conservative predictions for the proposed longwalls.

4.1. Introduction

The following sections provide the maximum predicted conventional subsidence effects due to the mining of the proposed LW709 to LW711 and LW905. The predicted subsidence effects and the impact assessments for the natural and built features are provided in Chapters 5 and 6.

The predicted vertical subsidence, tilt and curvature have been obtained using the IPM, which has been calibrated based on the latest monitoring data from Appin Colliery, as described in Section 3.6. The predicted strains have been determined by analysing the strains measured at Appin Colliery and other nearby collieries, where the longwall width-to-depth ratios and extraction heights are similar to those for the existing and proposed longwalls.

The maximum predicted subsidence effects and the predicted subsidence contours provided in this report describe the conventional movements and do not include the valley-related upsidence and closure movements, nor the effects of faults and other geological structures. Such effects have been addressed separately in the impact assessments for each feature provided in Chapters 5 and 6.

4.2. Maximum predicted conventional subsidence, tilt and curvature

A summary of the maximum predicted values of incremental conventional vertical subsidence, tilt and curvature due to the mining of LW709 to LW711 and LW905 is provided in Table 4.1. The incremental values represent the additional movements due to the mining of each longwall only.

Table 4.1 Maximum predicted incremental vertical subsidence, tilt and curvature due to the mining of LW709 to LW711 and LW905

Due to 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})
LW709	950	6.5	0.07	0.14
LW710A	425	2.5	0.02	0.05
LW710B	925	6.5	0.06	0.12
LW711	950	6.5	0.07	0.14
LW905	650	4.5	0.04	0.08

The predicted additional vertical subsidence contours due to the mining of LW709 to LW711 and LW905 are shown in Drawing No. MSEC1117-15, in Appendix E. These contours represent the additional movements due to the mining of the proposed longwalls only, i.e. after the completion of LW708B and LW904.

The predicted total vertical subsidence contours due to the mining in Appin Areas 7 and 9 are shown in Drawing No. MSEC1117-16, in Appendix E. These contours represent the total movements due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Summaries of the maximum predicted values of total vertical subsidence, tilt and curvature are provided in Table 4.2 for Area 7 and Table 4.3 for Area 9. The total values represent the accumulated movements within the Study Area due to the extraction of the existing, approved and proposed longwalls.

Table 4.2 Maximum predicted total vertical subsidence, tilt and curvature within the Study Area resulting from the mining of LW702 to LW711

After 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})
LW702 to LW708B	1450	7.5	0.07	0.15
LW709	1550	7.0	0.07	0.15
LW710A	1550	7.0	0.07	0.15
LW710B	1550	6.5	0.07	0.15
LW711	1550	7.0	0.08	0.15

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Table 4.3 Maximum predicted total vertical subsidence, tilt and curvature within the Study Area resulting from the mining of LW901 to LW905

After 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})
LW901 to LW904	1250	6.5	0.07	0.15
LW905	1300	6.5	0.07	0.15

The maximum predicted total vertical subsidence within the Study Area due to the mining of the existing, approved and proposed longwalls is 1550 mm in Area 7 and 1300 mm in Area 9. The maximum vertical subsidence of 1550 mm occurs above LW707B and it represents 46 % of the proposed extraction height of 3.4 m in this location.

The maximum predicted total vertical subsidence directly above the proposed longwalls (and not above the previously extracted longwalls) is 1400 mm above LW709 to LW711 and 800 mm directly above LW905. The maximum predicted subsidence above LW905 is less than the maximum predicted value above LW709 to LW711, as it is the last longwall in the series and therefore it has not developed additional subsidence due to the mining subsequent longwalls in the series.

The maximum predicted total tilt within the Study Area is 7 mm/m (i.e. 0.7 %, or 1 in 143), which occurs adjacent to the maingate of LW711. The maximum predicted total conventional curvatures within the Study Area are 0.08 km^{-1} hogging and 0.15 km^{-1} sagging, which represent minimum radii of curvature of 13 km and 7 km, respectively.

The predicted conventional subsidence effects vary across the Study Area as the result of, among other factors, variations in the longwall geometry, depths of cover, seam thickness and overburden geology. To illustrate this variation, the predicted profiles of vertical subsidence, tilt and curvature have been determined along two prediction lines. The predicted profiles of total vertical subsidence, tilt and curvature along Prediction Lines 1 and 2 are shown in Figs. C.01 and C.02, respectively, in Appendix C. The locations of these prediction lines are shown in Drawings Nos. MSEC1117-15 and MSEC1117-16.

4.3. Predicted strains

The prediction of strain is more difficult than the predictions 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 in bedrock, and the depth of bedrock. Survey tolerance can also represent a substantial portion of the measured strain, in cases where the strains are of a low order of magnitude. The profiles of observed strain, therefore, can be irregular even when the profiles of observed subsidence, tilt and curvature are relatively smooth.

In previous MSEC subsidence reports, predictions of conventional strain were provided based on the best estimate of the average relationship between curvature and strain. Similar relationships have been proposed by other authors. The reliability of the strain predictions was highlighted in these reports, where it was stated that measured strains can vary considerably from the predicted conventional values.

Adopting a linear relationship between curvature and strain provides a reasonable prediction for the conventional tensile and compressive strains. The locations that are predicted to experience hogging or convex curvature are expected to be net tensile strain zones and locations that are predicted to experience sagging or concave curvature are expected to be net compressive strain zones. In the Southern Coalfield, it has been found that a factor of 15 provides a reasonable relationship between the predicted maximum curvatures and the predicted maximum conventional strains.

The maximum predicted conventional strains resulting due to the mining of LW709 to LW711 and LW905, based on applying a factor of 15 to the maximum predicted curvatures, are 1.2 mm/m tensile and 2.3 mm/m compressive. These strains represent typical values when the ground subsides regularly with no localised or elevated strains due to near-surface geological structures or valley closure 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 proposed longwalls has been determined using monitoring data from the extracted longwalls at Appin Colliery and other nearby collieries, where the mining geometry and overburden geometry are similar. The range of strains measured during the extraction of these longwalls should, therefore, provide a reasonable indication of the range of potential strains for the proposed longwalls.

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

4.3.1. Analysis of strains measured in survey bays

For features that are in discrete locations, such as building structures, farm dams and heritage sites, it is appropriate to assess the frequency of the maximum strains measured in individual survey bays.

The survey database has been analysed to extract the maximum tensile and compressive strains that have been measured at any time during the extraction of longwalls at the mine, for survey bays that were located directly above goaf or the chain pillars that are located between the extracted longwalls, which has been referred to as "*above goaf*".

A histogram of the maximum total tensile and compressive strains measured in survey bays located above goaf is provided in Fig. 4.1. A number of probability distribution functions have been fitted to the empirical data. It was found that a *Generalised Pareto Distribution (GPD)* provided a good fit to the raw strain data, which have also been shown in this figure.

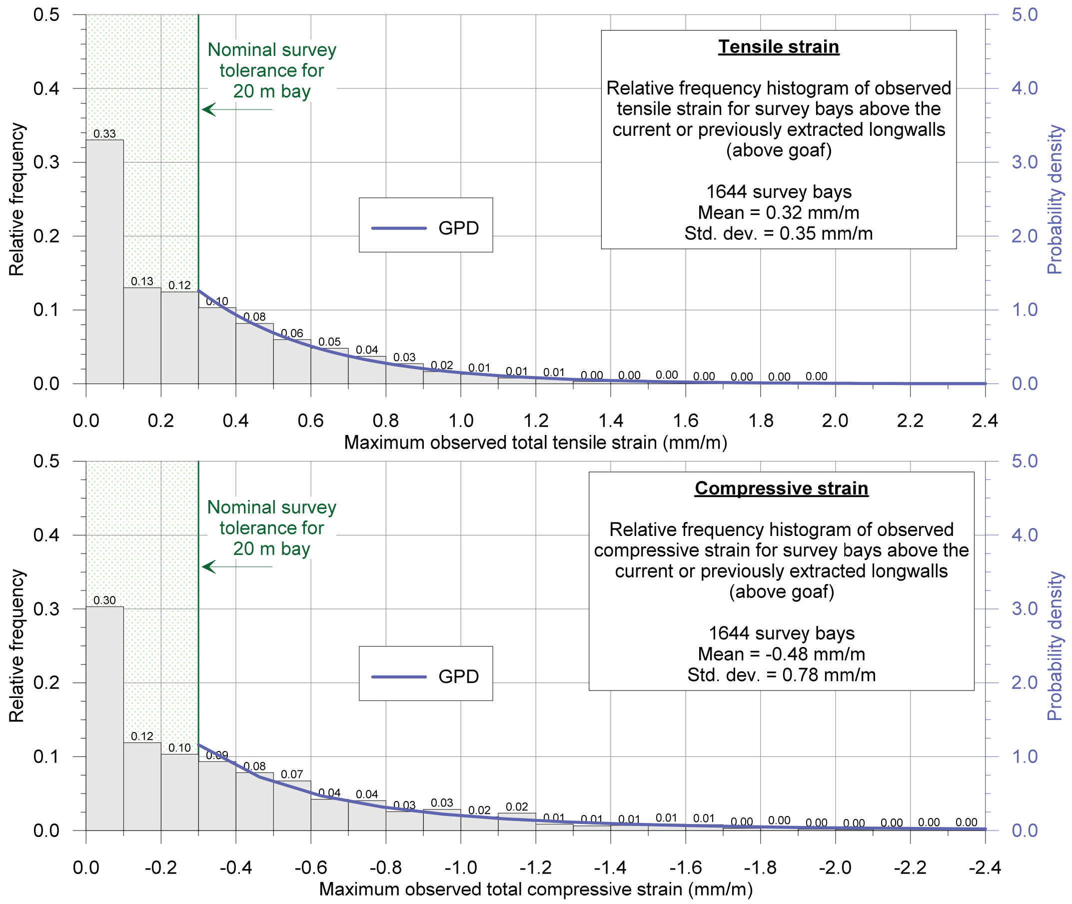

Fig. 4.1 Distributions of the maximum measured tensile and compressive strains during the extraction of longwalls in the Southern Coalfield for survey bays located directly above goaf

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

A summary of the probabilities of exceedance for tensile and compressive strains for survey bays located above goaf, based on the fitted GPDs, is provided in Table 4.4. The analysis does not include the strains resulting from valley-related effects, which are discussed separately in the impact assessments for the natural and built features provided in Chapters 5 and 6.

Table 4.4 Probabilities of exceedance for strain for survey bays located directly above goaf

Type	Strain (mm/m)	Probability of exceedance
Compression	-8.0	1 in 1300
	-6.0	1 in 550
	-4.0	1 in 170
	-2.0	1 in 30
	-1.0	1 in 8
	-0.5	1 in 3
	-0.3	1 in 2
Tension	+0.3	1 in 2
	+0.5	1 in 4
	+1.0	1 in 20
	+1.5	1 in 90
	+2.0	1 in 430
	+3.0	1 in 2000

The 95 % confidence levels for the maximum total strains that the individual survey bays above goaf experienced at any time during mining are 1.0 mm/m tensile and 1.6 mm/m compressive. The 99 % confidence levels for the maximum total strains that the individual survey bays above goaf experienced at any time during mining are 1.5 mm/m tensile and 3.3 mm/m compressive.

The probabilities for survey bays located above goaf are based on the strains measured anywhere above the extracted longwalls at the mine. As described previously, tensile strains are more likely to develop in the locations of hogging curvature and compressive strains are more likely to develop in the locations of sagging curvature.

The distribution of incremental strains measured above previously extracted longwalls in the Southern Coalfield is illustrated in Fig. 4.2 (after Barbato, 2017). The distances have been normalised, so that the locations of the measured strains are shown relative to the longwall maingate and tailgate sides. The approximate confidence levels for the incremental tensile and compressive strains are also shown in this figure, to help illustrate the variation in the data.

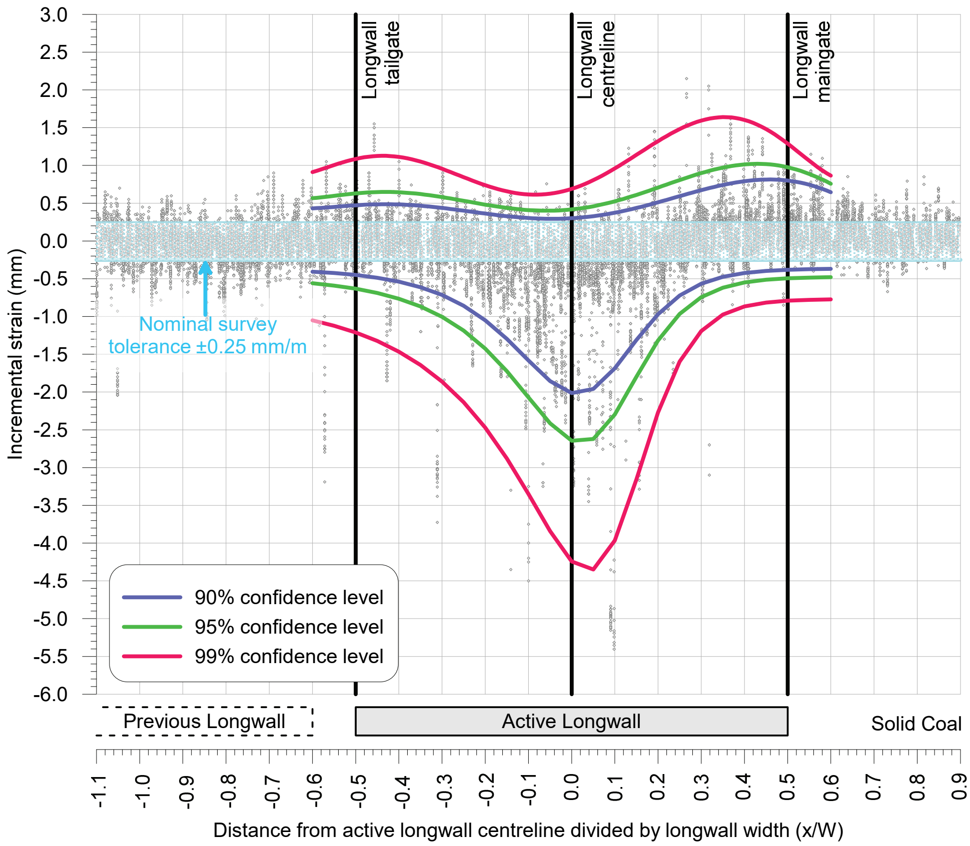

Fig. 4.2 **Measured incremental strains versus normalised distance from the longwall maingate for extracted longwalls in the Southern Coalfield**

The survey database has also been analysed to extract the maximum tensile and compressive strains that have been measured at any time during the extraction of the longwalls at Appin Colliery and other nearby collieries, for survey bays that were located outside and within 250 m of the nearest longwall goaf edge, which has been referred to as "*above solid coal*".

A histogram of the maximum total tensile and compressive strains measured in survey bays located above solid coal is provided in Fig. 4.3. The probability distribution functions, based on the fitted GPDs, have also been shown in this figure.

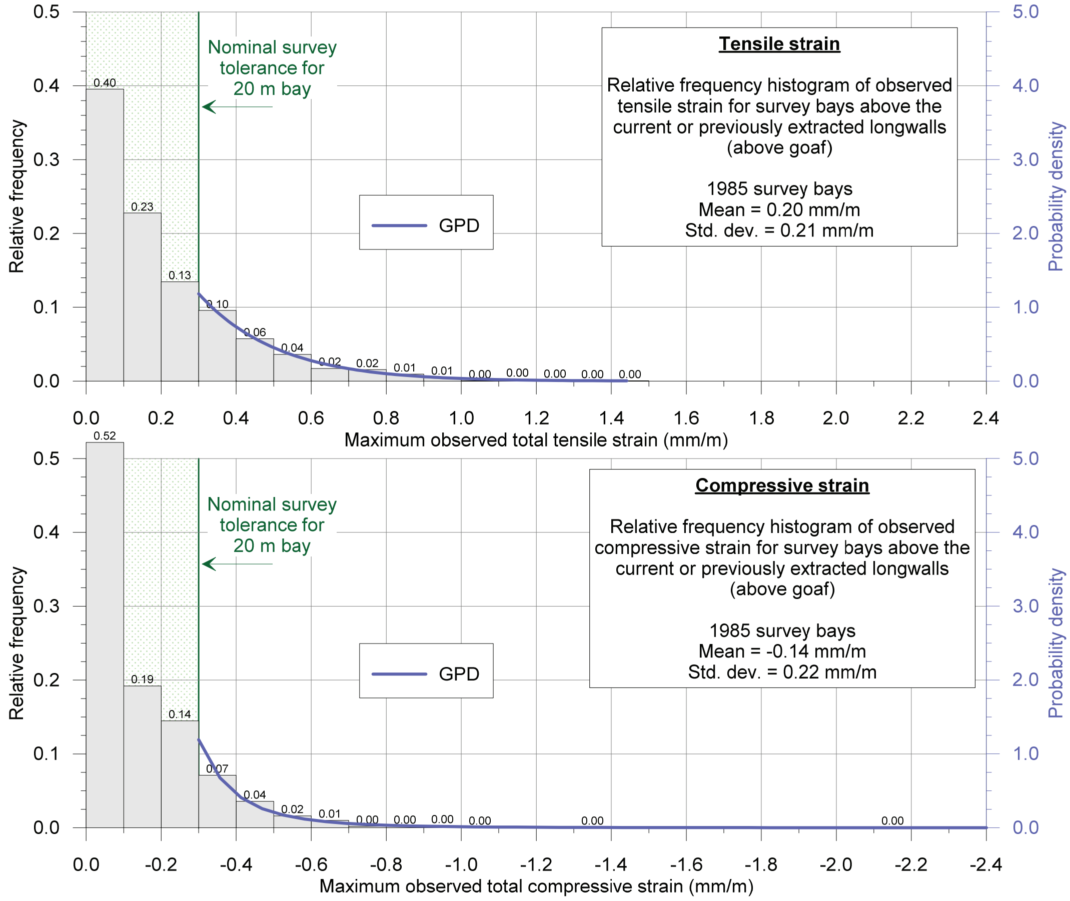

Fig. 4.3 Distributions of the maximum measured tensile and compressive strains during the extraction of longwalls in the Southern Coalfield for survey bays located above solid coal

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

A summary of the probabilities of exceedance for tensile and compressive strains for survey bays located above solid coal, based the fitted GPDs, is provided in Table 4.5. The analysis does not include the strains resulting from valley-related effects, which are discussed separately in the impact assessments for the natural and built features provided in Chapters 5 and 6.

Table 4.5 Probabilities of exceedance for strain for survey bays located above solid coal

Type	Strain (mm/m)	Probability of exceedance
Compression	-2.0	1 in 2350
	-1.5	1 in 890
	-1.0	1 in 230
	-0.5	1 in 28
	-0.3	1 in 7
Tension	+0.3	1 in 4
	+0.5	1 in 11
	+1.0	1 in 150
	+1.5	1 in 2700

The 95 % confidence levels for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 0.6 mm/m tensile and 0.4 mm/m compressive. The 99 % confidence levels for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 0.9 mm/m tensile and 0.8 mm/m compressive.

4.3.2. Analysis of strains measured along whole monitoring lines

For linear features such as roads, cables and pipelines, it is more appropriate to assess the frequency of the maximum strains measured along whole monitoring lines, rather than for individual survey bays. That is, an analysis of the maximum strains measured anywhere along the monitoring lines, regardless of where the strain occurs.

A histogram of maximum measured total tensile and compressive strains measured anywhere along the monitoring lines, at any time during or after the extraction of longwalls at Appin Colliery and other nearby collieries, is provided in Fig. 4.4.

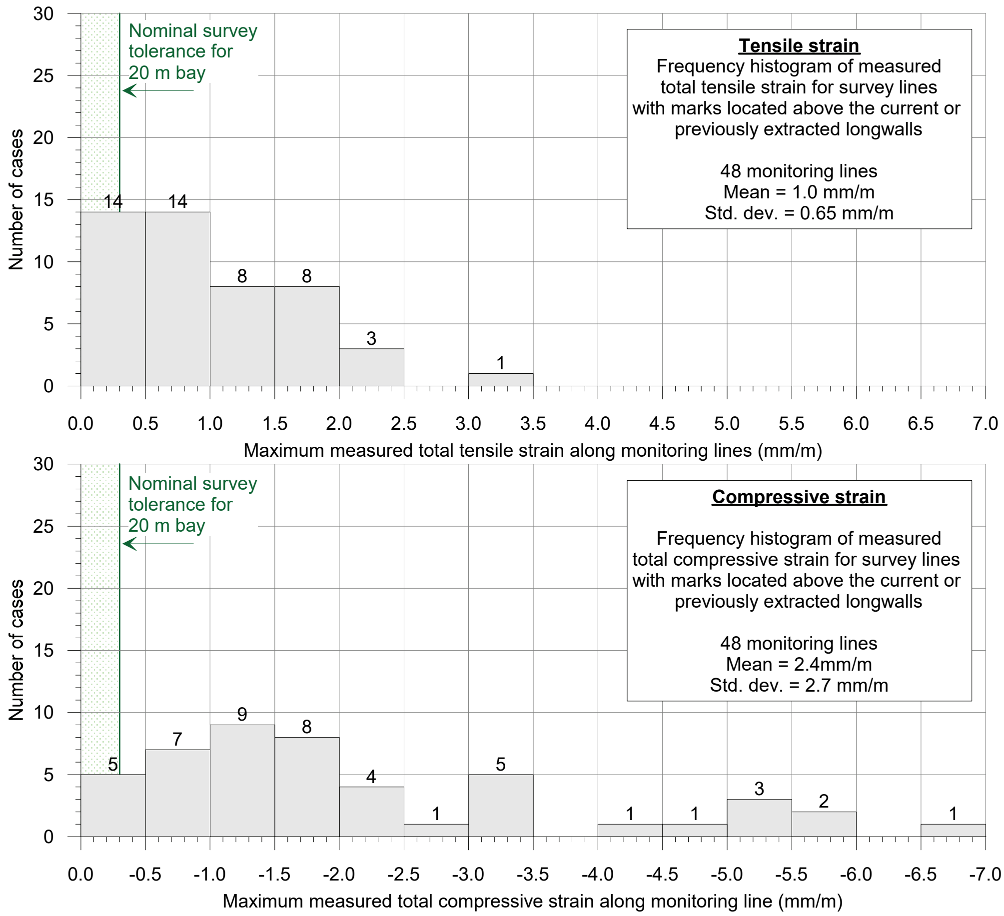

Fig. 4.4 Distributions of maximum measured tensile and compressive strains along the monitoring lines during the extraction of longwalls in the Southern Coalfield

It can be seen from the above figure, that 28 of the 48 monitoring lines (i.e. 58 %) had recorded maximum total tensile strains of 1.0 mm/m or less, and that 44 of the 48 monitoring lines (i.e. 92 %) had recorded maximum total tensile strains of 2.0 mm/m, or less. It can also be seen, that 29 of the 48 monitoring lines (i.e. 60 %) had recorded maximum compressive strains of 2.0 mm/m, or less, and that 39 of the 48 monitoring lines (i.e. 81 %) had recorded maximum compressive strains of 4.0 mm/m, or less.

4.3.3. Analysis of shear strains

As described in Section 3.2, ground strain comprises two components, being normal strain and shear strain, which can be interrelated using Mohr's Circle. The magnitudes of the normal strain and shear strain components are, therefore, dependent on the orientation in which they are measured. The maximum normal strains (i.e. principal strains) are those in the direction where the corresponding shear strain is zero.

Normal strains along monitoring lines can be measured using 2D and 3D techniques, by taking the change in horizontal distance between two points on the ground and dividing by the original horizontal distance between them. This provides the magnitude of normal strain along the orientation of the monitoring line and, therefore, this strain may not necessarily be the maximum (i.e. principal) strain.

Shear deformations are more difficult to measure, as they are the relative horizontal movements perpendicular to the direction of measurement. However, 3D monitoring techniques provide data on the direction and the absolute displacement of survey marks and, therefore, the shear deformations perpendicular to the monitoring line can be determined. But, in accordance with rigorous definitions and the principles of continuum mechanics, (e.g. Jaeger, 1969), it is not possible to determine horizontal shear strains in any direction relative to the monitoring line using 3D monitoring data from a straight line of survey marks.

As described in Section 3.2, shear deformations perpendicular to monitoring lines can be described using various parameters, including horizontal tilt, horizontal curvature, horizontal mid-ordinate deviation, angular distortion and shear index. In this report, horizontal mid-ordinate deviation has been used as the measure for shear deformation, which is defined as the differential horizontal movement of each survey mark, perpendicular to a line drawn between two adjacent survey marks.

The frequency distribution of the maximum total horizontal mid-ordinate deviations measured at survey marks above goaf, for previously extracted longwalls at Appin Colliery and other nearby collieries, is provided in Fig. 4.5. As the typical survey bay length was 20 m, the calculated mid-ordinate deviations were over a chord length of 40 m. The probability distribution function, based on the fitted GPD, has also been shown in this figure.

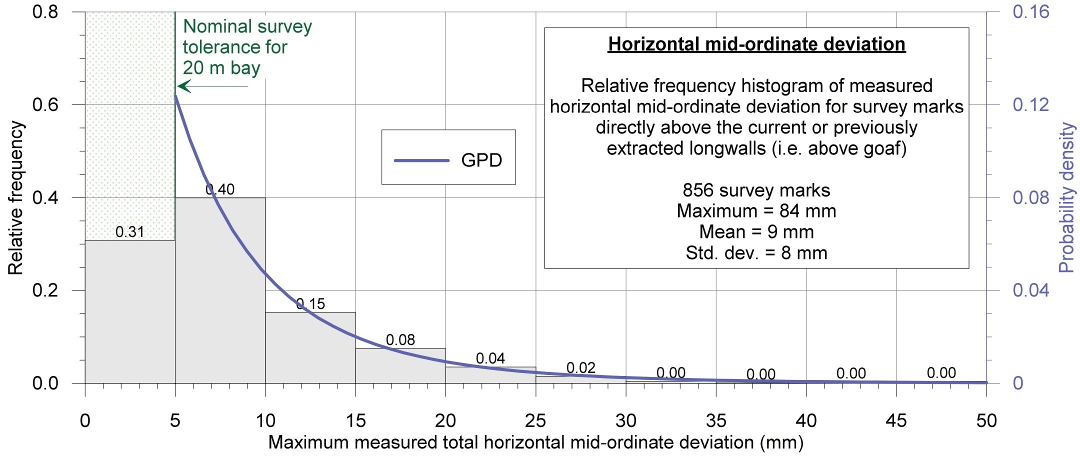

Fig. 4.5 Distribution of maximum measured mid-ordinate deviation during the extraction of previous longwalls in the Southern Coalfield for marks located above goaf

A summary of the probabilities of exceedance for total horizontal mid-ordinate deviation for survey bays located above goaf, based the fitted GPD, is provided in Table 4.6. The analysis does not include the strains resulting from valley-related effects, which are discussed separately in the impact assessments for the natural and built features provided in Chapters 5 and 6.

Table 4.6 Probabilities of exceedance for mid-ordinate deviation for survey marks above goaf for monitoring lines in the Southern Coalfield

	Horizontal mid-ordinate deviation (mm)	Probability of exceedance
Mid-ordinate deviation over a 40 m chord length	10	1 in 3
	20	1 in 15
	30	1 in 40
	40	1 in 110
	50	1 in 250
	60	1 in 550
	70	1 in 1,000
	80	1 in 1,900

The 95 % and 99 % confidence levels for the maximum total horizontal mid-ordinate deviation that the individual survey marks located above goaf experienced at any time during mining were 23 mm and 39 mm, respectively.

4.4. Predicted conventional horizontal movements

The predicted conventional horizontal movements over the existing and proposed longwalls are calculated by applying a factor to the predicted conventional tilt values. In the Southern Coalfield a factor of 15 is generally adopted, being the same factor as that used to determine the conventional strains from the conventional curvatures, and this has been found to give a reasonable correlation with measured data. This factor will vary and will be higher at low tilt values and lower at high tilt values. The application of this factor will therefore lead to over-prediction of horizontal movements where the tilts are high and under-prediction of the movements where the tilts are low.

The maximum predicted conventional tilt for the proposed longwalls is 7 mm/m. The maximum predicted conventional horizontal movement, therefore, is approximately 100 mm, i.e. 7 mm/m multiplied by a factor of 15. Greater movements can develop in incised terrain, due to the increased horizontal movements that develop in the downslope direction.

The distribution of the maximum measured horizontal movements for the 3D survey marks located directly above the longwalls in Appin Colliery and other nearby collieries is provided in Fig. 4.6. It can be seen from this figure, that horizontal movements have been measured up to approximately 550 mm, with an average measured value of approximately 220 mm.

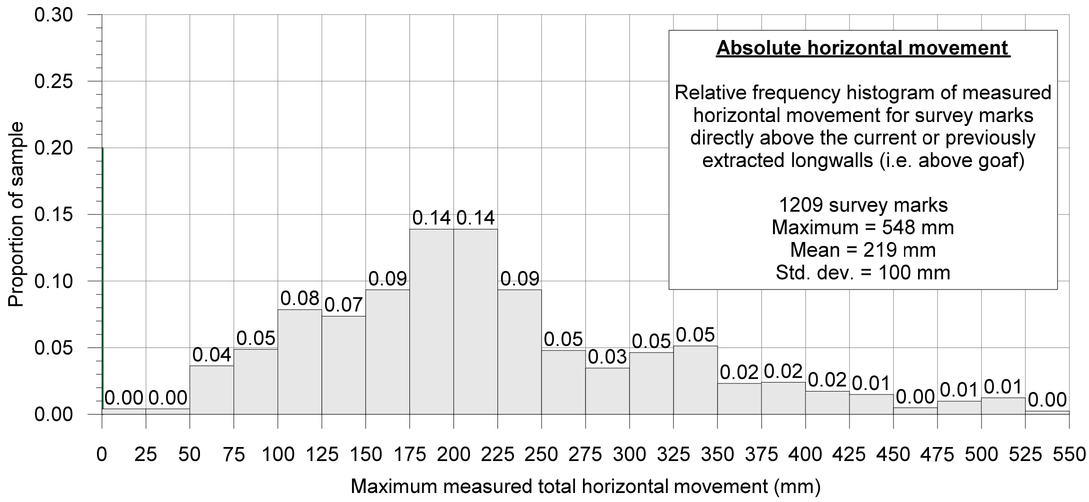

Fig. 4.6 Distribution of the maximum measured horizontal movements for the 3D marks located directly above the longwalls in the Southern Coalfield

Conventional horizontal movements do not directly impact on natural and built features, rather impacts occur as the result of differential horizontal movements. Strain is the rate of change of horizontal movement. The impacts of strain on the natural features and items of surface infrastructure are addressed in the impact assessments for each feature, which have been provided in Chapters 5 and 6.

4.5. Predicted far-field horizontal movements

In addition to the conventional subsidence movements that have been predicted above and adjacent to the proposed longwalls, and the predicted valley-related effects along the streams, it is also likely that far-field horizontal movements will be experienced during the extraction of the proposed longwalls.

The measured incremental far-field horizontal movements resulting from the extraction of each longwall, in any location above goaf (i.e. above the currently mined or previously mined longwalls) or above solid coal (i.e. unmined areas of coal) are provided in Fig. 4.7. The measured incremental far-field horizontal movements above solid coal only, i.e. outside the extents of extracted longwalls, are provided Fig. 4.8. The confidence levels based on fitted GPDs have also been shown in these figures to illustrate the spread of the data. It can be seen from Fig. 4.7 and Fig. 4.8 that the magnitude of the measured far-field horizontal movements over solid unmined areas of coal are lower and more consistent than the measured far-field horizontal movements over previously extracted longwalls.

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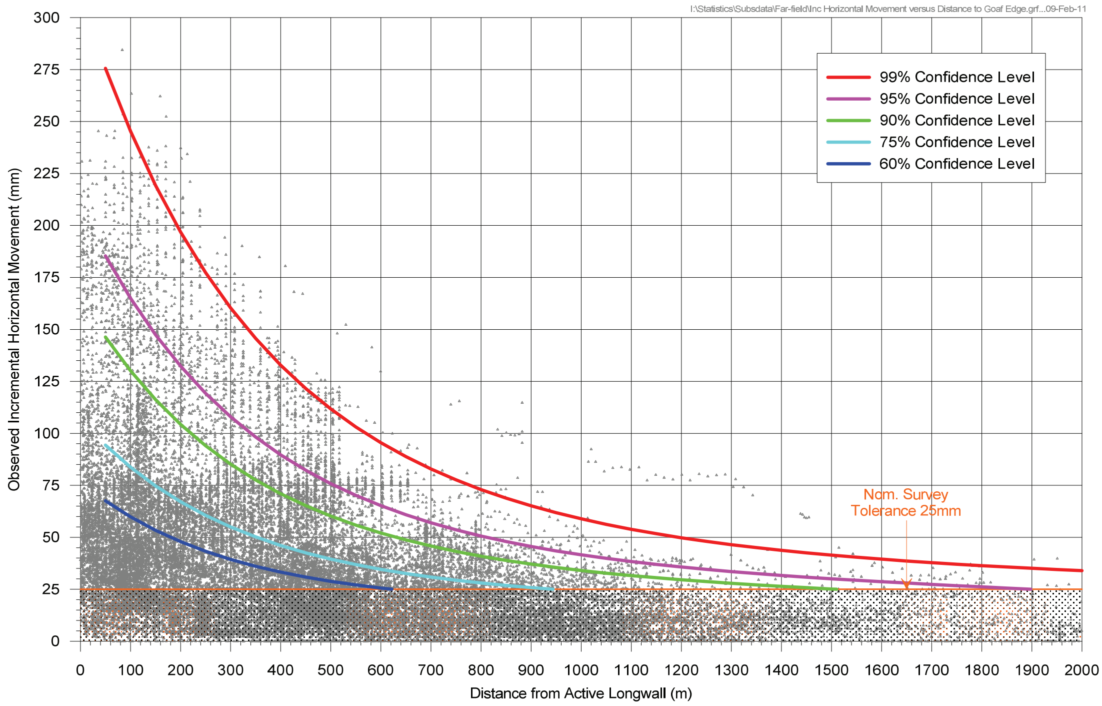

Fig. 4.7 Measured incremental far-field horizontal movements above goaf or solid coal

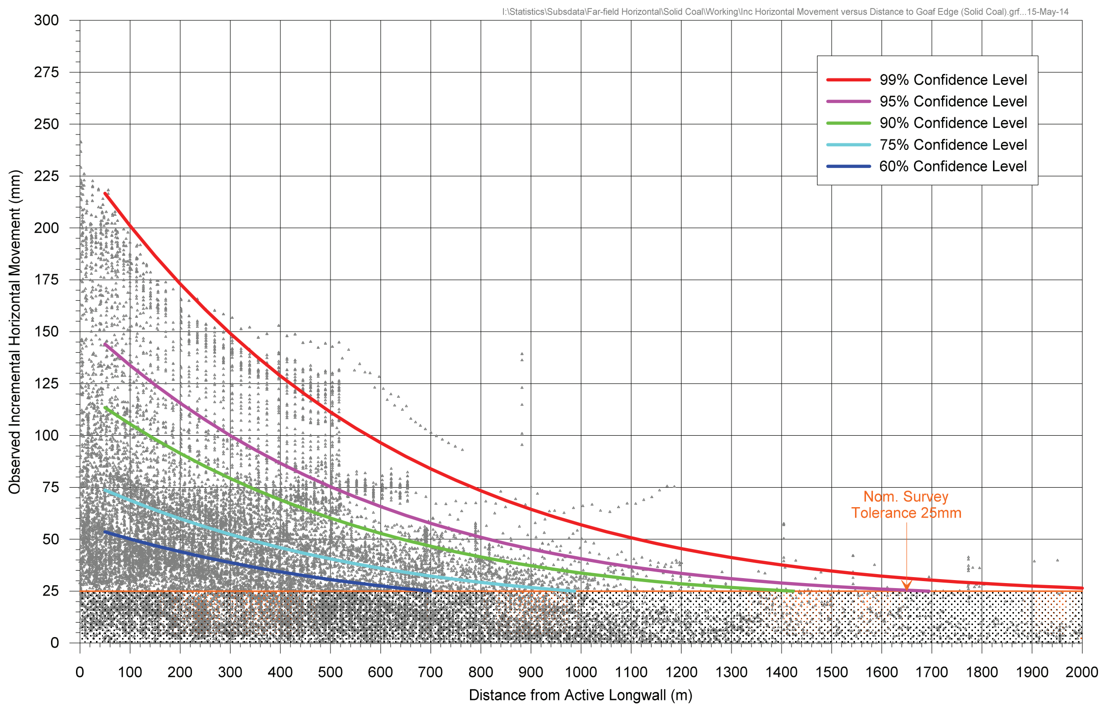

Fig. 4.8 Measured incremental far-field horizontal movements above solid coal only

As successive longwalls within a series of longwalls are mined, the magnitudes of the incremental far-field horizontal movements tend to decrease. The total far-field horizontal movement is not, therefore, the sum of the incremental far-field horizontal movements for the individual longwalls.

The predicted far-field horizontal movements resulting from the extraction of the longwalls are very small and could only be detected by precise surveys. Such movements tend to be bodily movements towards the extracted goaf area and are accompanied by very low-levels of strain, which are generally less than survey tolerance. The impacts of far-field horizontal movements on the natural features and items of surface infrastructure within the vicinity of the Study Area are not expected to be significant, except where they occur at large structures which are sensitive to small differential movements.

4.6. Non-conventional ground movements

It is likely non-conventional ground movements will occur within the Study Area, due to near-surface geological conditions, steep topography and valley-related effects, which are discussed in Section 3.4. These non-conventional movements are often accompanied by elevated tilts and curvatures that are likely to exceed the conventional predictions.

Specific predictions of upsidence, closure and compressive strain due to the valley-related effects are provided for the streams in Section 5.3. The impact assessments for the streams are based on both the conventional and valley-related effects. The potential for non-conventional movements associated with steep topography is discussed in the impact assessments for the steep slopes provided in Section 5.7.

In most cases, it is not possible to predict the exact locations or magnitudes of the non-conventional anomalous movements due to near-surface geological conditions. For this reason, the strain predictions provided in this report are based on a statistical analysis of measured strains in the NSW coalfields, including both conventional and non-conventional anomalous strains, as previously discussed in Section 4.3. In addition to this, the impact assessments for the natural features and items of surface infrastructure, which are provided in Chapters 5 and 6, include historical impacts resulting from previous longwall mining which have occurred as the result of both conventional and non-conventional subsidence movements.

The following sections provide the descriptions, predictions and impact assessments for the natural features located within the Study Area. All significant natural features located outside the Study Area, which may be subjected to far-field or valley-related effects and may be sensitive to these movements, have also been included as part of this assessment.

5.1. Catchment Areas and Declared Special Areas

There are no drinking water catchment areas, or declared special areas within the Study Area.

5.2. Rivers

There are no rivers within the Study Area or within 600 m of the proposed longwalls. The closest river is the Nepean River which is located to the south and to the east of the proposed longwalls. The thalweg (i.e. centreline) of the Nepean River is located 1.5 km south of the commencing (i.e. western) end of LW710A and 1.6 km east of the finishing (i.e. eastern) end of LW709, at its closest points to the proposed longwalls.

The predicted subsidence effects for the Nepean River, due to the mining of LW709 to LW711 and LW905, are less than 20 mm vertical subsidence, less than 20 mm upsidence and less than 20 mm closure. While the river could experience very low levels of vertical subsidence or valley-related effects, it is not predicted to experience measurable tilts, curvatures or strains.

It is unlikely, therefore, that the Nepean River would experience adverse physical impacts due to the mining-induced movements from LW709 to LW711 and LW905. Gas release zones have been observed along the river during the mining of longwalls in Areas 7 and 9. Further gas release zones could develop due to the mining of the proposed longwalls.

5.3. Creeks and tributaries

5.3.1. Descriptions of the creeks and tributaries

The locations of the named creeks are shown in Drawing No. MSEC1117-07.

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.

The creeks that have third order sections located within the Study Area or within 600 m of the proposed longwalls are Foot Onslow Creek, Harris Creek, Navigation Creek and Navigation Creek Tributary 1. There are no creeks with sections greater than third order located within the Study Area or within 600 m of the proposed longwalls.

A summary of the third order creeks that are located within the Study Area is provided in Table 5.1.

Table 5.1 Third order creeks located within the Study Area

Name	Location	Total length of third order section above the mining area (km)	Total length of third order section within the Study Area (km)
Foot Onslow Creek	Directly above LW708B, LW709 and LW710B	1.3	2.1
Harris Creek	Outside mining area, adjacent to LW706	0.0	0.4
Navigation Creek	Directly above LW711	1.2	2.1
Navigation Creek Tributary 1	Directly above LW709, LW710B and LW711	1.7	2.2
Total	-	**4.2**	**6.8**

The upper reaches of the third order creeks have shallow incisions into the surface soils, which have been derived from the Wianamatta Group, with some sandstone outcropping. The lower reaches of the third order creeks have substantial incisions into the surface soils, with exposed sandstone platforms in the bases and rock outcropping in the valley sides. Pools have naturally developed along the lengths of these creeks within the surface soils and rock platforms. Farm dams have also been established in some locations.

Photographs of Foot Onslow Creek, Harris Creek and Navigation Creek are provided in Fig. 5.1 to Fig. 5.4 (Source: IMC).

Fig. 5.1 Foot Onslow Creek (Source: IMC)

Fig. 5.2 Harris Creek (Source: IMC)

Fig. 5.3 Upper reaches of Navigation Creek (Source: IMC)

Fig. 5.4 Lower reaches of Navigation Creek (Source: IMC)

The natural gradients of the third order sections of the creeks within the Study Area typically vary between 5 mm/m (i.e. 0.5 %, or 1 in 200) and 40 mm/m (i.e. 4 %, or 1 in 25). The average natural gradients for these sections of creek vary between 10 mm/m (i.e. 1 %, or 1 in 100) and 20 mm/m (i.e. 2 %, or 1 in 50).

There are also first and second order creeks and tributaries located across the Study Area. These streams have shallow incisions into the natural surface soils which have been derived from the Wianamatta Group. The natural gradients of the first and second order creeks and tributaries vary between 20 mm/m (i.e. 2 %, or 1 in 50) and 400 mm/m (i.e. 40 %, or 1 in 2.5).

5.3.2. Predictions for the creeks and tributaries

The predicted profiles of total vertical subsidence, upsidence and closure along Foot Onslow Creek, Harris Creek, Navigation Creek and Navigation Creek Tributary 1 are shown in Figs. C.03 to C.06, respectively, in Appendix C. The predicted total profiles after the completion of LW702 to LW708B and LW901 to LW904 are shown as cyan lines. The predicted total profiles after the mining of each of LW709 to LW711 and LW905 are shown as the blue lines.

Summaries of the maximum predicted values of total vertical subsidence, tilt and curvature for the third order sections of Foot Onslow Creek, Harris Creek, Navigation Creek and Navigation Creek Tributary 1 are provided in Table 5.2 to Table 5.5, respectively. The values are the maximum predicted subsidence effects within the Study Area due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 5.2 Maximum predicted total vertical subsidence, tilt and curvature for the third order section of Foot Onslow Creek

Name	After longwall	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})
Foot Onslow Creek	LW709	1350	5.5	0.07	0.14
	LW710A	1350	6.0	0.07	0.14
	LW710B	1400	6.0	0.07	0.14
	LW711	1400	6.0	0.07	0.14
	LW905	1400	6.0	0.07	0.14

Table 5.3 Maximum predicted total vertical subsidence, tilt and curvature for the third order section of Harris Creek

Name	After longwall	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})
Harris Creek	LW709	500	3.0	0.02	0.01
	LW710A	500	3.0	0.02	0.01
	LW710B	500	3.0	0.02	0.01
	LW711	500	3.0	0.02	0.01
	LW905	500	3.0	0.02	0.01

Table 5.4 Maximum predicted total vertical subsidence, tilt and curvature for the third order section of Navigation Creek

Name	After longwall	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})
Navigation Creek	LW709	< 20	< 0.5	< 0.01	< 0.01
	LW710A	30	< 0.5	< 0.01	< 0.01
	LW710B	30	< 0.5	< 0.01	< 0.01
	LW711	950	6.5	0.07	0.14
	LW905	950	6.5	0.07	0.14

Table 5.5 Maximum predicted total vertical subsidence, tilt and curvature for the third order section of Navigation Creek Tributary 1

Name	After longwall	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})
Navigation Creek Tributary 1	LW709	130	0.5	0.02	< 0.01
	LW710A	130	0.5	0.02	< 0.01
	LW710B	950	6.0	0.06	0.11
	LW711	1350	7.0	0.07	0.12
	LW905	1350	7.0	0.07	0.12

The maximum predicted total tilt for the third order sections of the creeks within the Study Area is 7 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted total conventional curvatures are 0.07 km^{-1} hogging and 0.14 km^{-1} sagging, which represent minimum radii of curvature of 14 km and 7 km, respectively.

The maximum predicted conventional strains for the third order sections, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly above the mining area are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

The creeks will also experience valley-related effects. A summary of the maximum predicted upsidence and closure for the sections of third order creeks located is provided in Table 5.6. The values are the maximum predicted valley-related effects within the Study Area due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

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Table 5.6 **Maximum predicted total valley-related effects for the third order sections of the creeks**

Name	Maximum predicted total upsidence (mm)	Maximum predicted total closure (mm)
Foot Onslow Creek	300	250
Harris Creek	350	300
Navigation Creek	350	475
Navigation Creek Tributary 1	550	800

The maximum predicted values of valley-related closure for the third order sections of the creeks within the Study Area vary between 250 mm and 800 mm. These creeks could experience compressive strains due to these valley-related effects. The predicted strains due to valley-related effects have been determined from an analysis of ground monitoring lines for valleys with similar heights located directly above extracted longwalls at Appin Colliery and other nearby collieries.

The third order sections of the creeks located above the mining area have effective valley heights typically ranging between 10 m and 40 m, with a small section of Navigation Creek having an effective valley height up to 60 m. The maximum compressive strain measured at similar streams located directly above extracted longwalls at Appin Colliery and other nearby collieries is 7 mm/m based on the 95 % confidence level.

The first and second order sections of the creeks are located across the Study Area and, therefore, could experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence effects within the Study Area is provided in Chapter 4.

5.3.3. Impact assessments for the creeks and tributaries

The impact assessments for the creeks are provided in the following sections. The assessments provided in this report should be read in conjunction with the assessments provided in the reports by the other specialist consultants on the project.

Potential for increased levels of ponding, flooding and scouring due to the mining-induced tilts

Mining can result in increased levels of ponding in locations where the mining-induced tilts oppose and are greater than the natural drainage line gradients that exist before mining. Mining can also potentially result in an increased likelihood of scouring of the banks in the locations where the mining-induced tilts considerably increase the natural drainage line gradients that exist before mining.

The maximum predicted tilt for the creeks within the Study Area is 7 mm/m (i.e. 0.7 %, or 1 in 143). The predicted mining-induced tilts are less than the average natural gradients of the creeks which vary between 10 mm/m (i.e. 1 %, or 1 in 100) and 20 mm/m (i.e. 2 %, or 1 in 50) for the third order sections and between 20 mm/m (i.e. 2 %, or 1 in 50) and 400 mm/m (i.e. 40 %, or 1 in 2.5) for the first and second order sections

The natural grades and the predicted post-mining grades along drainage lines Foot Onslow Creek, Harris Creek, Navigation Creek and Navigation Creek Tributary 1 are illustrated in Fig. 5.5 to Fig. 5.8, respectively. The locations of these creeks are shown in Drawing No. MSEC1117-07.

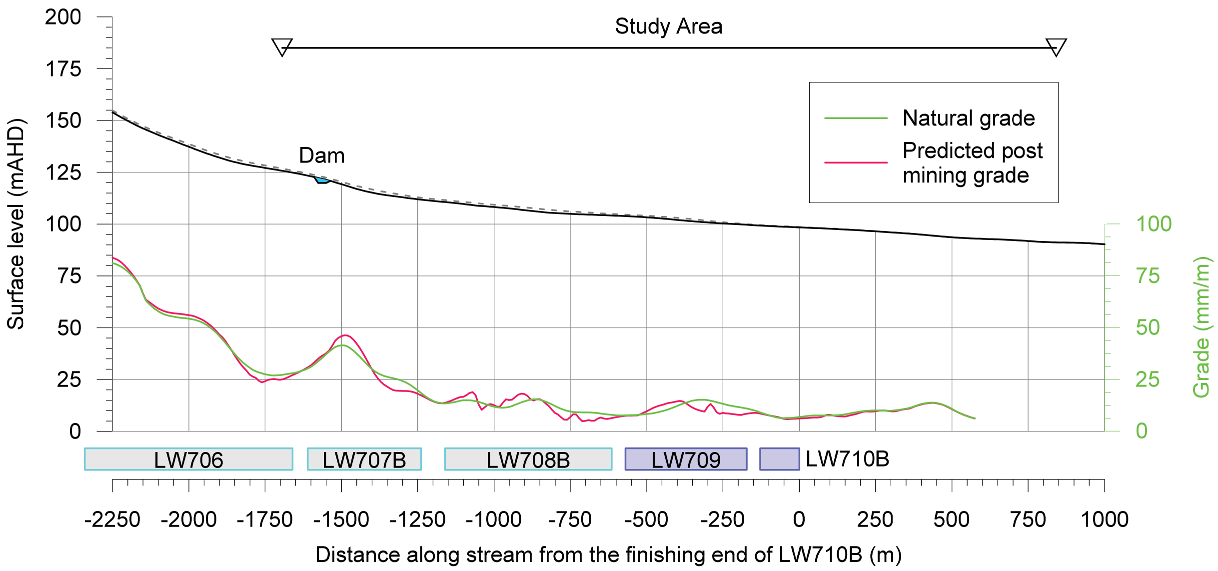

Fig. 5.5 Natural and predicted post-mining surface levels along Foot Onslow Creek

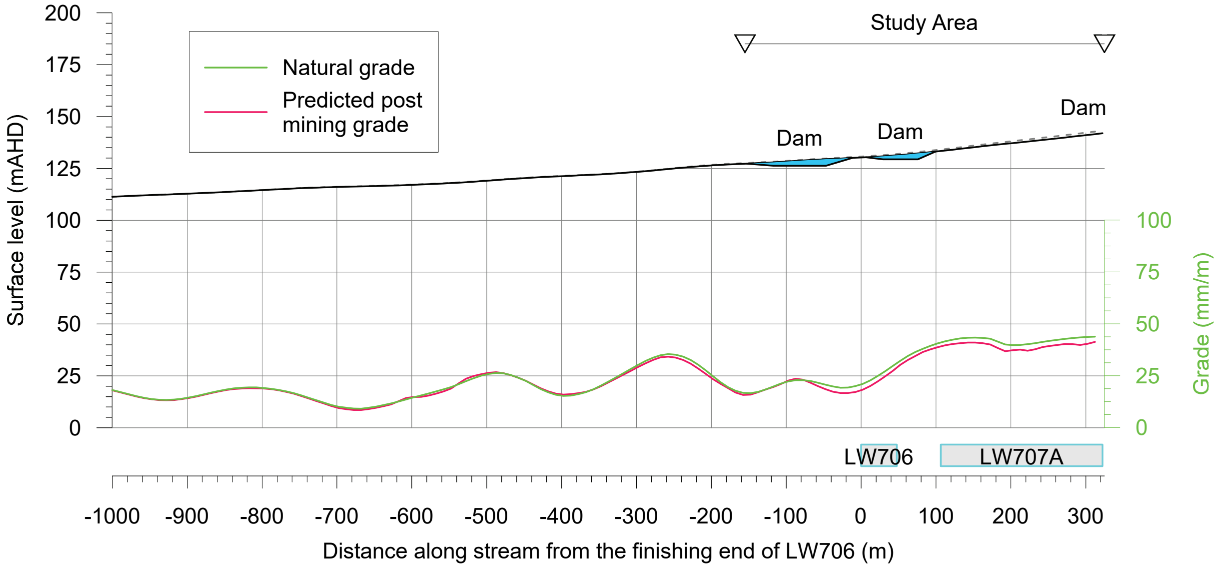

Fig. 5.6 Natural and predicted post-mining surface levels along Harris Creek

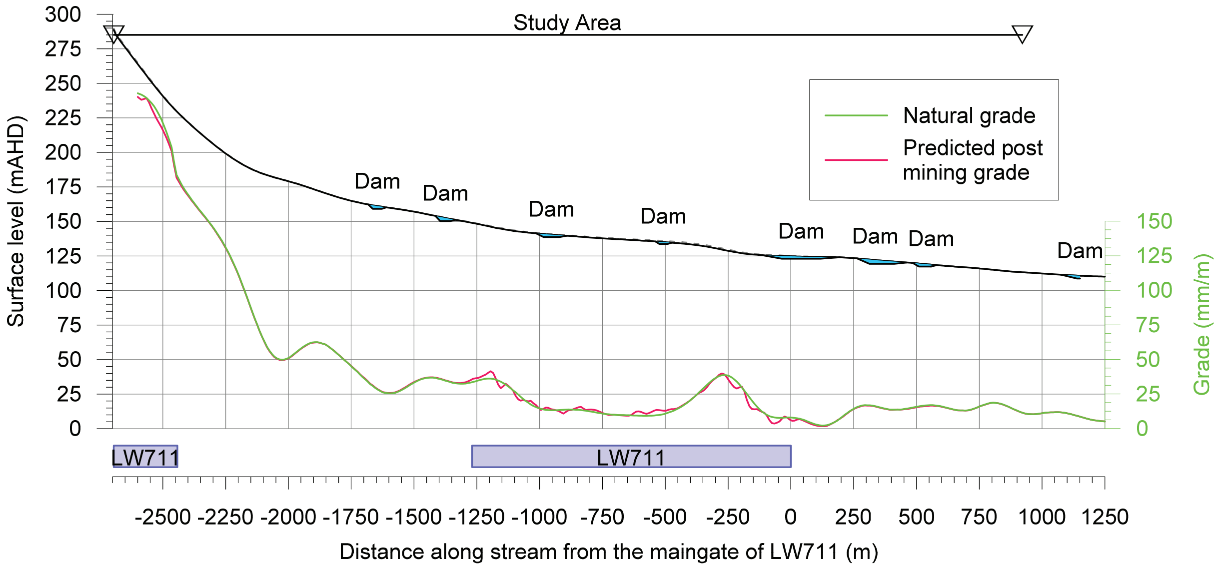

Fig. 5.7 Natural and predicted post-mining surface levels along Navigation Creek

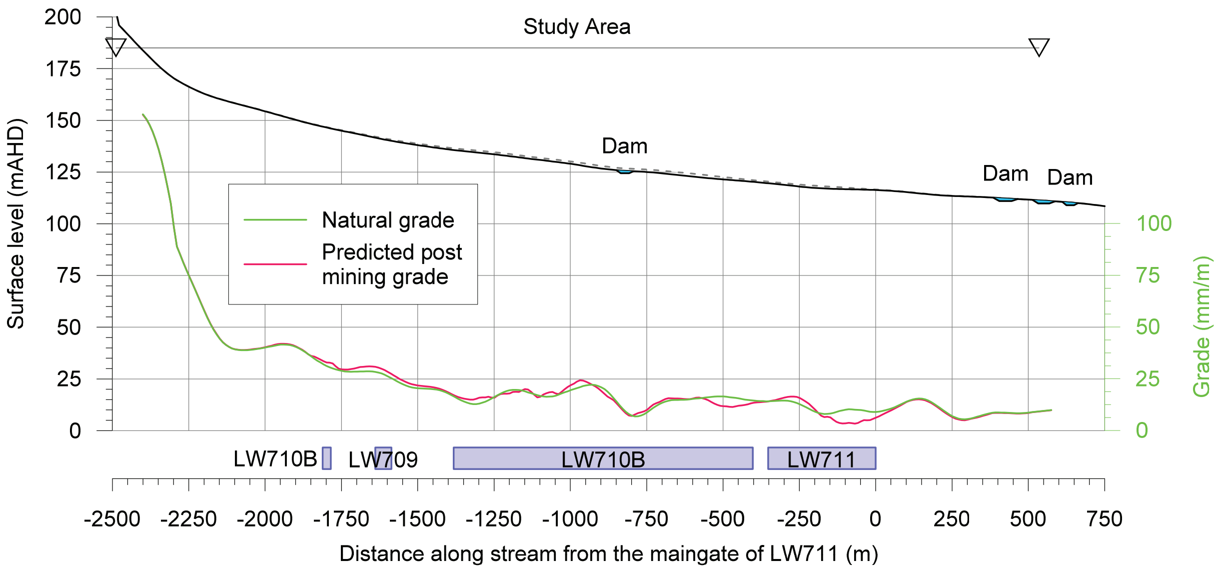

Fig. 5.8 Natural and predicted post-mining surface levels along Navigation Creek Tributary 1

There are no predicted reversals of stream grade along Foot Onslow Creek, Harris Creek, Navigation Creek or Navigation Creek Tributary 1. Similarly, there are no predicted reversals of stream grade along the first and second order creeks and tributaries located elsewhere within the Study Area.

It is unlikely, therefore, that there would be large-scale adverse changes in the levels of ponding or scouring of the banks along the creeks and tributaries within the Study Area due to the mining-induced tilt. It is possible that localised increased ponding could develop in some isolated locations, where the natural grades are small, and upstream of the chain pillars and the edges of the mining area.

The potential impacts of increased ponding and scouring of the drainage lines, therefore, are expected to be minor and localised. Impacts resulting from changes in surface water flows due to mining-induced tilt are expected to be small in comparison with those which occur during natural flooding conditions.

Potential for cracking in the creek bed and fracturing of bedrock

The third order sections of the creeks are predicted to experience a maximum conventional tensile strain of 1.0 mm/m based on the 95 % confidence level. The maximum predicted compressive strain due to the valley-related effects is 7 mm/m based on the 95 % confidence level. The first and second order sections of the creeks and tributaries could experience similar levels of strains.

Fracturing in bedrock has been observed due to previous longwall mining in the Southern Coalfield where the tensile strains have been greater than 0.5 mm/m or where the compressive strains have been greater than 2 mm/m. Fracturing could therefore develop along the creeks and tributaries due to the mining of the proposed LW709 to LW711 and LW905. Fracturing will predominately occur where the creeks and tributaries are located directly above the mining area. Impacts can also occur outside the mining area, with minor and isolated fracturing occurring at distances up to approximately 400 m outside the longwalls, as previously observed at Appin Colliery and elsewhere in the Southern Coalfield.

The mining-induced compression due to valley closure effects can also result in dilation and the development of bed separation in the topmost bedrock, as it is less confined. This additional dilation due to valley closure is expected to develop predominately within the top 10 m to 20 m of the bedrock. Compression can also result in buckling of the topmost bedrock resulting in heaving in the overlying surface soils.

Surface water flow diversions could occur along the creeks and tributaries that are located directly above the mining area. In times of heavy rainfall, the majority of the runoff would flow over the fractured bedrock and soil beds and would not be diverted into the dilated strata below. In times of low flow, however, surface water flows can be diverted into the dilated strata below the beds. The creeks and tributaries are ephemeral and, therefore, surface water flows only occur during and for short periods after rain events.

Creeks and tributaries have been directly mined beneath by the completed longwalls in Appin Areas 7 and 9 and at other nearby collieries. A summary of the experience of mining beneath ephemeral creeks and tributaries in the Southern Coalfield is provided in Table 5.7.

Table 5.7 Experience of mining beneath creeks and tributaries in the Southern Coalfield

Longwalls	Streams	Measured movements	Observed impacts
Appin Area 3 (LW301 and LW302)	2.7 km of streams directly mined beneath	650 mm subsidence 4.5 mm/m tilt 1.0 mm/m tensile strain 3.0 mm/m comp. strain (Measured M & N-Lines)	No reported fracturing which resulted in surface water flow diversions
Appin Area 4 (LW401 to LW409)	3.8 km of streams directly mined beneath, including Creek 2A, Rocky Ponds Creek and Simpsons Creek	700 mm subsidence 5.0 mm/m tilt 1.0 mm/m tensile strain 2.0 mm/m comp. strain (Measured A6000-Line)	No reported fracturing which resulted in surface water flow diversions
Appin Area 7 (LW701 to LW708A)	12 km of streams directly mined beneath, including upper reaches of Harris Creek	1300 mm subsidence 8.5 mm/m tilt 1.5 mm/m tensile strain 8.5 mm/m comp. strain (Measured ARTC-Line and M31-Lines)	No reported fracturing which results in surface water flow diversions
Appin Area 9 (LW901 and LW902)	3.9 km of streams directly mined beneath including tributaries to the Nepean River	525 mm subsidence 3.0 mm/m tilt 1.5 mm/m tensile strain 3.0 mm/m comp. strain (Measured ARTC-Line)	No reported fracturing which results in surface water flow diversions
West Cliff Area 5 (LW29 to LW37)	5.6 km of streams directly mined beneath, including Unnamed Creek, Ousedale Creek, Mallaty Creek and Leafs Gully	1350 mm subsidence 11 mm/m tilt 1.5 mm/m tensile strain 5.5 mm/m comp. strain (Measured B-Line)	Fracturing observed in the bed of Mallaty Creek, loss of water holding capacity in one pool (Ref. MC109).

Based on the experience of mining beneath ephemeral creeks and tributaries in the Southern Coalfield, it is likely that some fracturing will occur along the streams within the Study Area, particularly those located directly above or adjacent to the mining area. Some standing pools could experience a reduction or loss of water holding capacity.

Further assessments of the potential impacts on surface water are provided in the reports by the specialist surface water and groundwater consultants on the project.

5.3.4. Recommendations for the creeks and tributaries

IMC has developed management strategies for creeks and tributaries that have been directly mined beneath by longwalls in Appin Areas 7 and 9. It is recommended that these management strategies are reviewed and updated to incorporate the proposed LW709 to LW711 and LW905. It is also recommended that periodic inspections are carried out along the streams during active subsidence.

5.4. Aquifers and known groundwater resources

Shallow groundwater aquifers have been identified within the Study Area. The descriptions and assessment of potential impacts on the groundwater resources are provided in the report by the specialist groundwater consultant on the project.

5.5. Cliffs

5.5.1. Descriptions of the cliffs and minor cliffs

The definition of a cliff provided in the project approval (BSO, 2011) are:

> *"Cliff* *Continuous rock face, including overhangs, having a minimum height of 10 metres and a minimum slope of 2 to 1, ie having a minimum angle to the horizontal of 63°*

The definitions of cliffs and minor cliffs provided in the NSW DPIE *Standard and Model Conditions for Underground Mining* (DPIE, 2012) are:

> *"Cliff* *Continuous rock face, including overhangs, having a minimum length of 20 metres, a minimum height of 10 metres and a minimum slope of 2 to 1 (>63.4°)*
>
> *Minor Cliff* *A continuous rock face, including overhangs, having a minimum length of 20 metres, heights between 5 metres and 10 metres and a minimum slope of 2 to 1 (>63.4°); or a rock face having a maximum length of 20 metres and a minimum height of 10 metres"*

The cliffs and minor cliffs within the Study Area have been identified from the LiDAR surface level contours and from site investigations. The locations of the cliffs are shown in Drawing No. MSEC1117-08.

Cliffs have been identified in the western part of the Study Area along Razorback Range. These cliffs have formed in the sandstone members (Rwb and Rwbh) of the Wianamatta Group. A summary of the cliffs within the Study Area is provided in Table 5.8.

Table 5.8 Details of the cliffs located within the Study Area

Cliff Ref.	Overall length (m)	Maximum height (m)	Location
RR-CL1	25	15	470 m west of LW710A
RR-CL2	50	13	420 m west of LW710A
RR-CL3	30	20	Directly above LW710A
RR-CL4	30	13	150 m south of LW710A and 420 m west of LW905
RR-CL5	90	20	Directly above LW710A
RR-CL6	30	12	Directly above LW905
RR-CL7	35	12	Directly above LW905

The cliffs have overhang depths ranging between 1 m and 3 m. Natural fracturing and dislodged rocks are evident in Cliffs RR-CL2, RR-CL3, RR-CL6 and RR-CL7. There is also minor water seepage visible on the faces of the cliffs.

The cliffs within the Study Area were inspected by the IMC field team on 23 and 24 July 2020. Photographs of these cliffs are provided in Fig. 5.9 to Fig. 5.14 (Source: IMC).

Fig. 5.9 Cliff RR-CL1 (Source: IMC)

Fig. 5.10 Cliff RR-CL2 (Source: IMC)

Fig. 5.11 Cliff RR-CL3 (Source: IMC)

Fig. 5.12 Cliff RR-CL4 (Source: IMC)

Fig. 5.13 Cliff RR-CL6 (Source: IMC)

Fig. 5.14 Cliff RR-CL7 (Source: IMC)

Cliffs have also been identified along the Nepean River and Harris Creek; however, these features are located outside the Study Area and are at distances of more than 1 km from the proposed longwalls.

Minor cliffs and rock outcrops have also been identified within the Study Area. These rock features are generally located along Razorback Range and the steeper sections of the streams.

5.5.2. Predictions for the cliffs and minor cliffs

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature for the cliffs within the Study Area is provided in Table 5.9. The values are the maximum predicted subsidence effects within 20 m of the mapped extents of each of the cliffs due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 5.9 Maximum predicted total vertical subsidence, tilt and curvature for the cliffs within the Study Area

Feature	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})
Cliffs	RR-CL1	< 20	< 0.5	< 0.01	< 0.01
	RR-CL2	< 20	< 0.5	< 0.01	< 0.01
	RR-CL3	150	2.0	0.03	< 0.01
	RR-CL4	125	< 0.5	< 0.01	< 0.01
	RR-CL5	225	3.0	0.03	< 0.01
	RR-CL6	775	4.5	0.01	0.08
	RR-CL7	600	4.5	0.03	0.04

The maximum predicted total tilt for the cliffs within the Study Area is 4.5 mm/m (i.e. 0.45 %, or 1 in 222). The maximum predicted total conventional curvatures are 0.03 km^{-1} hogging and 0.08 km^{-1} sagging, which represent minimum radii of curvature of 33 km and 13 km, respectively.

The maximum predicted conventional strains for the cliffs, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 0.5 mm/m tensile and 1.0 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly above the mining area are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels. The maximum predicted strains outside the mining area are 0.6 mm/m tensile and 0.4 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

The minor cliffs are located across the Study Area and, therefore, are expected to experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence movements within the Study Area is provided in Chapter 4.

5.5.3. Impact assessments for the cliffs and minor cliffs

The total length of cliffs that are located within the Study Area is 290 m. These cliffs are predicted to experience mine subsidence effects up to 775 mm vertical subsidence, 4.5 mm/m tilt and 0.03 km^{-1} hogging curvature and 0.08 km^{-1} sagging curvature.

It is difficult to assess the likelihood of cliff instabilities based upon predicted ground movements. The likelihood of a cliff becoming unstable is dependent on many factors that are difficult to quantify. Some of these factors include jointing, inclusions, weathering within the rockmass, groundwater pressure and seepage flow behind the rockface. Even if these factors could be determined, it would still be difficult to quantify the extent to which these factors may influence the stability of a cliff naturally or when it is exposed to mine subsidence movements. It is therefore possible that cliff instabilities may occur during mining that may be attributable to either natural causes, mine subsidence, or both.

The likelihood of cliff instabilities within the Study Area has been assessed based on case studies where longwall mining has previously occurred directly beneath cliffs in the Southern Coalfield.

- *Tower Longwalls 1 to 17 beneath the Cataract and Nepean Rivers*

  Tower Longwalls 1 to 17 mined directly beneath the valleys of the Cataract and Nepean Rivers. The total length of cliffs that were directly mined beneath or located within the 35° angle of draw line from these longwalls was greater than 5 km. The overall heights of the cliffs varied between 10 m and 60 m and they had formed within the Hawkesbury Sandstone Sedimentary Group.

  Tower Longwalls 1 and 17 had void widths varying between 110 m and 210 m and solid chain pillar widths varying between 35 m and 50 m. The longwalls were extracted from the Bulli Seam at depths of cover varying between 400 m and 540 m. The width-to-depth ratios of these longwalls therefore typically ranged between 0.4 and 0.5.

  There were a total of 10 cliff instabilities recorded along the Cataract and Nepean Rivers, due to the mining of Tower Longwalls 1 to 17, all of which occurred where the longwalls mined directly beneath the cliffs. The details of the cliff instabilities are provided in Table 5.10.

Table 5.10 Recorded cliff instabilities along the Cataract and Nepean River Valleys due to the mining of Tower Longwalls 1 to 17

Colliery	River valley	Longwalls	Number of recorded cliff instabilities due to mining	Total length of recorded cliff instabilities due to mining	Total length of cliff within 0.7 times depth of cover from the longwalls	Observed rate of cliff instabilities due to mining (%)
Tower	Cataract	LW16 & LW17	8	160	3700	4.3
	Nepean	LW1 to LW17	2	40	1875	2.1
	Total		**10**	**200**	**5575**	**3.5**

  The total length of cliff instabilities due to the mining of Tower Longwalls 1 to 17 was approximately 4 % of the total length of the cliffs. All the recorded cliff instabilities occurred where the cliffs were directly mined beneath.

- *Tahmoor Longwalls 14 to 19 beneath the Bargo River*

  Tahmoor Longwalls 14 to 19 mined directly beneath the Bargo River. The total length of cliffs that were directly mined beneath or located within the 35° angle of draw line from these longwalls was approximately 2.5 km. The overall heights of the cliffs varied between 10 m and 25 m and they had formed within the Hawkesbury Sandstone Sedimentary Group.

  Tahmoor Longwalls 14 to 19 had void widths of 240 m and solid chain pillar widths of 37 m. The longwalls were extracted from the Bulli Seam at depths of cover varying between 380 m and 390 m. The width-to-depth ratios of these longwalls therefore typically ranged between 0.6 and 0.65.

  No cliff instabilities were observed during the mining period.

Based on the experience of mining beneath cliffs at Tower and Tahmoor Collieries, it is estimated that on average between 3 % and 5 % of the total length, or between 1 % and 3 % of the total face area of cliffs that are located directly above the mining area would experience adverse impacts. It is also anticipated that less than 3 % of the total face area of minor cliffs located directly above the proposed longwalls would experience adverse impacts.

Cliffs RR-CL3, RR-CL5, RR-CL6 and RR-CL7 are located directly above the proposed LW710A and LW905. The total length of these cliffs is approximately 185 m and the total face area is approximately 3180 m^2.

There are no building structures or other built features located directly beneath Cliffs RR-CL3, RR-CL5, RR-CL6 and RR-CL7. The risk to public safety, therefore, is considered to be low. However, it is recommended that, subject to landholder access, IMC carry out periodic inspections of the cliffs at a safe distance during active subsidence, to identify any fracturing, unstable rocks and rockfalls.

Cliffs RR-CL1, RR-CL2 and RR-CL4 are located outside the mining area at distance varying between 150 m and 470 m. At these distances, the cliffs are not predicted to experience measurable conventional tilts, curvatures or strains. It is not anticipated, therefore, that adverse impacts would occur to Cliffs RR-CL1, RR-CL2 and RR-CL4. However, it is possible that isolated rock falls could occur at these cliffs, but it is expected that this would represent on average less than 1 % of the total length or total face area of the cliffs located outside the mining area.

5.5.4. Recommendations for the cliffs and minor cliffs

It is recommended that a Landscape Management Plan be developed for the cliffs within the Study Area to monitor and manage any impacts that result from cliff instabilities.

5.6. Rock Outcrops

Rock outcrops are defined as exposed rockfaces with heights of less than 10 m or slopes of less than 2 in 1. There are rock outcrops located across the Study Area, primarily along the Razorback Range and the incised creeks and tributaries.

The rock outcrops are located across the Study Area and, therefore, are expected to experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence movements within the Study Area is provided in Chapter 4.

The extraction of the proposed longwalls is likely to result in fracturing of the rock outcrops and, where the rock is marginally stable, this could then result in instabilities. Previous experience in the Southern Coalfield indicates that the percentage of rock outcrops that are likely to be impacted by mining is very small, representing on average less than 3 % of the total surface area.

The potential for isolated rockfalls, however, could result in a public safety risk where houses or infrastructure are located beneath large rock outcrops.

IMC has developed a *Cliff and Steep Slope Management Plan* for LW701 to LW708B and LW901 toLW904. The Management Plan addresses monitoring, response action, reporting and public safety. It is recommended that the management plan be reviewed and, where required, revised to include the proposed LW709 to LW711 and LW905.

5.7. Steep slopes

5.7.1. Descriptions of the steep slopes

The definition of a steep slope provided in the project approval (BSO, 2011) is: "*An area of land having a gradient between 1 in 3 (33% or 18.3º) and 2 in 1 (200% or 63.4º)*". The locations of the steep slopes were identified from the 1 m surface level contours which were generated from a LiDAR survey of the area.

The areas identified as having steep slopes are shown in Drawing No. MSEC1117-08.

The steep slopes within the Study Area have been identified along Razorback Range above LW710A, the western end of LW711 and above LW905. A photograph of Razorback Range in Area 9 is provided in Fig. 5.15.

Fig. 5.15 Razorback Range in Area 9

A section showing the surface topography and the natural grades through Razorback Range is illustrated in Fig. 5.16. The section has been taken across the range (i.e. in the direction of the maximum terrain slope) and oblique to the proposed longwalls.

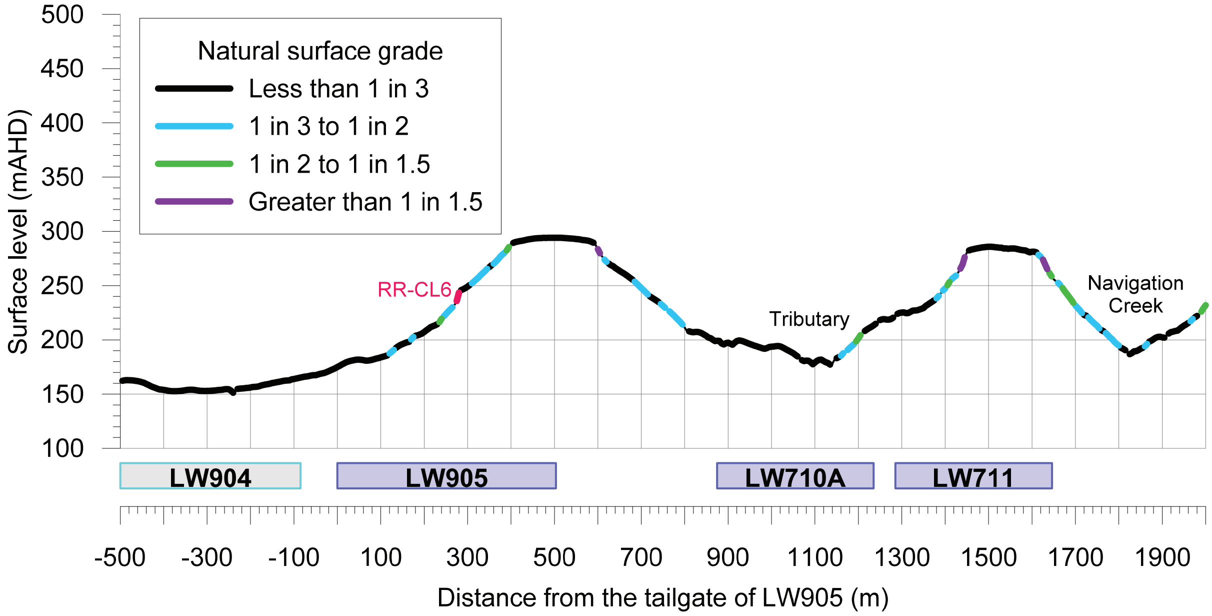

Fig. 5.16 Section through Razorback Range and Appin Area 9

The distribution of the natural grades of the steep slopes along Razorback Range in Appin Area 9 is illustrated in Fig. 5.17. The steep slopes have natural grades typically ranging between 1 in 3 and 1 in 2 (88 % of the surface area), but there are locations with natural grades ranging between 1 in 2 and 1 in 1.5 (8 % of the surface area), between 1 in 1.5 and 1 in 1 (3 % of the surface area) and greater than 1 in 1 (1 % of the surface area).

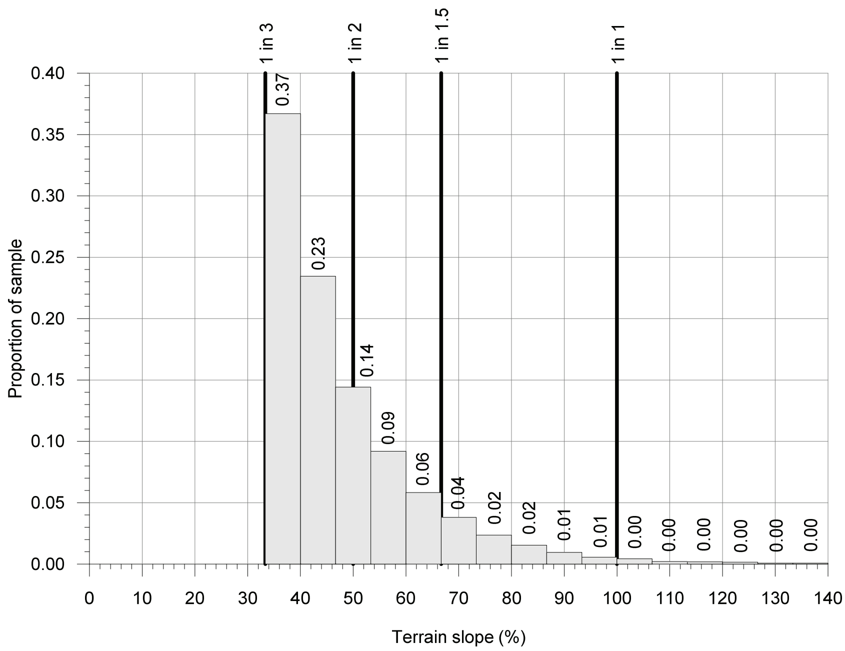

Fig. 5.17 Distribution of the natural grades for the steep slopes along Razorback Range in Area 9

Steep slopes are also located above the proposed LW709, LW710B and the eastern end of LW711, and along the ridgeline above the approved LW902 to LW904. The natural grades of these steep slopes typically vary up to approximately 1 in 2 (i.e. 27° or 50 %), with isolated areas with natural grades up to 1 in 1.5 (i.e. 34° or 67 %).

The surface soils for the steep slopes along Razorback Range have formed from the Wianamatta Group. The extent of the Wianamatta Shale within the Study Area has been mapped and further discussions are provided in the report by GHD (2021d).

5.7.2. Predictions for the steep slopes

A summary of the maximum predicted values of total vertical subsidence, tilt and curvatures for the steep slopes along Razorback Range is provided in Table 5.11. The values in this table are the maximum predicted subsidence effects within the Study Area due to the mining of the existing, approved and proposed longwalls.

Table 5.11 Maximum predicted total vertical subsidence, tilt and curvatures for the steep slopes along Razorback Range

Location	After longwall	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})
Steep slopes along Razorback Range	LW709	950	6.0	0.06	0.10
	LW710A	950	6.0	0.06	0.10
	LW710B	950	6.0	0.06	0.10
	LW711	950	7.0	0.08	0.14
	LW905	1150	7.0	0.08	0.14

The maximum predicted total tilt for the steep slopes along Razorback Range is 7 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted total conventional curvatures are 0.08 km^{-1} hogging and 0.14 km^{-1} sagging, which represent minimum radii of curvature of 13 km and 7 km, respectively.

The maximum predicted conventional strains for the steep slopes along Razorback Range, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly above the mining area are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

The steep slopes located elsewhere with the Study Area could experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence effects within the Study Area is provided in Chapter 4.

5.7.3. Impact assessments for the steep slopes

The maximum predicted tilt for the steep slopes is 7.0 mm/m (i.e. 0.7 %, or 1 in 143) for Razorback Range and 7 mm/m (i.e. 0.7 %, or 1 in 143) elsewhere within the Study Area. The predicted changes in grade are small when compared to the natural grades of the steep slopes, which are greater than 1 in 3 and, therefore, the mining-induced tilts themselves are unlikely to result in adverse impacts on the stability of the steep slopes.

The steep slopes are more likely to be impacted by the mining-induced curvatures and strains. The potential impacts would generally result from the increased horizontal movements in the downslope direction, causing tension cracks to appear at the tops and along the sides of the slopes and compression ridges to form at the bottoms of the slopes.

The maximum predicted curvatures for the steep slopes are 0.08 km^{-1} hogging and 0.14 km^{-1} sagging for the Razorback Range and 0.08 km^{-1} hogging and 0.15 km^{-1} sagging elsewhere within the Study Area. The maximum predicted strains are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels. The maximum predicted curvatures and strains for the steep slopes within the Study Area are similar to those experienced for previous longwall mining in the Southern Coalfield.

There is extensive experience of mining beneath steep slopes in the Southern Coalfield. These include steep slopes along the Cataract, Nepean, Bargo and Georges Rivers. No large-scale slope failures have been observed along these slopes, even where longwalls have been mined directly beneath them. Although no large-scale slope failures have been observed in the Southern Coalfield, tension cracking has been observed at the tops and along the sides of steep slopes as the result of increased horizontal movements in the downslope direction.

Cracks resulting from downslope movements at depths of cover greater than 400 m, such as the case in the Study Area, have been observed with typical widths in the order of 25 mm to 50 mm. Larger cracks have also been observed at the tops of very steep slopes and adjacent to large rock formations, having typical widths in the order of 100 mm to 150 mm or greater. A photograph of a tension crack near the top of a steep slope in the Southern Coalfield is provided in Fig. 5.18.

Fig. 5.18 Example of surface tension cracking along the top of a steep slope

The soils within the Study Area are generally derived from the Wianamatta Shale Group and there is extensive natural erosion in some locations. A photograph of natural erosion within the Study Area is provided in Fig. 5.19.

Fig. 5.19 Photograph of natural soil erosion within the Study Area

As the slopes along the Razorback range are steep, exhibit natural soil erosion and are predicted to experience the full range of predicted subsidence movements, it is likely that the extraction of the proposed longwalls would result in large surface cracks near the tops and along the sides of these slopes. Detailed site investigations and studies of the potential impacts on the steep slopes along the Razorback Range have been undertaken and are described in the reports by GHD (2021a, 2021b, 2021c and 2021d).

If tension cracks were to develop, as the result of the extraction of the proposed longwalls, it is possible that soil erosion could occur if these cracks were left untreated. It is possible, therefore, that some remediation would be required, including infilling of surface cracks with soil or other suitable materials, or by locally regrading and recompacting the surface. In some cases, erosion protection measures may be needed, such as the planting of additional vegetation in order to stabilise the slopes in the longer term.

While in most cases, impacts on steep slopes are likely to consist of surface cracks, there remains a low probability of large-scale downslope movements. Experience indicates that the probability of mining induced large-scale slippages is extremely low due to the significant depth of cover within the Study Area.

While the risk is extremely low, some risk remains and it is recommended that attention is paid to any features or items of infrastructure located in the vicinity of steep slopes directly above the proposed longwalls, which include the:

- local roads;
- powerlines and copper telecommunications cables;
- houses;
- rural and other structures;
- survey control marks.

The locations of the surface infrastructure in the vicinity of steep slopes are shown in Drawing No. MSEC1117-08. The risks associated with the proximity of the steep slopes are discussed in the impact assessments for each item of infrastructure.

A Landslide Risk Assessment (LRA) for the proposed LW709 to LW711 and LW905 has been carried out by GHD (2021d). The key conclusion of the LRA is that the "*results of the preliminary investigations indicate that the structures located on the identified steep slopes should be able to be effectively managed, using the techniques and management tools available and previously employed in similar geotechnical circumstances, to permit Appin Mine to extract the proposed longwalls*".

GHD (2021d) categorised the properties into "*those not requiring additional appraisal, those requiring a brief site visit (contingent upon landholder approval for access) to confirm the site setting not observable from the public roadways, to more detailed appraisals for residences in high hazard environments*". GHD (2021d) states that the "*residential sites that require appraisals can be conducted on a longwall-by-longwall basis*" so that "*the hazards can be managed through each subordinate longwall's Structures Management Plan*".

5.7.4. Recommendations for the steep slopes

IMC has engaged a team of consultants to assess the existing stability and the potential for subsidence impacts on the steep slopes associated with the Razorback Range. The assessed risks and recommendations are provided in the reports by GHD (2021a, 2021b, 2021c and 2021d).

IMC has developed a *Cliff and Steep Slope Management Plan* for LW701 to LW708B and LW901 to LW904. The existing Management Plan addresses monitoring, response action, reporting and public safety. It is recommended that the management plan be reviewed and, where required, revised to include the proposed LW709 to LW711 and LW904.

5.8. Escarpments

The Razorback Range forms a well-defined escarpment in the western part of the Study Area. The descriptions, predictions and impact assessments for the rock outcrops and steep slopes along the Razorback Range are provided in Sections 5.6 and 5.7, respectively.

5.9. Land prone to flooding and inundation

The catchment areas of the streams within the Study Area are relatively small and the land drains freely into the Nepean River. There are no major flood prone areas identified within the Study Area. The predicted changes in the surface levels of the streams is predicted to only have a marginal effect on their natural gradients, as described in 5.3.

5.10. Swamps, wetlands and water related ecosystems

There are no swamps or wetlands within the Study Area. There are water related ecosystems within the Study Area associated with the major streams. Discussions on the water related ecosystems are provided in the reports by Cardno (2021) and SLR (2020 and 2021).

5.11. Flora and fauna

The potential for impacts on the vegetation in the mining area is dependent on the surface cracking, changes in surface water and changes in groundwater. Assessments of the physical impacts due to the proposed longwall are provided in Sections 5.2 to 5.10. Assessments of the environmental consequences have been provided by the other specialist consultants on the project.

Assessments for the aquatic and terrestrial ecology are provided by Cardno (2021).

The following sections provide the descriptions, predictions and impact assessments for the built features within the Study Area. All significant features located outside the Study Area, which may be subjected to far-field or valley-related effects and may be sensitive to these movements, have also been included as part of these assessments.

6.1. Main Southern Railway

6.1.1. Descriptions of the Main Southern Railway

The locations of the Main Southern Railway and its associated infrastructure are shown in Drawing No. MSEC1117-09.

The Main Southern Railway is a key national transport route that carries significant freight and passenger services between Sydney and Melbourne. The Main Southern Railway is leased by Australian Rail Track Corporation (ARTC), who is responsible for maintaining the track.

The Main Southern Railway is located to the east of the proposed longwalls. The railway is situated immediately adjacent to the south-eastern corner of LW709 and it is 0.4 km from LW710B and 0.9 km from LW711, at its closest points. The total length of railway within the Study Area is approximately 1.3 km, which extends between kilometrages 68.2 km and 69.5 km.

The railway crosses directly above the completed and approved longwalls in Appin Areas 7 and 9. The total lengths of railway located above these existing longwalls are approximately 3.0 km above LW703 to LW708B and 2.1 km above LW901. The potential impacts on the railway due to these existing longwalls have been managed with the implementation of the approved Management Plans (Reports Nos. MSEC642 and MEC706).

The railway line is a dual track consisting of 60 kg rail on concrete sleepers with a mix of straight and curved track sections within the Study Area. The maximum speed limits on both tracks are 115 km/h for normal services and 125 km/h for XPT services. A photograph of a section of the railway within the Study Area is provided in Fig. 6.1.

Photograph courtesy of BloorRail

Fig. 6.1 Main Southern Railway at 69.0 km above LW708B

There are two railway cuttings located within the Study Area. Details of the cuttings are provided in Table 6.1 and a photograph is provided in Fig. 6.2. The cutting faces generally consist of Wianamatta Shale and clays.

Table 6.1 Railway cuttings within the Study Area

Label	Location	Kilometrages (km)	Length (m)	Maximum height (m)
68.6 km (Cutting 6)	Above LW708B and adjacent to LW709	68.40 to 68.85	450	6 (up rail) 4 (down rail)
69.6 km (Cutting 5)	Above LW706 and LW707	69.30 to 69.75	450	8 (up rail) 4 (down rail)

Fig. 6.2 Cutting at 68.6 km with gabion wall and race on down side

There is one railway embankment located within the Study Area. Details of this embankment are provided in Table 6.2.

Table 6.2 Railway embankments within the Study Area

Label	Location	Kilometrages (km)	Length (m)	Maximum height (m)
69.0 km (Embankment 2)	Above LW707B and LW708B	68.85 to 69.30	360 (up rail) 450 (down rail)	13

The base of the embankment at 69.0 km has been substantially widened by IMC to reduce the potential for impacts due to the extraction of LW707B to LW709. Photographs of the widened embankment are provided in Fig. 6.3.

Photographs courtesy of BloorRail

Fig. 6.3 Embankment at 69.0 km

There are three railway culverts located within the Study Area. Details of these culverts are provided in Table 6.3. A photograph of the culvert at 69.000 km is provided in Fig. 6.4.

Table 6.3 Railway culverts within the Study Area

Label	Location	Kilometrage (km)	Type	Diameter (mm)
68.621 km (Culvert 9)	110 m east of LW709	68.621 km	Concrete pipes	450 (2 off)
69.000 km (Culvert 8)	Directly above LW708B	69.000 km	Brick arch culvert with drop down pit	1300
69.455 km (Culvert 7)	Directly above LW707B	69.455 km	Concrete pipe	1000

Fig. 6.4 Culvert at 69.0 km (prior to completion of mitigation works)

Other infrastructure associated with the railway within the Study Area include electrical, signalling and communications systems.

6.1.2. Predictions for the Main Southern Railway

The predicted profiles of total vertical subsidence, tilt and curvature along the Main Southern Railway are shown in Fig. C.07, in Appendix C. The predicted total profiles after the completion of LW702 to LW708B and LW901 to LW904 are shown as cyan lines. The predicted total profiles after the mining of each of LW709 to LW711 and LW905 are shown as the blue lines.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature for the Main Southern Railway is provided in Table 6.4. The values are the maximum predicted subsidence effects within the Study Area due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 6.4 Maximum predicted total vertical subsidence, tilt and curvature for the Main Southern Railway within the Study Area due to the mining in Areas 7 and 9

Name	After 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})
Main Southern Railway	LW702 to LW708B	1350	6.0	0.07	0.13
	LW709 to LW711 and LW905	1400	6.5	0.07	0.13

The majority of the predicted subsidence effects for the section of railway within the Study Area occur due to the mining of LW702 to LW708B, as it is located directly above these existing longwalls. Only low level additional movements are predicted due to the mining of the LW709 to LW711 and LW905, as the railway is located outside the extents of these proposed longwalls.

A summary of the maximum predicted values of additional vertical subsidence, tilt and curvature for the Main Southern Railway is provided in Table 6.5. The values are the maximum predicted additional subsidence effects for the railway due to the mining of the proposed LW709 to LW711 and LW905 only.

Table 6.5 Maximum predicted additional vertical subsidence, tilt and curvature for the Main Southern Railway due to the mining of LW709 to LW711 and LW905 only

Name	Due to longwalls	Maximum predicted additional vertical subsidence (mm)	Maximum predicted additional tilt (mm/m)	Maximum predicted additional hogging curvature (km^{-1})	Maximum predicted additional sagging curvature (km^{-1})
Main Southern Railway	LW709 to LW711 and LW905 only	150	0.5	0.01	< 0.01

The maximum predicted additional tilt for the railway due to the mining of LW709 to LW711 and LW905 only is 0.5 mm/m (i.e. 0.05 %, or 1 in 2000). The maximum predicted additional conventional curvatures are 0.01 km^{-1} hogging and less than 0.01 km^{-1} sagging, which represent minimum radii of curvature of 100 km and greater than 100 km, respectively.

The maximum predicted additional conventional strains for the railway due to the mining of LW709 to LW711 and LW905 only, based on applying a factor of 15 to the maximum predicted conventional curvatures, are less than 0.5 mm/m tensile and compressive. The distribution of the predicted strains above solid coal is described in Section 4.3.1. The maximum predicted strains outside the extents of the proposed longwalls are 0.6 mm/m tensile and 0.4 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

Summaries of the maximum predicted values of additional vertical subsidence, tilt and curvature for the railway cuttings, embankments and culverts are provided in Table 6.6 to Table 6.8, respectively. The values are the maximum predicted additional subsidence effects for the railway infrastructure due to the mining of the proposed LW709 to LW711 and LW905 only.

Table 6.6 Maximum predicted additional vertical subsidence, tilt and curvature for the railway cuttings due to the mining of LW709 to LW711 and LW905 only

Feature	Reference	Maximum predicted additional vertical subsidence (mm)	Maximum predicted additional tilt (mm/m)	Maximum predicted additional hogging curvature (km^{-1})	Maximum predicted additional sagging curvature (km^{-1})
Railway cuttings	68.6 km	100	0.5	0.01	< 0.01
	69.6 km	20	< 0.5	< 0.01	< 0.01

Table 6.7 Maximum predicted additional vertical subsidence, tilt and curvature for the railway embankments due to the mining of LW709 to LW711 and LW905 only

Feature	Reference	Maximum predicted additional vertical subsidence (mm)	Maximum predicted additional tilt (mm/m)	Maximum predicted additional hogging curvature (km^{-1})	Maximum predicted additional sagging curvature (km^{-1})
Railway embankment	69.0 km	150	0.5	0.01	< 0.01

Table 6.8 **Maximum predicted additional vertical subsidence, tilt and curvature for the railway culverts due to the mining of LW709 to LW711 and LW905 only**

Feature	Reference	Maximum predicted additional vertical subsidence (mm)	Maximum predicted additional tilt (mm/m)	Maximum predicted additional hogging curvature (km^{-1})	Maximum predicted additional sagging curvature (km^{-1})
Railway culverts	68.621 km	60	< 0.5	< 0.01	< 0.01
	69.000 km	150	0.5	0.01	< 0.01
	69.455 km	30	< 0.5	< 0.01	< 0.01

The railway cuttings, embankments and culverts are predicted to experience additional vertical subsidence up to 150 mm due to the mining of LW709 to LW711 and LW905. Only low level additional movements are predicted due to their distances outside the proposed mining area.

6.1.3. Impact assessments for the Main Southern Railway

IMC and the Australian Rail Track Corporation (ARTC) have developed detailed risk management plans for managing potential mine subsidence impacts on the Main Southern Railway due to the extraction of LW703 to LW708B and LW901 to LW904 at Appin Colliery.

The management measures described in these plans are similar to those that have been developed in consultation with ARTC and successfully implemented during the mining of LW25 to LW32 at Tahmoor Colliery.

A Rail Technical Committee has been coordinated to develop the risk management strategies. This Technical Committee includes representatives from ARTC, IMC, and specialist consultants in the fields of railway track engineering, geotechnical engineering, structural engineering, track signalling, mine subsidence, risk assessment and project management. The Technical Committee consults with the Resources Regulator, Department of Regional NSW and the Office of the National Rail Safety Regulator (ONRSR).

Works by the Rail Technical Committee include:

- identification of potential impacts on the railway;
- undertaking a risk management approach, where identified risks are assessed and risk control measures are implemented; and
- development of management measures that include mitigation and preventive works, monitoring plans, triggered response plans and communication plans.

The following sections provide subsidence predictions and likely management measures that will likely be used to manage potential impacts on rail infrastructure during the mining of LW709 to LW711 and LW905.

6.1.4. Changes in track geometry

The mining of the proposed LW709 to LW711 could result in changes in track geometry. Changes to track geometry are described using the following parameters:

- vertical misalignment (top) – vertical deviation of the track from design;
- horizontal misalignment (line) – horizontal deviation of the track from design;
- changes in track cant – changes in super-elevation across the rails of each track from design; and
- track twist – changes in super-elevation over a length of track from design.

The Australian Rail Track Corporation's (ARTC) National Code of Practice provide allowable deviations in track geometry. The predicted total changes in track geometry for the Main Southern Railway have been determined using the predicted conventional subsidence effects provided in 6.1.2.

A summary of the maximum allowable and maximum predicted changes in track geometry is provided in Table 6.9. The predicted values are the maximum for the section of railway within the Study Area due to the mining of LW702 to LW711 and LW901 to LW905.

Table 6.9 Allowable and predicted maximum changes in track geometry for the Main Southern Railway based on conventional subsidence movements

Track geometry parameter	Description	Maximum allowable (mm)		Maximum predicted based on convention movements (mm)
		Speed limit is first applied	Trains are stopped	
Top	Vertical mid-ordinate deviation over a 10 m chord	38	46	2
Line	Horizontal mid-ordinate deviation over an 8 m chord	35	53	3
Change in cant	Deviation from design super-elevation across rails spaced 1.435 m apart	41	75	8
Long twist	Changes in cant over a 14 m chord	43	65	< 2

The predicted changes in track geometry are considerably less than the maximum allowable deviations specified in the National Code of Practice, if conventional subsidence occurs. For example, the maximum allowable changes in cant across the rails are 41 mm and 75 mm before the trains are respectively slowed and then stopped. In mining terminology, this represents tilts of approximately 30 mm/m to 50 mm/m (i.e. 3 % to 5 %), which are substantially greater than the maximum predicted conventional tilt for the section of railway within the Study Area of 6.5 mm/m.

The changes in track geometry could be greater than those presented in Table 6.9 if non-conventional movements develop along the Main Southern Railway. The potential rates of development of non-conventional movements have been assessed using the ground monitoring data from the previously extracted longwalls at Appin Colliery and elsewhere in the Southern Coalfield.

An example of substantial non-conventional movement in the Southern Coalfield occurred above Appin LW408. In this case, a low angle thrust fault was re-activated in response to mine subsidence movements, resulting in differential vertical and horizontal movements across the fault. Observations at the site showed that the non-conventional movements developed gradually and over a long period of time.

Regular ground monitoring across the low angle thrust fault indicated that the rate of differential movement was less than 0.5 mm/day at the time non-conventional movements could first be detected. Subsequently as mining progressed, the rate of differential movement increased to a maximum of 28 mm/week. In comparison with the National Code of Practice, the maximum allowable deviations in track geometry are much larger than the measured daily rates of change due to mining.

Localised non-conventional subsidence events have adversely impacted on track geometry along the Main Southern Railway. Differential subsidence movements developed gradually at each site, such that visual inspections could detect small changes at an early stage. This allows time to resurface the track in between the passing of trains and return track geometry parameters to within safety limits.

It is therefore considered that while non-conventional movements may potentially result in adverse changes to track geometry, the potential risk to track safety can be managed through early detection via monitoring and early response through the implementation of triggered response plans. A number of management measures are proposed to manage changes in track geometry:

- assess pre-mining track condition and adjust track (if necessary) so that pre-mining track geometry is within normal operating standards prior to the development of subsidence;
- identify potential sites of non-conventional movement, such as creeks and geological structures;
- extend the existing monitoring system, which includes among other things, the monitoring of ground movements, rail stress, rail temperature, switch displacement and track geometry;
- regularly review and assess the monitoring data;
- conduct regular visual inspections of the track; and
- adjust the track in response to monitoring results during mining, if required, to keep the track well within safety limits.

Visual inspections and regular track geometry recordings during the mining of Appin LW703 to LW707, Appin LW901 to LW903 and Tahmoor Longwalls 25 to 32, have confirmed that the impact of normal subsidence movements on track geometry has generally been very low and these very small changes in track geometry developed very gradually.

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Significant changes in track geometry have been previously observed at isolated locations along the Main Southern Railway. The key observations are provided below:

- most significant changes in track geometry have been experienced at isolated locations within railway cuttings, where the track formation is founded directly on rock. The majority of the railway cuttings have consisted of weathered shale, as present in the cuttings that are located within the Study Area;
- while substantial differential subsidence movements have developed in the natural ground beneath embankments, there has been little noticeable adverse impact on track geometry. It is considered that the embankment fill buffers the ground movements. An exception to the above experiences was observed at the Embankment at 90.676 km above Tahmoor Colliery, where a change in lateral alignment of approximately 50 mm occurred;
- differential subsidence movements have developed gradually during the mining of each longwall beneath the railway. Rates of change have, however been significant at isolated locations. The track has been resurfaced multiple times during these periods, with Temporary Speed Restrictions imposed as a precaution;
- visual inspections could detect small changes at an early stage, at levels well below the trigger levels;
- the monitoring systems could detect very small changes in the ground and on the track. On some occasions, it has been found that changes in track geometry have occurred when longitudinal ground strains have been relatively minor. Surveys across the cuttings, however, have measured closure of the cutting faces. Surveys are now undertaken along and across the cutting during periods of active subsidence. This includes the cutting at 68.6 km within the Study Area;
- the frequency of track geometry trolley surveys was increased when cutting closure has been observed;
- resurfacing work could be undertaken between trains; and
- localised changes in track geometry in areas of good track condition are more noticeable to drivers. This can result in rough ride reports from train drivers and imposition of Temporary Speed Restrictions well before trigger levels are reached.

With an appropriate management plan in place, it is considered that potential impacts on track geometry can be managed during the mining of LW709 to LW711 and LW905, even if actual subsidence movements are greater than the predictions or substantial non-conventional movements occur.

6.1.5. Changes in track grade

The section of the Main Southern Railway within the Study Area climbs gradually in the southbound direction. The natural surface level is at approximately 123.8 mAHD at kilometrage 68.2 km and is approximately 137.7 mAHD at kilometrage 69.5 km. The maximum gradient for the section of railway within the Study Area is approximately 1 in 30 near kilometrage 68.5 km adjacent to the proposed LW709.

The maximum predicted additional tilt along the Main Southern Railway, due to the mining of LW709 to LW711 and LW905, is 0.5 mm/m (i.e. 0.05 %, or 1 in 2000). The predicted change in grade for the railway is very small and unlikely to result in adverse impacts.

6.1.6. Changes in rail stress

The Railway comprises continuously welded rail and, therefore, changes in temperature induce stresses in the rail. Higher temperatures result in increased compression and lower temperatures result in increased tension in the rail. The Stress Free Temperature (SFT) is the rail temperature at which it is at zero stress.

The predicted change in SFT for continuously welded rail due to mine subsidence has been determined using the following empirical formula:

Equation 1: Predicted change in SFT (°C): $\boldsymbol{E_t} = \frac{85.5C_t}{L}$

where C_t = change in length due to strain
L = long bay length

The review of the ground and rail monitoring data along the Main Southern Railway at Appin and Tahmoor Collieries has found that there is good correlation between the measured and predicted changes in rail SFT when: the change in length due to strain (C_t) is determined over 100 m long bay lengths (i.e. L = 100 m); and 100 % transfer of ground strain to rail strain is assumed (i.e. $\varepsilon_{track} = \varepsilon_{ground}$).

A summary of the maximum predicted incremental changes in rail SFT, due to the mining of LW709 to LW711 and LW905, is provided in Table 6.7. The values in this table represent the additional movements due to the mining of each of the proposed longwalls.

Table 6.10 Maximum predicted incremental changes in rail SFT due to the mining of each of the proposed LW709 to LW711 and LW905

Location	Longwall	Maximum predicted incremental increase in rail SFT (deg)	Maximum predicted incremental decrease in rail SFT (deg)
Main Southern Railway	LW709	8	-3
	LW710A	< 1	< 1
	LW710B	1	< 1
	LW905	< 1	< 1

The maximum predicted incremental changes in rail SFT are +8°C and -3°C due to the mining of LW709. The predicted changes in rail SFT could be sufficient to result in rail break and possibly rail instability if no preventive measures were to be implemented. The predicted changes in rail SFT for the other proposed longwalls are ±1°C or less. The likelihood of rail break or rail instability is considered to be low.

Management of rail stress during active subsidence has been a primary focus of the Rail Technical Committee. Traditionally, rail stress has been managed in Australia and overseas by rail strain or stress monitoring. Once measured changes in rail stress reach defined triggers, the stress is dissipated by unclipping the rails from the sleepers, cutting the rails and adding steel to, or removing steel from the rails as required, followed by re-stressing the rails to their desired stress. This process is effective but it is labour intensive and very difficult to undertake on busy tracks such as the Main Southern Railway, particularly if the frequency of required rail re-stressing is likely to be more often than weekly, as would be expected during the mining of the proposed longwalls.

For this reason, the Rail Technical Committee has introduced a combination of rail expansion switches and zero toe load clips to dissipate mining and temperature related rail stress during mining. Rail expansion switches consist of a tapered joint in the track, which allow the rails on each side of the joints to slide independently. Maximum allowable displacements of expansion switches vary between different types of switches and those that have been employed above the existing longwalls at Appin Colliery have a capacity of approximately 310 mm. Expansion switches are standard rail equipment and operate in non-subsidence applications in Australia and overseas to accommodate, for example, differential thermal movements between bridges and natural ground. A photograph of a rail expansion switch is shown in Fig. 6.5.

Fig. 6.5 Rail expansion switch

Zero toe load clips allow the rails to slide longitudinally along the track while maintaining lateral stability. In combination, the rails are able to expand or contract in response to mine subsidence and thermal loads into and out of the expansion switches. It is estimated that the switches will be spaced between 200 m and 400 m apart along the track within the subsidence area.

The combination of expansion switches and zero toe load clips has been successfully employed during the mining of LW703 to LW707B, LW901 and LW902 at Appin Colliery and LW25 to LW32 at Tahmoor Colliery.

A significant advantage of using rail expansion switches and zero toe load clips is that the system is flexible and can be adjusted during mining should the tolerance of the switches reach their design limits. The rails can be cut and steel can be either added or removed as necessary to restore capacity in the switches. The process is significantly faster than conventional re-stressing work as the clips do not have to be removed and reinstated and no stressing work is required. The process can be safely achieved in between the passage of trains without delaying the operation of trains.

It is likely that the following management measures will be used to manage changes in rail stress:

- assess pre-mining track condition and adjust track if required so that pre-mining track geometry and sleeper arrangements are at or close to design prior to the development of subsidence;
- identify potential sites of non-conventional movement, such as creeks and geological structures;
- assess the required spacing of expansion switches based on the predicted ground movements;
- install the expansion switches and zero toe load clips;
- install a monitoring system, which includes, among other things, the monitoring of ground movements, rail stress, rail temperature, switch displacement and track geometry;
- regularly review and assess the monitoring data;
- conduct regular visual inspections of the track, switches and clips; and
- adjust the track in response to monitoring results during mining if required.

It is considered that with the adoption of appropriate management measures, changes to rail stress can be managed, even if actual subsidence movements are greater than the predictions or substantial non-conventional movements occur.

6.1.7. Potential impacts on the railway cuttings

The maximum predicted additional vertical subsidence for the railway cuttings, due to the mining of LW709 to LW711 and LW905, are 100 mm at 68.6 km and 20 mm at 69.6 km. Only low level additional movements are predicted at the cuttings as they are located outside the extents of the proposed longwalls.

Fracturing could occur in the cutting at 68.6 km, where it is located closest to LW709, and this could result in spalling of rock if it is marginally stable. Fracturing in cutting 69.6 km is less likely due to its distance from the proposed longwalls and the very low levels of predicted movement.

In the unlikely event that the faces of these cuttings are impacted by mine subsidence, the failure is likely to be very minor, in the form of small fragments of rock, and likely to fall into the clear area adjacent to the railway, referred to as *the cess* (Christie, 2010).

The Rail Technical Committee will consider mitigation measures before the cuttings experience subsidence effects. Mitigation works could include, for example, scaling the cutting faces and removing debris from the cess. The following management measures could be used to manage potential impacts on the cuttings:

- assess condition of the cuttings prior to mining;
- consider and implement mitigation measures such as scaling the cutting faces and removing debris from the cess;
- install a monitoring system, which includes, among other things, the monitoring of ground movements at the cuttings;
- regularly review and assess the monitoring data;
- conduct regular visual inspections of the cuttings; and
- clear the cess of debris if required based on observations during mining.

It is considered that with the adoption of appropriate management measures, the potential impacts on the railway cuttings can be managed, even if actual subsidence movements are greater than the predictions or substantial non-conventional movements occur.

6.1.8. Potential impacts on the railway embankment

The maximum predicted additional vertical subsidence for the railway embankment at 69.0 km, due to the mining of LW709 to LW711 and LW905, is 150 mm. This embankment is located above the completed LW707B and LW708B and it is predicted to have already experienced vertical subsidence up to 1150 mm due to the mining of those longwalls.

IMC has appointed an embankment sub-committee, which has completed detailed studies and reviews on potential changes to embankment stability as a result of mine subsidence for the embankment at 69.0 km. Reviews were completed in 2016, 2019 and 2020.

- detailed site surveys of embankment geometry;
- geotechnical investigations of the embankment material;
- finite element modelling of potential changes to embankment stress and strain due to mine subsidence;
- slope stability analyses of existing embankment condition and potential condition if a tension crack formed in the embankment; and
- reviews of monitoring results during the mining of LW707B.

Following the review in 2016, IMC implemented additional controls to manage potential impacts on the embankment. The additional controls included earthworks to provide additional stability at the deepest sections on both sides of the embankment near the culvert. The earthworks were completed in late 2016, prior to the influence of LW707B. The Embankment at 69.000 km experienced minor changes during the mining of LW707B.

Prior to the influence of LW708B in 2020, the sub-committee conducted another review. It confirmed that there is sufficient robustness in the current stability of the embankment, with existing strengthening measures in place, to accommodate the projected subsidence movements and impacts from the extraction of LW 708B, and ensure that planned contingency measures can be effectively implemented in a timely manner to ensure that the embankment remains safe and serviceable during mining. Additional works were recommended by ARTC at the drop pit to improve drainage at the site and these have been implemented by IMC.

The Rail Technical Committee will consider whether further investigations or mitigation measures should be carried out prior to the mining of the proposed LW709 to LW711 and LW905. The following management measures will be considered to manage potential impacts on the embankment:

- assess pre-mining condition of the embankments;
- consider and implement mitigation measures such as cleaning out of culverts and strengthening of the culverts to prevent collapse;
- install a monitoring system, which includes, among other things, the monitoring of ground movements at the embankments;
- regularly review and assess the monitoring data;
- conduct regular visual inspections of the embankments and culverts; and
- provide additional culvert support in response to actual measurements and observations during mining.

It is considered that with the adoption of appropriate management measures, the potential impacts on the railway embankment can be managed, even if actual subsidence movements are greater than the predictions or substantial non-conventional movements occur.

6.1.9. Potential impacts on the railway culverts

The maximum predicted additional vertical subsidence for the railway culverts, due to the mining of LW709 to LW711 and LW905, are 60 mm at 68.621 km, 150 mm at 69.000 km and 30 mm at 69.455 km. Only low level additional movements are predicted at the culverts as they are located outside the extents of the proposed longwalls. The culverts at 69.000 km and 69.455 km are located above the completed LW707B and LW708B and they are predicted to have already experienced vertical subsidence up to 1100 mm due to the mining of those longwalls.

The culvert at 69.000 km is a brick arch culvert and there is potential for physical impacts to occur. The potential for impact is greatest due to the mining of LW708B directly beneath it; however, lesser impacts could occur due to the mining of the proposed LW709. It is possible that this culvert could experience some cracking and spalling of the masonry due to the mining of the proposed longwalls. Cracking may occur in the masonry arch or in the headwalls. While predicted movements are not considered likely to result in collapse of the culvert, IMC inserted a reinforced concrete pipe sleeve inside the culvert in 2016 prior to the influence of LW707B. Modifications have also been made to the drop down pit to improve drainage flows.

The culverts at 68.621 km and 69.455 km are concrete culverts. Only low level additional movements are predicted at these culverts, up to 60 mm vertical subsidence, due to their distances outside the extents of the proposed longwalls. The potential for adverse impacts on these two culverts is less than that for the brick arch culvert.

However, given the potentially severe consequences of culvert collapse, the Rail Technical Committee will consider mitigation measures prior to each culvert experiencing subsidence effects. The following management measures will be considered to manage potential impacts on the railway culverts:

- assess pre-mining condition of culverts;
- consider and implement mitigation measures to reduce or avoid the potential for culvert collapse. In the case of the culvert at 69.000 km, a reinforced concrete pipe has been inserted into the culvert;
- install a monitoring system, which includes, among other things, the monitoring of ground movements around the culvert and change in track geometry and rail stress;
- regularly review and assess the monitoring data;
- conduct regular visual inspections of the culverts; and
- provide additional track and/or culvert support in response to actual measurements and observations during mining.

It is considered that with the adoption of appropriate management measures, potential impacts on railway culverts can be managed, even if actual subsidence movements are greater than the predictions or substantial non-conventional movements occur.

6.1.10. Recommendations for the Main Southern Railway

IMC has developed management strategies for the Main Southern Railway for LW703 to LW708B and LW901 to LW903. It is recommended that these management plans are reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.2. M31 Hume Motorway

The locations of the M31 Hume Motorway and its associated infrastructure are shown in Drawing No. MSEC1117-09.

The M31 Hume Motorway is located outside and to the east of the Study Area. The motorway is located 470 m from the south-eastern corner of LW709, at its closest point to the proposed longwalls. The motorway is located directly above the existing LW703 to LW708B.

The predicted additional vertical subsidence for the M31 Hume Motorway due to the mining of the proposed LW709 to LW711 and LW905 is less than 20 mm. While the motorway could experience very low levels of vertical subsidence, it is not predicted to experience measurable tilts, curvatures or strains.

It is not anticipated therefore that the M31 Hume Motorway would experience adverse impacts due to the mining of the proposed LW709 to LW711 and LW905. The discussions on the Nepean Twin Bridges are provided in Section 6.4 and the road bridges over the motorway are provided in Section 6.5.

6.3. Local roads

6.3.1. Descriptions of the local roads

The locations of the local roads are shown in Drawing No. MSEC1117-09.

The main local road within the Study Area is Menangle Road. This road provides a connection between the township of Campbelltown, located north-east of the Study Area, and Picton Road, to the south-west of the Study Area. There are also a number of local roads located across the Study Area.

A summary of the main local roads within the Study Area is provided in Table 6.11. There are other local roads within the Study Area that are not included in this table.

Table 6.11   Main local roads located within the Study Area

Name	Location	Total length above the proposed longwalls (km)	Total length within the Study Area (km)
Cummins Road	Directly above LW711	0.1	0.6
Carrols Road	Directly above LW709, LW710B and LW711	1.3	2.3
Donalds Range Road	Outside proposed mining area	-	1.2
Finns Road	Partially above LW711	0.1	0.5
Hawkey Road	Directly above LW710B and LW905	0.8	2.1
Menangle Road	Directly above LW709, LW710B and LW711	1.2	5.1
Quirkes Road	Directly above LW711	1.8	2.4
Top Ridge/Gibraltar Road	Directly above LW710A and LW711	0.7	1.1

The local roads have single carriageways with bitumen seals. Some local roads also have concrete kerb and guttering. A photograph of Menangle Road is provided in Fig. 6.6.

Fig. 6.6   Photograph of Menangle Road in Area 9

The local roads are owned and maintained by the Wollondilly Shire Council.

6.3.2. Predictions for the local roads

The predicted profiles of total vertical subsidence, tilt and curvature along Menangle Road and Carrolls Road are shown in Figs. C.08 and C.09, respectively, in Appendix C. The predicted total profiles after the completion of LW702 to LW708B and LW901 to LW904 are shown as cyan lines. The predicted total profiles after the mining of each of LW709 to LW711 and LW905 are shown as the blue lines.

Summaries of the maximum predicted values of total vertical subsidence, tilt and curvature for the Menangle Road and Carrolls Road are provided in Table 6.12 and Table 6.13, respectively. The values are the maximum predicted subsidence effects within the Study Area due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 6.12 Maximum predicted total vertical subsidence, tilt and curvature for Menangle Road within the Study Area due to the mining in Areas 7 and 9

Name	After 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})
Menangle Road	LW708B	1300	5.5	0.06	0.12
	LW709 to LW711 and LW905	1400	5.0	0.06	0.12

Table 6.13 Maximum predicted total vertical subsidence, tilt and curvature for Carrolls Road within the Study Area due to the mining in Areas 7 and 9

Name	After 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})
Carrolls Road	LW708B	70	< 0.5	< 0.01	< 0.01
	LW709	650	3.5	0.05	0.08
	LW710A/B	1050	5.0	0.06	0.11
	LW711 and LW905	1300	6.0	0.07	0.12

The other local roads are located across the Study Area and, therefore, could experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence effects within the Study Area is provided in Chapter 4.

The maximum predicted total tilt for the local roads within the Study Area is 7 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted total conventional curvatures are 0.08 km^{-1} hogging and 0.15 km^{-1} sagging (refer to Table 4.2), which represent minimum radii of curvature of 13 km and 7 km, respectively.

The maximum predicted conventional strains for the local roads, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly above the mining area are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

6.3.3. Impact assessments for the local roads

There is extensive experience of mining directly beneath local roads in the Southern Coalfield which indicates that impacts can be managed with the implementation of suitable management strategies. In all cases the local roads have remained in safe and serviceable conditions and have been remediated using normal road maintenance techniques.

A summary of the experience of mining beneath local roads at Appin Colliery and other nearby collieries is provided in Table 6.14. the predicted subsidence effects for the local roads within the Study Area are similar to the measured values for these case studies.

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Table 6.14 Experience of mining beneath local roads at Appin Colliery and other nearby collieries

Road	Length mined beneath and longwalls	Measured movements	Observed impacts
Appin Road	3.9 km mined beneath by West Cliff LW5A3, LW5A4 and LW29 to LW37	1350 mm subsidence 11 mm/m tilt 1.5 mm/m tensile strain 5.5 mm/m comp. strain (Measured B-Line)	Localised depression above LW5A3. Bumps up to 100 mm and cracking up to 10 mm in pavement above LW32 to LW37
Brooks Point Road	2.4 km mined beneath by Appin LW1, LW2 and LW405 to LW409	700 mm subsidence 5 mm/m tilt 1 mm/m tensile strain 2 mm/m comp. strain (Measured A6000-Line)	Bump approximately 100 mm in pavement above LW408
Menangle Road	2.2 km mined beneath by Appin LW707A, LW708A and LW903	875 mm subsidence 8.5 mm/m tilt 1.5 mm/m tensile strain 8.5 mm/m comp. strain (Measured MR-Line)	Compressive heaving developed above LW707A near base of hill. Minor crack in pavement elsewhere along road
Moreton Park Road	3.8 km mined beneath by Appin LW702 to LW707B	1300 mm subsidence 7.5 mm/m tilt 1.0 mm/m tensile strain 5.0 mm/m comp. strain (Measured MPR-Line)	Minor cracking and localised bumps in pavement
Wilton Road	2.6 km mined beneath by Appin LW1, LW2, LW15, LW16, LW301 and LW302	650 mm subsidence 4.5 mm/m tilt 1 mm/m tensile strain 3 mm/m comp. strain (Measured M & N-Lines)	Some minor impacts to the road surface were observed above LW301 and LW302

The impacts on these local roads did not present an immediate public safety risk and were remediated using normal road maintenance techniques. Photographs of the impacts observed along Appin Road are provided in Fig. 6.7 and Fig. 6.8.

Fig. 6.7 Bump in slip lane along Appin Road above West Cliff Longwall 32 (Source: Colin Dove)

Fig. 6.8 Tension crack in Appin Road above West Cliff Longwall 32 (Source: Colin Dove)

The mining of LW707A and LW708A beneath Menangle Road resulted in a dip developing in the pavement near the top of Spaniards Hill and a compression bump developing near the base of the hill. A photograph of these impacts is provided in Fig. 6.9.

Fig. 6.9 Compression bumps in Menangle Road (Source: Network Solutions)

Menangle Road was maintained in safe and serviceable conditions using weekly ground monitoring and visual inspections. Preventive measures were carried out including milling of the compression bump and pavement repairs. Warning signs were also installed along the road during active subsidence.

There is also extensive experience of mining beneath local roads at Tahmoor Colliery. Longwalls 22 to 21 have mined directly beneath more than 28 km of local roads and a total of 52 impact sites have been observed. The observed rate of impact on the local roads equates to an average of one impact for every 540 m of pavement. In most cases, the impacts were relatively minor and were remediated by locally resurfacing the pavements.

The most severe impacts at Tahmoor Colliery were located where substantial non-conventional movements had developed. These impact sites were identified using visual and ground monitoring and remediation was undertaken during active subsidence to maintain these roads in safe and serviceable conditions. Impacts have also been observed to concrete kerbs, gutters and drainage pits. The impacts are most commonly focussed on driveway laybacks and involve cracking, spalling or buckling.

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The western section of Hawkey Road traverses a ridgeline of Razorback Range above the maingate of the proposed LW905. Top Ridge Road, Gibraltar Drive other local roads are located at the top of Razorback Range above the proposed LW710A and the western end of the proposed LW711.

The surface level and natural grade along the alignment of the alignment of Hawkey Road are illustrated in Fig. 6.10. The surface level and natural grade across the alignment of the road, at the top of Razorback Range, are illustrated in Fig. 6.11.

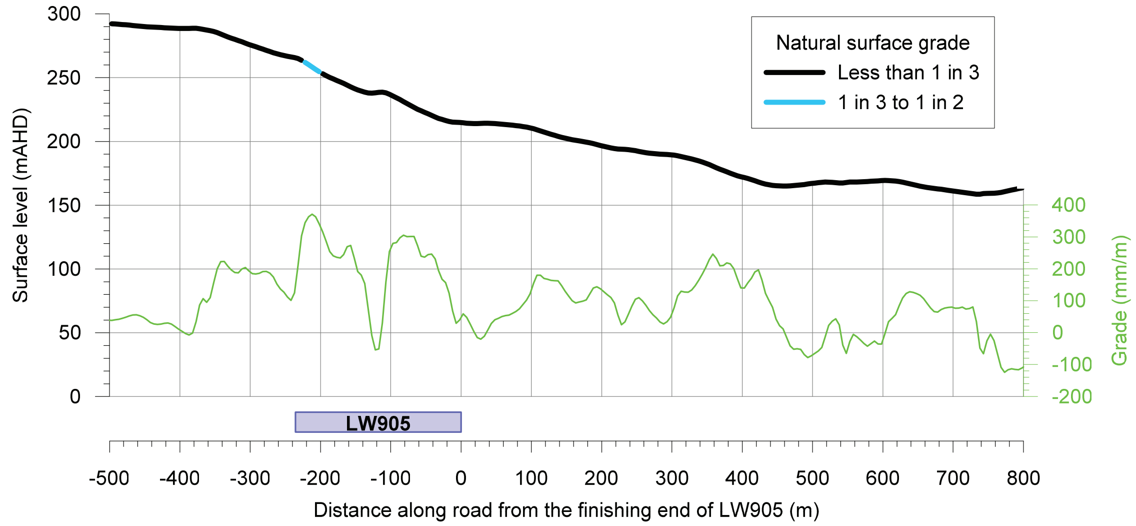

Fig. 6.10 Surface level and natural grade along the alignment of Hawkey Road

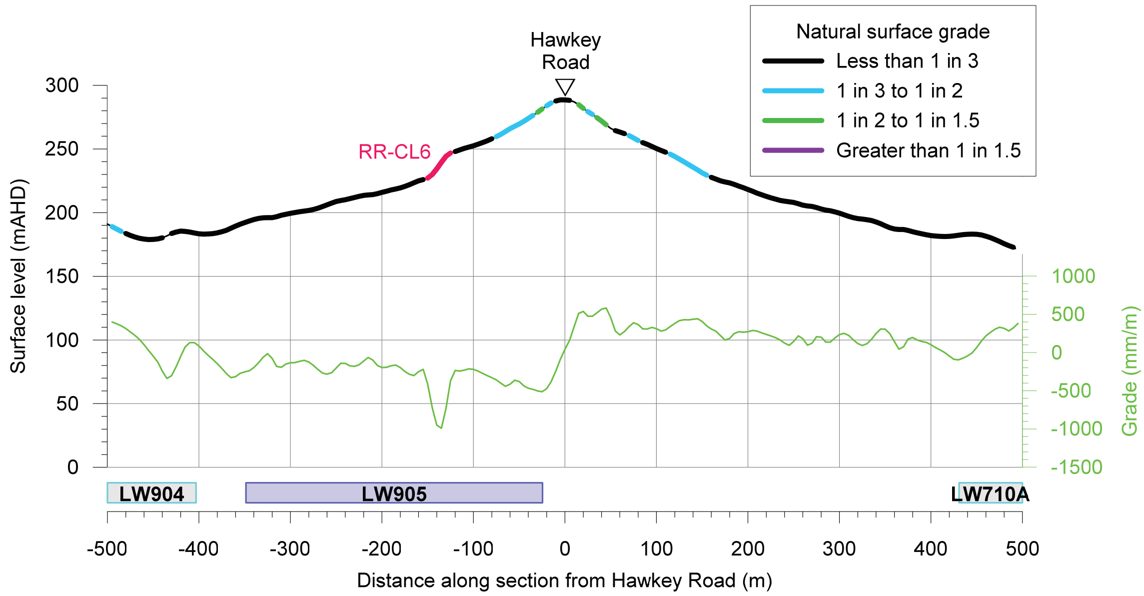

Fig. 6.11 Surface level and natural grade across the alignment of Hawkey Road

The natural grades along the alignment of Hawkey Road (refer Fig. 6.10) are typically less than 1 in 3 (i.e. 18° or 33 %). The natural grades on the ridgeline either side of Hawkey Road vary between 1 in 3 and 1 in 1.5 (i.e. 34° or 67 %). A cliff is also located on the southern side of the ridgeline, approximately 130 m from the centreline of the road.

The mining of LW905 beneath the western section of Hawkey Road could result in increased horizontal movements in the downslope direction causing tensile cracking in the road pavement. Similarly, tensile cracking could also develop in the other local roads located on the top of the ridgeline and above the proposed longwalls. It is recommended that ground movement and visual monitoring are carried out along these roads during active subsidence to identify increased or irregular movements.

Further discussions on the potential impacts on the steep slopes are provided in the reports by GHD (2021a, 2021b, 2021c and 2021d).

6.3.4. Recommendations for the local roads

IMC has developed management strategies for the local roads for LW703 to LW708B and LW901 to LW903. It is recommended that these management plans are reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.4. Nepean Twin Bridges

The locations of the road bridges are shown in Drawing No. MSEC1117-09.

The Nepean Twin Bridges are located where the M31 Hume Motorway crosses the Nepean River. These twin bridges are 1 km south of the completed LW901 and 1.8 km south-west of the completed LW703. The bridges are located 2.5 km south LW905, at their closest point to the proposed longwalls.

The Nepean Twin Bridges are located outside the Study Area for LW709 to LW711 and LW905. However, they could experience far-field horizontal movements and could be sensitive to these effects. These bridges have therefore been included in the impact assessments.

The Nepean Twin Bridges have an overall length of approximately 235 m for the southbound carriageway and 285 m for the northbound carriageway. Both bridges consist of reinforced concrete bridge decks and piers. A photograph of these bridges is provided in Fig. 6.12.

Fig. 6.12 Nepean Twin Bridges along the M31 Hume Motorway over the Nepean River

An indicative elevation of the Nepean Twin Bridges is provided in Fig. 6.13 (Source: IMC), showing the relative locations of the supporting columns, which are spaced approximately 50 m apart. The figure also shows the locations of the 3D relative monitoring points that have been used to measure the movements during the mining of LW701 to LW708B and LW901 to LW903. The marks at the bases of the column were also measured during the extraction of Tower Longwalls 16 and 17.

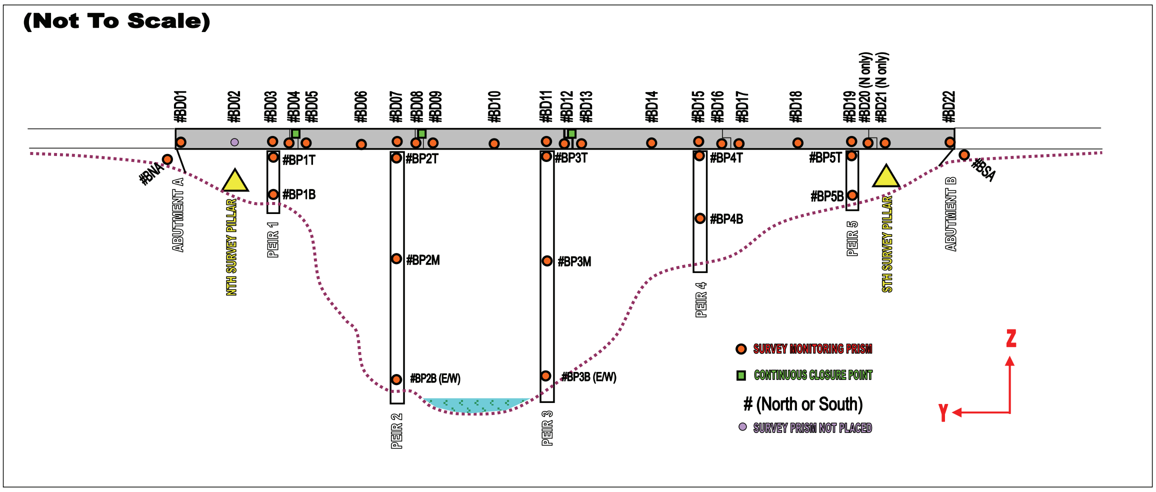

Fig. 6.13 Indicative elevation of the Nepean Twin Bridges (Source: IMC)

Monitoring has been established on the Nepean Twin Bridges and has been measured during the mining of LW701 to LW707B and LW901 to LW903. The monitoring includes absolute 3D bridge monitoring points, relative 3D bridge monitoring points, inclinometer monitoring, bridge joint monitoring and visual inspections.

Management Plans have been developed for the Nepean Twin Bridges for the mining of longwalls in Appin Areas 7 and 9. A Technical Committee has been established, to review the monitoring data and carry out actions in accordance with the Trigger Action Response Plan (TARP).

The measured absolute horizontal movements at the 3D marks at the northern end (DPBN) and southern end (DPBS) of the Nepean Twin Bridges are illustrated in Fig. 6.14. These marks have been monitored during the mining of LW701 to LW707B, LW901 and LW902. The Monitoring Review Point trigger level is also shown as the orange line in this figure.

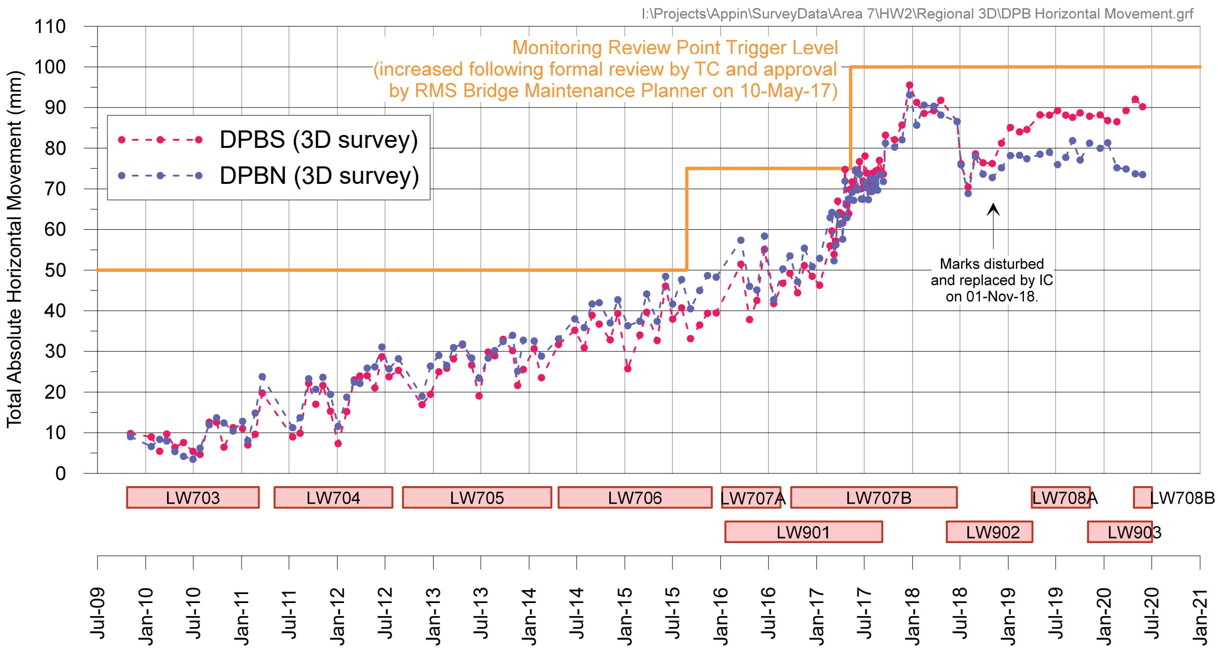

Fig. 6.14 Measured absolute horizontal movements at Marks DPBN and DPBS

The Technical Committee has carried out formal reviews and agreed to increase the Monitoring Review Point trigger level on two occasions, from 50 mm to 75 mm and then 75 mm to 100 mm during mining. The decisions were based on the surveys of the bridges, monitoring of displacement sensors and FBGs at the bridge joints, which indicated no measurable differential lateral movement.

The measured relative movements between the Marks DPBN and DPBS at either end of the Nepean Twin Bridges are illustrated in Fig. 6.15.

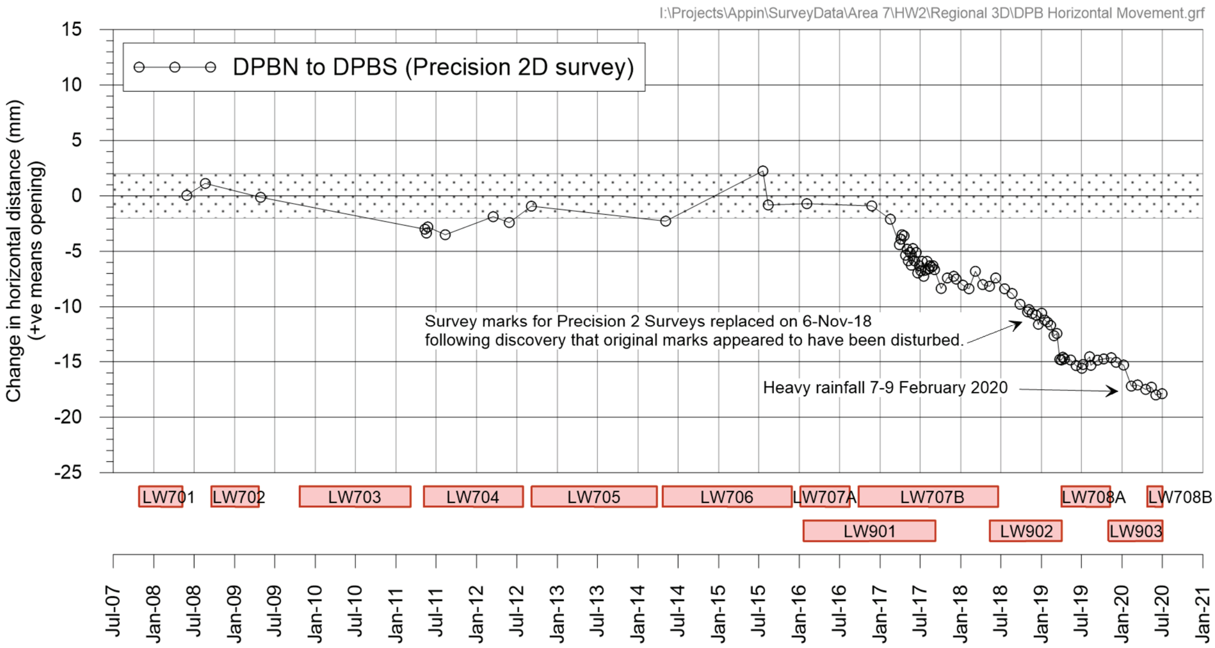

Fig. 6.15 Measured relative horizontal movements between Marks DPBN and DPBS

The maximum measured relative horizontal movement between Marks DPBN and DPBS exceeded the Level 1 trigger of 5 mm. In response to this trigger, additional relative 3D surveys of the bridges were carried out and it was found that the measured lateral alignments of the bridges were within the allowable tolerances. IMC and RMS (now Transport for NSW) commissioned an engineering inspection and review of the Douglas Park Bridges by Cardno (2020). The review included a detailed measurement of the gaps at the expansion joint finger plates of both bridges by RMS. The review found that there remains up to 55 mm of additional capacity to accommodate valley closure movements at the bridges, considering the capacity to accommodate thermal expansion of the bridges.

The Nepean Twin Bridges will experience additional low-level far-field horizontal movements due to the mining of the proposed LW709 to LW711 and LW905. The longwall series in Areas 7 and 9 are mining away from the bridges and, therefore, the incremental movements decrease for successive longwalls.

IMC has an approved management plan for the Nepean Twin Bridges for LW701 to LW708B and LW901 to LW903. It is recommended that this management plan is reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.5. Road bridges

Moreton Park Road Bridge (North) is located 1.5 km north-east of the proposed LW709, LW710B and LW711. Moreton Park Road Bridge (South) is located 0.6 km south-west of the completed LW703 and is more than 2 km south of the proposed longwalls.

Moreton Park Road Bridge (North and South) are located outside the Study Area for LW709 to LW711 and LW905. However, they could experience far-field horizontal movements and could be sensitive to these effects. These bridges have therefore been included in the impact assessments.

The two bridges cross the M31 Hume Motorway and have overall lengths of approximately 100 m. The bridges are supported by three single piers, spaced at approximately 30 m apart, with concrete abutments at each end. Photographs of the Morten Park Road Bridge (North) and Moreton Park Road Bridge (South) are provided in Fig. 6.16 and Fig. 6.17, respectively.

Fig. 6.16 Moreton Park Road Bridge (North)

Fig. 6.17 Moreton Park Road Bridge (South)

The discussions on the Nepean Twin Bridges where the M31 Hume Motorway crosses the Nepean River are provided in Section 6.4.

Monitoring has been established on Moreton Park Road Bridge (South) and has been measured during the mining of LW701 to LW707B and LW901 to LW903. The monitoring includes absolute 3D bridge monitoring points, relative 3D bridge monitoring points and visual inspections.

Management Plans have been developed for the bridge for the mining of longwalls in Appin Areas 7 and 9. A Technical Committee has been established, to review the monitoring data and carry out actions in accordance with the Trigger Action Response Plan (TARP).

The measured absolute horizontal movements at the 3D marks at the eastern end (MPBE) and western end (MPBW) of Moreton Park Road Bridge (South) are illustrated in Fig. 6.18. These marks have been monitored during the mining of LW703 to LW707B, LW901 and LW902. The Monitoring Review Point trigger level is also shown as the orange line in this figure.

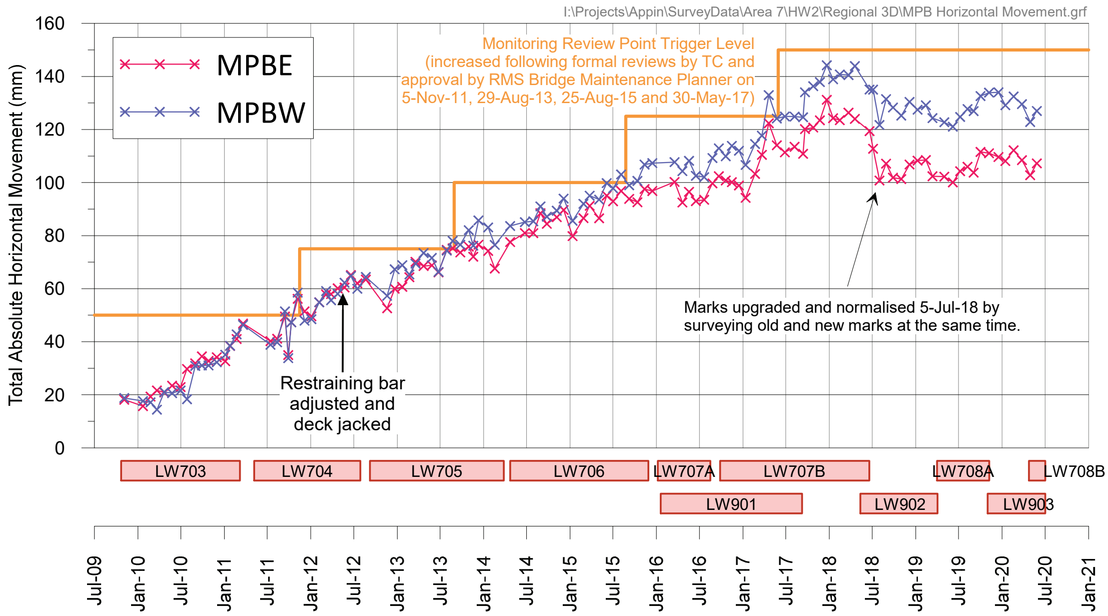

Fig. 6.18 Measured absolute horizontal movements at Marks MPBE and MPBW

The Technical Committee has carried out formal reviews and agreed to increase the Monitoring Review Point trigger level on four occasions. The decisions were based on the relative, which indicated that the differential movements were in the order of survey tolerance.

The measured relative movements between the Marks MPBE and MPBW at either end of Moreton Park Road Bridge (South) are illustrated in Fig. 6.19.

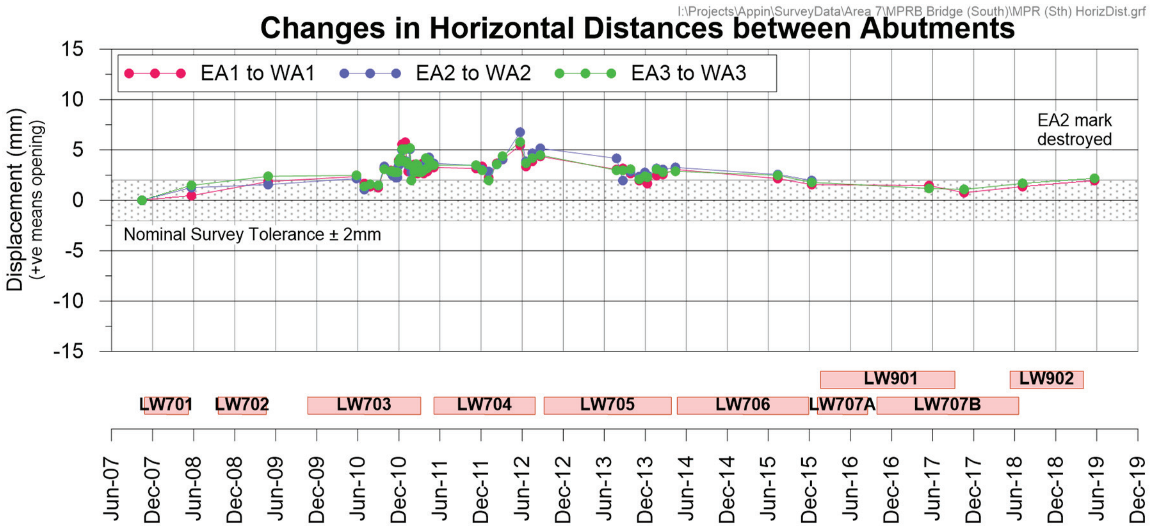

Fig. 6.19 Measured relative horizontal movements between Marks MPBE and MPBW

There was a small amount of abutment spreading, in the order of +5 mm, that developed during the extraction of LW703 to LW705. The results vary slightly between surveys and the cause is thought to be related to changes in moisture and/or temperature. The measured total changes in horizontal distance between the bridge abutments were less than ±2 mm at the completion of LW707B and LW902. The total measured movements, therefore, were within the order of survey tolerance at the completion of this longwall.

Moreton Park Road Bridge (South) will experience additional low-level far-field horizontal movements due to the mining of the proposed LW709 to LW711 and LW905. The longwall series in Areas 7 and 9 are mining away from this bridge and, therefore, the incremental movements decrease for successive longwalls. Moreton Park Road Bridge (North) will also experience low-level far-field horizontal movements due to the mining of the proposed longwalls.

IMC has an approved management plan for Moreton Park Road Bridge (South and North) for LW701 to LW708B and LW901 to LW903. It is recommended that this management plan is reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.6. Road culverts

Road culverts are located where the local roads cross the streams or other topographical depressions. The culverts comprise concrete pipes or concrete box culverts with concrete headwalls.

The road culverts are located across the Study Area and, therefore, are expected to experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence movements within the Study Area is provided in Chapter 4.

The maximum predicted tilt for road culverts is 7 mm/m (i.e. 0.7 %, or 1 in 143). It is unlikely that the mining-induced tilts would result in adverse impacts on the serviceability of the culverts, as the changes in grade are less than 1 %. If the flow of water through the culverts were to be adversely affected, due to the proposed mining, they could be remediated by re-levelling the affected culverts.

The predicted curvatures and strains could be of sufficient magnitudes to result in cracking in the culverts or the headwalls. It is unlikely, however, that these movements would adversely impact on the stabilities or structural integrities of the culverts. The potential impacts on the road culverts could be managed by visual inspection and, where required, the affected culverts can be repaired or replaced.

The road culverts are located along the streams and therefore could experience valley related effects. The culverts are orientated along the alignments of the streams and, therefore, the upsidence and closure movements are orientated perpendicular the main axes of the culverts and unlikely therefore to result in adverse impacts.

Experience of mining beneath road culverts in the Southern Coalfield indicates that the incidence of impacts is low. Impacts have generally been limited to cracking in the concrete headwalls which can be readily remediated. In some cases, however, cracking in the culvert pipes occurred which required the culverts to be replaced.

IMC has an approved management plan for the local roads, including the drainage culverts, for LW701 to LW708B and LW901 to LW903. It is recommended that this management plan is reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.7. Water infrastructure

The potable water infrastructure is shown in MSEC1117-12. The locations and details of this infrastructure are based on a Dial Before You Dig search (DB4YD, 2020) and follow up correspondence with Sydney Water.

There is no potable water infrastructure identified within the Study Area. Potable water pipelines are located within Douglas Park to the south of the Study Area. These pipelines are located more than 1.1 km from the proposed LW709 to LW711 and LW905. At this distance, the potable water pipelines are not predicted to experience measurable conventional subsidence effects. It is not anticipated, therefore, that adverse impacts would occur to these pipelines due to the proposed mining.

6.8. Sewerage infrastructure

The sewerage infrastructure is shown in MSEC1117-12. The locations and details of this infrastructure are based on a Dial Before You Dig search (DB4YD, 2020) and follow up correspondence with Sydney Water.

There is no sewerage infrastructure identified within the Study Area. A local sewer network is proposed to be constructed in the Menangle region in the next one to two years. The new infrastructure would need to be designed and constructed to accommodate mine subsidence effects prescribed by SA NSW.

6.9. Gas infrastructure

The gas infrastructure is shown in MSEC1117-12. The locations and details of this infrastructure are based on a Dial Before You Dig search (DB4YD, 2020) and follow up correspondence with AGL.

There is no gas infrastructure identified within the Study Area. A local gas distribution network services the houses located along Menangle Road and Finns Road to the north of the Study Area. These services are located more than 500 m from the proposed mining area. At this distance, the local gas distribution network is not predicted to experience measurable conventional subsidence effects. It is not anticipated, therefore, that adverse impacts would occur to the local gas distribution network due to the proposed mining.

6.10. Electrical infrastructure

6.10.1. Descriptions of the powerlines

The locations of the electrical infrastructure are shown in Drawing No. MSEC1117-10.

The electrical infrastructure within the Study Area comprises 66 kV powerlines, 11 kV powerlines and low voltage powerlines. There are no transmission lines located within the Study Area.

There are three 66 kV powerline located within the Study Area. All three powerlines cross directly above the proposed LW709, LW710B and LW711 and one of these powerlines also crosses directly above the proposed LW905. The 11 kV and low voltage powerlines are located across the Study Area and the generally follow the alignments of the local roads.

A summary of the lengths of the powerlines within the Study Area is provided in Table 6.15.

Table 6.15 Powerlines within the Study Area

Type	Location	Total length above the proposed longwalls (km)	Total length within the Study Area (km)
66 kV powerlines	Directly above LW709, LW710B, LW711 and LW905	3.3	8.4
11 kV powerlines	Directly above LW709 to LW711 and LW905	6.6	17.1
Low voltage powerlines	Directly above LW709 to LW711 and LW905	4.3	9.6

The 66 kV, 11 kV and low voltage powerlines consist of aerial copper cables supported on timber poles. A photograph of the 66 kV powerline (right-hand side) and an 11 kV powerline (left-hand side) along Menangle Road is provided in Fig. 6.20.

Fig. 6.20 66 kV and 11 kV powerlines along Menangle Road

The powerlines are owned and operated by Endeavour Energy.

6.10.2. Predictions for the powerlines

The predicted profiles of total vertical subsidence, tilt along and tilt across the alignment of the 66 kV powerline Branches 1, 2 and 3 are shown in Figs. C.10 to C.12, respectively, in Appendix C. The predicted total profiles after the completion of LW702 to LW708B and LW901 to LW904 are shown as cyan lines. The predicted total profiles after the mining of each of LW709 to LW711 and LW905 are shown as the blue lines.

A summary of the maximum predicted values of total vertical subsidence, tilt along and tilt across the 66 kV powerlines is provided in Table 6.16. The values are the maximum predicted subsidence effects within the Study Area due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 6.16 Maximum predicted total vertical subsidence, tilt along and tilt across the 66 kV powerlines due to the mining in Areas 7 and 9

Location	Reference	Maximum predicted total vertical subsidence (mm)	Maximum predicted total tilt along alignment (mm/m)	Maximum predicted total tilt across alignment (mm/m)
66 kV powerlines	Branch 1	1500	6.5	4.0
	Branch 2	1400	7.0	3.0
	Branch 3	1300	6.0	4.0

The 11 kV and low voltage powerlines are located across the Study Area and, therefore, could experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence effects within the Study Area is provided in Chapter 4.

The maximum predicted total tilts for the 66 kV powerlines are 7.0 mm/m (i.e. 0.7 %, or 1 in 143) along the alignments and 4.0 mm/m (i.e. 0.4 %, or 1 in 250) across the alignments. The maximum predicted total tilt in any direction for the 11 kV and low voltage powerlines within the Study Area is 7 mm/m (i.e. 0.7 %, or 1 in 143).

The maximum predicted horizontal movement of the ground associated with the maximum predicted tilt is 100 mm, i.e. 15 times maximum tilt of 7 mm/m. The maximum predicted horizontal movement at the tops of the poles (assuming a height of 15 m) therefore is 200 mm, i.e. horizontal movement at the ground plus the maximum tilt of 7 mm/m times 15 m pole height.

6.10.3. Impact assessments for the powerlines

The 66 kV, 11 kV and low voltage powerline will not be directly affected by the ground strains, as the cables are supported by the power poles above ground level. However, the cables may be affected by the changes in bay lengths, i.e. the distances between the poles at the levels of the cables, resulting from the differential subsidence, horizontal movements and tilt at the pole locations. The stabilities of the poles and the cable clearances may also be affected by the mining-induced tilts and the changes in the catenary profiles of the cables.

The maximum predicted tilt for the powerlines is 7 mm/m (i.e. 0.7 %, or 1 in 143). A rule of thumb used by some electrical engineers is that the tops of the poles may displace up to two pole diameters horizontally before remediation works are considered necessary. Based on pole heights of 15 m and pole diameters of 250 mm, the maximum tolerable tilt at the pole locations is in the order of 20 mm/m.

There is extensive experience of mining directly beneath powerlines at Appin Colliery and elsewhere in the Southern Coalfield. Examples of cases where the measured subsidence effects are similar to the predicted values for the powerlines within the Study Area is provided in Table 6.17.

Table 6.17 Experience of mining beneath powerlines in the Southern Coalfield

Colliery and longwalls	Length of powerline directly mined beneath (km)	Maximum measured movements at the powerlines	Observed impacts
Appin Area 1 (LW1 to LW12)	5.2 km of 11 kV 104 power poles	850 mm subsidence 6 mm/m tilt (Measured WX-Line)	No significant impacts
Appin Area 2 (LW14 to LW29)	1.0 km of 66 kV 4.6 km of 11 kV 76 power poles	1200 mm subsidence 7.0 mm/m tilt (Measured A-Line)	No significant impacts
Appin Area 3 (LW301 and LW302)	0.6 km of 66 kV 0.2 km of 11 kV 14 power poles	650 mm subsidence 4.5 mm/m tilt (Measured M & N-Lines)	No significant impacts
Appin Area 4 (LW401 to LW408)	3.4 km of 66 kV 0.6 km of 33 kV 2.9 km of 11 kV 96 power poles	700 mm subsidence 5.0 mm/m tilt (Measured A-Line)	No significant impacts
Appin Area 7 (LW702 to LW708A)	3.6 km of 66 kV 9.9 km of 11 kV 171 power poles	1300 mm subsidence 8.5 mm/m Tilt (Measured ARTC-Line and M31-Lines)	No significant impacts
Appin Area 9 (LW901 and LW902)	1.2 km of 66 kV 2.1 km of 11 kV 67 power poles	525 mm subsidence 3.0 mm/m tilt (Measured ARTC-Line)	No significant impacts

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Colliery and longwalls	Length of powerline directly mined beneath (km)	Maximum measured movements at the powerlines	Observed impacts
Dendrobium Area 2 (LW3 and LW4)	0.8 km of 33 kV	1100 mm subsidence 40 mm/m tilt (Measured 2000-Line)	No significant impacts
Tahmoor North (LW22 to LW31)	Approx. 41 km of electrical cables and 1060 power poles	1375 mm subsidence 12 mm/m tilt (Extensive street monitoring)	Some minor adjustments to cable catenaries, pole tilts and consumer cables required.
Tower (LW1 to LW10)	6.0 km of 66 kV 4.3 km of 11 kV 112 power poles	400 mm subsidence 3 mm/m tilt (Measured T & TE-Lines)	No significant impacts
West Cliff Areas 4 & 5 (LW5A3 to LW5A4 & LW29 to LW37)	1.8 km of a 66 kV 8.5 km of 11 kV 170 power poles	1350 mm subsidence 11 mm/m tilt (Measured B-Line)	No significant impacts

The past experiences demonstrate that there have only been minor impacts on aerial powerlines that have been directly mined beneath by previously extracted longwalls in the Southern Coalfield. Some remedial measures were required, which included adjustments to cable catenaries, pole tilts and to consumer cables which connect between the powerlines and houses. The incidence of these impacts was very low.

Based on this experience, it is likely that the extraction of the proposed longwalls would result in only minor impacts on the powerlines within the Study Area. It is expected that the remedial measures would include some adjustments of the cable catenaries, pole tilts and the consumer cables, as has been undertaken in the past, but any other impacts are expected to be relatively infrequent.

11 kV and low voltage powerlines follow Top Ridge Road and Gibraltar Drive at the top of Razorback Range above the proposed LW710A and the western end of the proposed LW711. Increased horizontal movements could develop in the downslope direction due to mining beneath the steep slopes. It is recommended ground movement and visual monitoring are carried out along these powerlines during active subsidence to identify increased or irregular movements.

6.10.4. Recommendations for the powerlines

IMC has an approved management plan for the powerlines for LW701 to LW708B and LW901 to LW903. It is recommended that this management plan is reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.11. Telecommunications infrastructure

6.11.1. Descriptions of the telecommunications infrastructure

The locations of the telecommunications infrastructure are shown in Drawing No. MSEC1117-11.

There are optical fibre cables owned by Telstra and Optus that are located within the Study Area. A summary of these optical fibre cables is provided in Table 6.18. The Telstra cables have been numbered from east to west within the Study Area, as shown in Drawing No. MSEC1117-11.

Table 6.18 Optical fibre cables located within the Study Area

Owner	Reference	Location	Total length above the proposed longwalls (km)	Total length within the Study Area (km)
Telstra	Branch 1	Outside proposed mining area, adjacent to eastern end of LW709	0.0	1.3
	Branch 2	Directly above LW709, LW710B and LW711	1.2	3.3
	Branch 3	Outside the proposed mining area, 400 m south of LW709	0.0	1.5
	Branch 4	Directly above LW709 and LW710B	0.8	1.9
	Branch 5	Outside proposed mining area, 160 m west of LW711	0.0	1.2
Optus	-	Outside the proposed mining area, 380 m south of LW709	0.0	1.5

An AAPT optical fibre cable is located just outside the eastern boundary of the Study Area, on the western side of the M31 Hume Motorway. This cable is located 400 m east of LW709, at its closest point to the proposed longwalls. Optical fibre cables owner by Telstra, NextGen and Optus are also located outside the Study Area, on the eastern side of the M31 Hume Motorway. These cables are located more than 500 m east of LW709, at their closest points to the proposed longwalls.

Copper telecommunications cables are also located within the Study Area. These underground cables generally follow the local roads and they service the properties within the Study Area.

There is one telecommunications tower located within the Study Area, as shown in Drawing No. MSEC1117-11. The tower is located on Razorback Range and it is outside and immediately adjacent to the maingate of the proposed LW905. A photograph of this tower is provided in Fig. 6.21.

Fig. 6.21 Mobile phone telecommunications tower

The telecommunications tower supports GSM antennae and microwave dishes owned by Telstra and Optus which are used for mobile telephone communications. There are also light-weight shed structures associated with the telecommunications tower.

6.11.2. Predictions for the telecommunications infrastructure

The predicted profiles of total vertical subsidence, tilt and curvature along the Telstra optical fibre cable Branches 2, 3 and 4 are shown in Figs. C.13 to C.15, respectively, in Appendix C. The predicted total profiles after the completion of LW702 to LW708B and LW901 to LW904 are shown as cyan lines. The predicted total profiles after the mining of each of LW709 to LW711 and LW905 are shown as the blue lines.

The predicted profiles along the Optus optical fibre cable are similar to the profiles for the Telstra optical fibre cable Branch 3, as illustrated in Fig. C.14, in Appendix C. The Telstra optical fibre cable Branches 1 and 5 are located outside the proposed mining area and, therefore, are predicted additional subsidence effects due to the proposed longwalls are less than for the other optical fibre cables.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvature for the optical fibre cables is provided in Table 6.19. The values are the maximum predicted subsidence effects within the Study Area due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 6.19 Maximum predicted total vertical subsidence, tilt and curvature for the optical fibre cables within the Study Area due to the mining in Areas 7 and 9

Feature	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})
Optical fibre cables	Telstra Branch 1	1400	6.5	0.07	0.13
	Telstra Branch 2	1350	5.0	0.07	0.12
	Telstra Branch 3	1400	5.0	0.06	0.12
	Telstra Branch 4	1350	4.0	0.06	0.12
	Telstra Branch 5	30	< 0.5	< 0.01	< 0.01
	Optus	1400	5.0	0.06	0.12

The maximum predicted total tilt for the optical fibre cables within the Study Area is 6.5 mm/m (i.e. 0.65 %, or 1 in 154). The maximum predicted total conventional curvatures are 0.07 km^{-1} hogging and 0.13 km^{-1} sagging, which represent minimum radii of curvature of 14 km and 8 km, respectively.

The maximum predicted conventional strains for the optical fibre cables, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly above the mining area are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

The Telstra Branch 1, Telstra Branch 3, Telstra Branch 5 and Optus optical fibre cables are located outside the proposed mining area. A summary of the maximum predicted values of additional vertical subsidence, tilt and curvature for these optical fibre cables is provided in Table 6.20. The values are the maximum predicted subsidence effects within the Study Area due to the mining of the proposed longwalls only.

Table 6.20 Maximum predicted additional vertical subsidence, tilt and curvature for the optical fibre cables within the Study Area due to the mining of LW709 to LW711 and LW905

Feature	Reference	Maximum predicted additional vertical subsidence (mm)	Maximum predicted additional tilt (mm/m)	Maximum predicted additional hogging curvature (km^{-1})	Maximum predicted additional sagging curvature (km^{-1})
Optical fibre cables	Telstra Branch 1	180	1.0	0.01	< 0.01
	Telstra Branch 3	130	1.0	0.01	< 0.01
	Telstra Branch 5	30	< 0.5	< 0.01	< 0.01
	Optus	140	1.0	0.01	< 0.01

The maximum predicted additional tilt for the Telstra Branch 1, Telstra Branch 3, Telstra Branch 5 and Optus optical fibre cables is 1.0 mm/m (i.e. 0.1 %, or 1 in 1000). The maximum predicted additional conventional curvatures are 0.01 km^{-1} hogging and less than 0.01 km^{-1} sagging, which represent minimum radii of curvature of 100 km and greater than 100 km, respectively.

The maximum predicted conventional strains for the optical fibre cables, based on applying a factor of 15 to the maximum predicted conventional curvatures, are less than 0.5 mm/m tensile and compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains outside the mining area are 0.6 mm/m tensile and 0.4 mm/m compressive based on the 95 % confidence levels.

The copper telecommunications cables are located across the Study Area and, therefore, could experience the full range of predicted subsidence movements. A summary of the maximum predicted conventional subsidence effects within the Study Area is provided in Chapter 4.

The optical fibres and copper telecommunications cables cross the streams directly above the proposed mining area and therefore could experience valley-related effects. The maximum predicted valley-related effects for these cables are 25 mm upsidence and 50 mm closure.

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A summary of the maximum predicted values of total vertical subsidence, tilt and curvature for telecommunications tower is provided in Table 6.20. The values are the maximum predicted subsidence effects within 20 m of the tower due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 6.21 Maximum predicted total vertical subsidence, tilt and curvature for the telecommunications towers due to the mining of LW709 to LW711 and LW905

Feature	After longwall	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})
Telecom. tower	LW709	30	< 0.5	< 0.01	< 0.01
	LW710A	60	< 0.5	< 0.01	< 0.01
	LW711	60	< 0.5	< 0.01	< 0.01
	LW905	350	3.0	0.05	0.01

The maximum predicted total tilt for the telecommunications tower is 3.0 mm/m (i.e. 0.3 %, or 1 in 333). The maximum predicted total conventional curvatures are 0.05 km^{-1} hogging and 0.01 km^{-1} sagging, which represent minimum radii of curvature of 20 km and 100 km, respectively.

The maximum predicted conventional strains for the telecommunications tower, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and less than 0.5 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly outside the mining area are 0.9 mm/m tensile and 0.8 mm/m compressive based on the 95 % confidence levels.

6.11.3. Impact assessments for the telecommunications cables

The optical fibre cables are direct buried and therefore could potentially be impacted by ground strains. The greatest potential for impacts will occur as the result of localised ground strains due to non-conventional movements or valley-related effects.

The tensile strains in the optical fibre cables could be higher than predicted, where the cables connect to the support structures, which may act as anchor points, preventing any differential movements that may have been allowed to occur with the ground. Tree roots have also been known to anchor cables to the ground. The extent to which the anchor points affect the ability of the cables to tolerate the mine subsidence movements depends on the cable size, type, age, installation method and ground conditions.

In addition to this, optical fibre cables contain additional fibre lengths over the sheath lengths, where the individual fibres are loosely contained within tubes. Compression of the sheaths can transfer to the loose tubes and fibres and result in “micro-bending” of the fibres constrained within the tubes, leading to higher attenuation of the transmitted signal. If the maximum predicted compressive strains were to be fully transferred into the optical fibre cables, the strains could be of sufficient magnitude to result in the reduction in capacities of the cables or transmission loss.

The strains transferred into the optical fibre cables can be monitored using Remote Fibre Monitoring Systems (RFMS) such as Optical Time Domain Reflectometry (OTDR), which can be used to notify the infrastructure owners of strain concentrations due to non-conventional ground movements or valley-related effects.

There is extensive experience of mining directly beneath optical fibre cables at Appin Colliery and elsewhere in the Southern Coalfield. Examples of cases where the measured subsidence effects are similar to the predicted values for the optical fibre cables within the Study Area is provided in Table 6.22.

Table 6.22 Examples of mining beneath optical fibre cables in the Southern Coalfield

Colliery and longwalls	Length of optical fibre cable directly mined beneath (km)	Maximum measured movements at the optical fibre cables	Pre-mining mitigation, monitoring and observed impacts
Appin Area 3 (LW301 and LW302)	0.8	650 mm subsidence 1.0 mm/m tensile Strain 3.0 mm/m comp. Strain (Measured M & N-Lines)	600 m aerial cable on standby. Ground survey, visual, OTDR. No reported impacts.
Appin Area 7 (LW703 to LW708A)	32.7 total for five cables	1300 mm subsidence 1.5 mm/m tensile Strain 8.5 mm/m comp. Strain (Measured ARTC-Line and M31-Lines)	New cable redirection to avoid potential impacts to old optical fibre cable. Ground survey, visual, OTDR. Strain concentrations detected in three cables, attenuation losses were relieved by locally exposing the cables or by building a bypass cable.
Tahmoor North (LW22 to LW32)	4.6	1375 mm subsidence 3.0 mm/m tensile strain 8.0 mm/m comp. strain (Extensive street monitoring)	Ground survey, visual, OTDR, SBS. No reported impacts.
Tower (LW1 to LW10)	1.7	400 mm subsidence 3 mm/m tilt 0.5 mm/m tensile Strain 1 mm/m comp. Strain	No reported impacts
West Cliff Areas 4 & 5 (LW5A3, LW5A4 and LW29 to LW37)	3.6	1350 mm subsidence 1.5 mm/m tensile strain 5.5 mm/m comp. strain (Measured B-Line)	Survey, visual, OTDR, SBS. No reported impacts.

Note: SBS is a method of monitoring optical fibres and means Stimulated Brillouin Scattering

The experience of mining beneath optical fibre cables at Appin Colliery and elsewhere in the Southern Coalfield indicates that the potential impacts can be managed with the implementation of suitable management and monitoring strategies. With an appropriate management plan in place, it is considered that potential impacts on the optical fibre cables due to the proposed mining can be managed, even if actual subsidence movements are greater than the predictions or substantial non-conventional movements occur.

The copper telecommunications cables are located across the Study Area. There is extensive experience of mining beneath copper telecommunications cables at Appin Colliery and elsewhere in the Southern Coalfield. There has been no reported impacts on the direct buried copper telecommunications cables in these cases. It is not anticipated, therefore, that the copper telecommunications cables within the Study Area will experience adverse impacts.

Copper telecommunications cables follow Top Ridge Road and Gibraltar Drive at the top of Razorback Range above the proposed LW710A and the western end of the proposed LW711. Increased horizontal movements could develop in the downslope direction due to mining beneath the steep slopes. It is recommended ground movement and visual monitoring are carried out along these underground cables during active subsidence to identify increased or irregular movements.

6.11.4. Impact assessments for the telecommunications tower

The maximum predicted tilt for the telecommunications tower is 3.0 mm/m (i.e. 0.3 %, or 1 in 333). The tilt is small and unlikely to adversely impact on the tower structure itself or the shed structures containing the telecommunications equipment.

The microwave dishes that link each GSM tower are sensitive to small angular deviations. The predicted angular deviation due to the mining-induced tilt of 3.0 mm/m is approximately 0.2°. The maximum predicted vertical subsidence of the tower is 350 mm. The predicted angular deviation due to the vertical subsidence, based on a minimum line of site distance of say 2 km, is less than 0.1°.

The maximum predicted angular deviation due to both vertical subsidence and tilt of the tower sites is therefore approximately 0.3°. It is expected that the angular deviations of the microwave dishes can be managed by making any necessary adjustments to the lines of sight as the proposed LW905 is mined adjacent to it.

The maximum predicted curvatures for the tower are 0.05 km^{-1} hogging and 0.01 km^{-1} sagging, which represent minimum radii of curvature of 20 km and 100 km, respectively. The maximum predicted strains are 0.9 mm/m tensile and 0.8 mm/m compressive based on the 95 % confidence levels.

It is recommended that the predicted subsidence effects for the telecommunications tower is provided to the infrastructure owner so that a detailed structural analysis can be undertaken of the tower and its associated infrastructure. It is also recommended that suitable preventive measures be established, in consultation with the infrastructure owner, so that the tower and associated infrastructure can be maintained in safe and serviceable conditions throughout the mining period.

6.11.5. Recommendations for the telecommunications infrastructure

IMC has an approved management plan for the telecommunications infrastructure for LW701 to LW708B and LW901 to LW903. It is recommended that this management plan is reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

It is also recommended that the predicted subsidence effects for the telecommunications tower are provided to the infrastructure owner so that a detailed structural analysis can be undertaken. It is recommended that monitoring and management measures is implemented so that the tower and associated infrastructure are maintained in safe and serviceable conditions.

6.12. Agricultural utilisation

The agricultural land classification types within the Study Area are illustrated in Fig. 6.22.

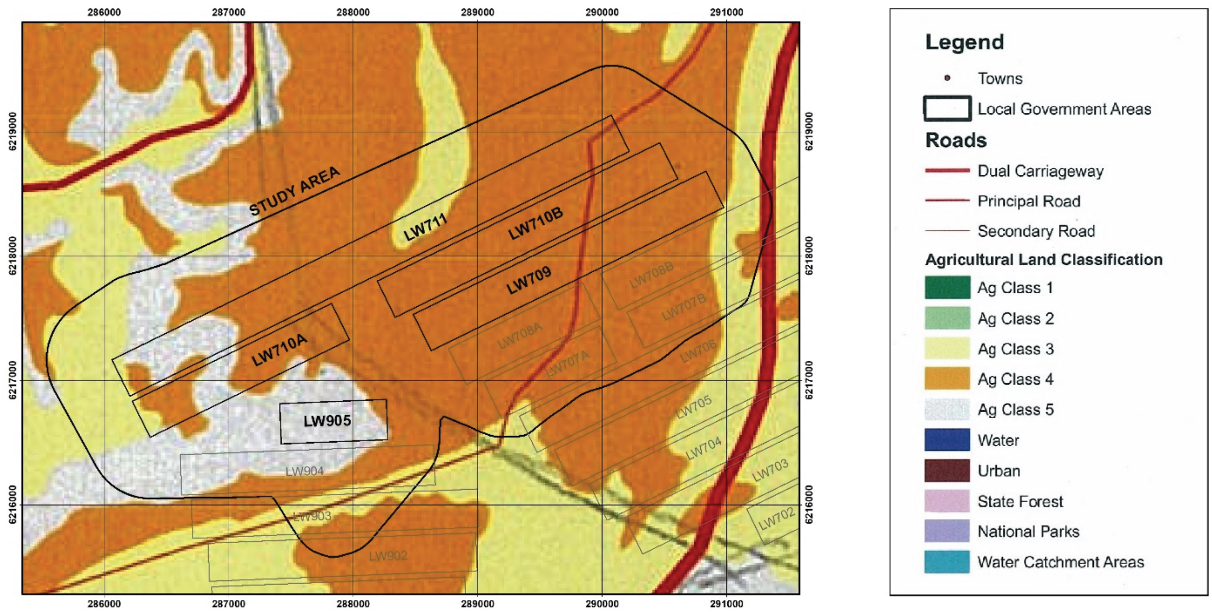


Fig. 6.22 Agricultural Land Classification within the Study Area (Source DTIRIS, November 2008)

There are three main agricultural land classification types within the Study Area:

- Class 3 – grazing land or land well suited to pasture improvement,
- Class 4 – land suitable for grazing but not for cultivation, and
- Class 5 – land unsuitable for agriculture, or at best suited only to light grazing.

The flatter areas of land within the Study Area have been predominately cleared and are used for light agricultural and residential purposes. The hillier areas within the Study Area, including the Razorback Range, have not been cleared of the natural vegetation.

6.13. Rural structures

6.13.1. Descriptions of the rural structures

The locations of the rural structures are shown in Drawing No. MSEC1117-13.

There are 581 rural structures that have been identified within the Study Area. These structures include sheds, garages, carports and other non-residential building structures. Details of the rural structures are included in Table D.01, in Appendix D. A summary of the rural structures within the Study Area is provided in Table 6.23.

Table 6.23 Details of the rural structures within the Study Area

Type	Number located above the existing and approved longwalls	Number located above the proposed LW709 to LW711 and LW905	Number located outside the mining area
Sheds	97	180	193
Garages/carports	9	33	28
Awnings/Pergolas	1	12	15
Other	1	6	6
Total	108	231	242

There are 339 rural structures (i.e. 58 %) that are located above the existing and proposed longwalls and 242 rural structures.(i.e. 42 %) that are located outside the mining area.

6.13.2. Predictions for the rural structures

Predictions of conventional vertical subsidence, tilt and curvature have been made at the centroid and at the vertices of each structure, as well as eight equally spaced points placed radially around the centroid and vertices at a distance of 20 m. In the case of a rectangular shaped structure, predictions have been made at a minimum of 45 points within and around the structure.

The maximum predicted values of total vertical subsidence, tilt and curvature for each of the rural structures within the Study Area are provided in Table D.02, in Appendix D. The predicted tilts represent the maximum values in any direction after the completion of each of the proposed LW709 to LW711 and LW905. The predicted curvatures are the maximum values in any direction at any time during or after the extraction of each of the proposed longwalls.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvatures for the rural structures is provided in Table 6.24. The table provides the maximum predicted values for the structures at any time during or after the extraction of each longwall.

Table 6.24 Maximum predicted total vertical subsidence, tilt and curvatures for the rural structures

After longwall	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})
LW709	1400	6.5	0.06	0.13
LW710A	1400	6.5	0.06	0.13
LW710B	1425	6.5	0.06	0.14
LW711	1425	7.0	0.07	0.14
LW905	1425	7.0	0.07	0.14

The maximum predicted tilt for the rural structures is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted curvatures are 0.07 km^{-1} hogging and 0.14 km^{-1} sagging, which represent minimum radii of curvature of 14 km and 7 km, respectively.

Distributions of the predicted vertical subsidence, tilt and curvatures for the rural structures within the Study Area are illustrated in Fig. 6.23 and Fig. 6.24.

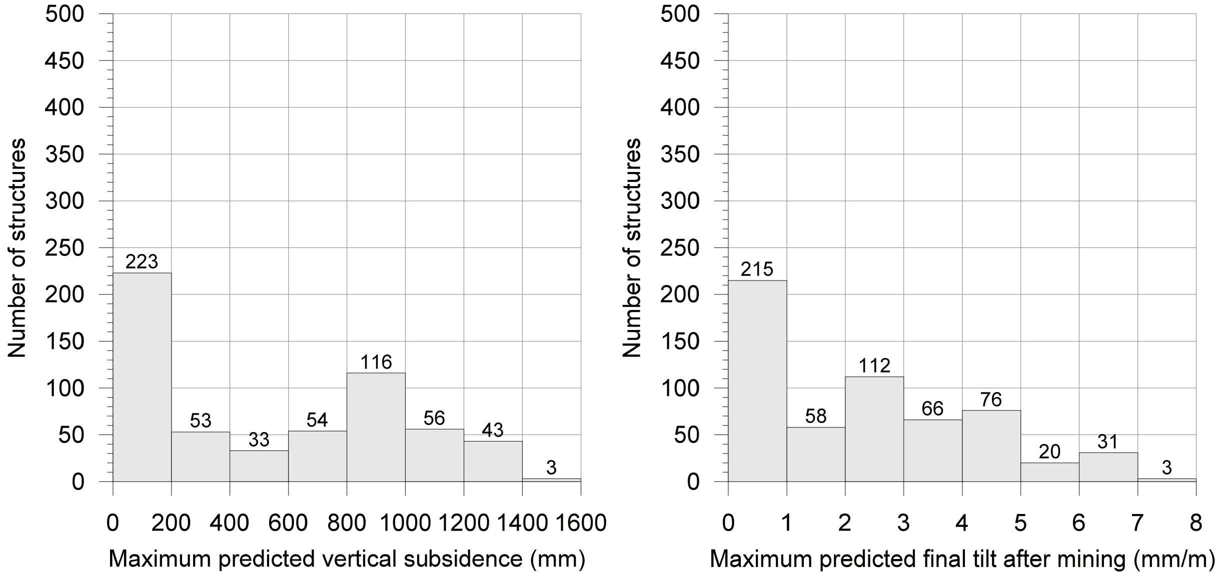


Fig. 6.23 Maximum predicted vertical subsidence (left-hand side) and final tilt (right-hand side) for the rural structures

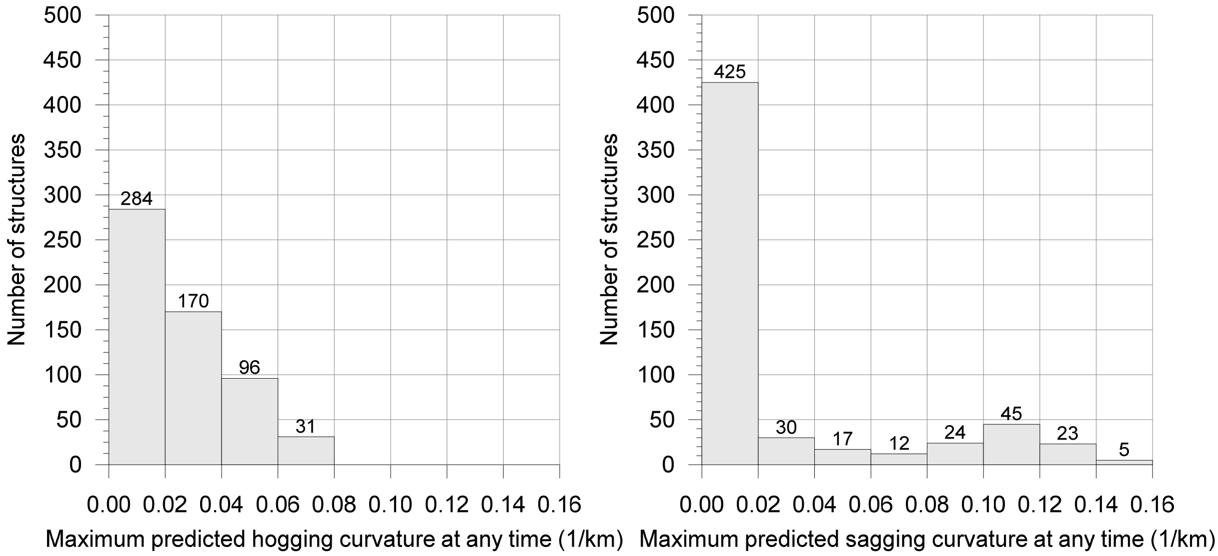


Fig. 6.24 Maximum predicted hogging curvature (left-hand side) and sagging curvature (right-hand side) at any time for the rural structures

The maximum predicted conventional strains for the rural, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. Higher strains could develop at the structures due to irregular ground movements or topographic effects.

The predicted distributions of strain due to the proposed mining are described in Chapter 4. The rural structures are at discrete locations and, therefore, the most relevant distribution of strain is the maximum strains measured in individual survey bays above previous longwall mining, which is summarised in Section 4.3.1. The maximum predicted total strains directly above the proposed longwalls are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

The strains have been predicted for each of the rural structures using the method described by Barbato (2017). This method considers the position of each structure relative to the longwalls, the surface slope, surface lithology and the potential for irregular anomalous movements.

The predicted total strains for each of the rural structures within the Study Area are provided in Table D.02, in Appendix D. Distributions of the predicted total strains based on the mean and on the 95 % confidence levels are provided in Fig. 6.25 and Fig. 6.26, respectively.

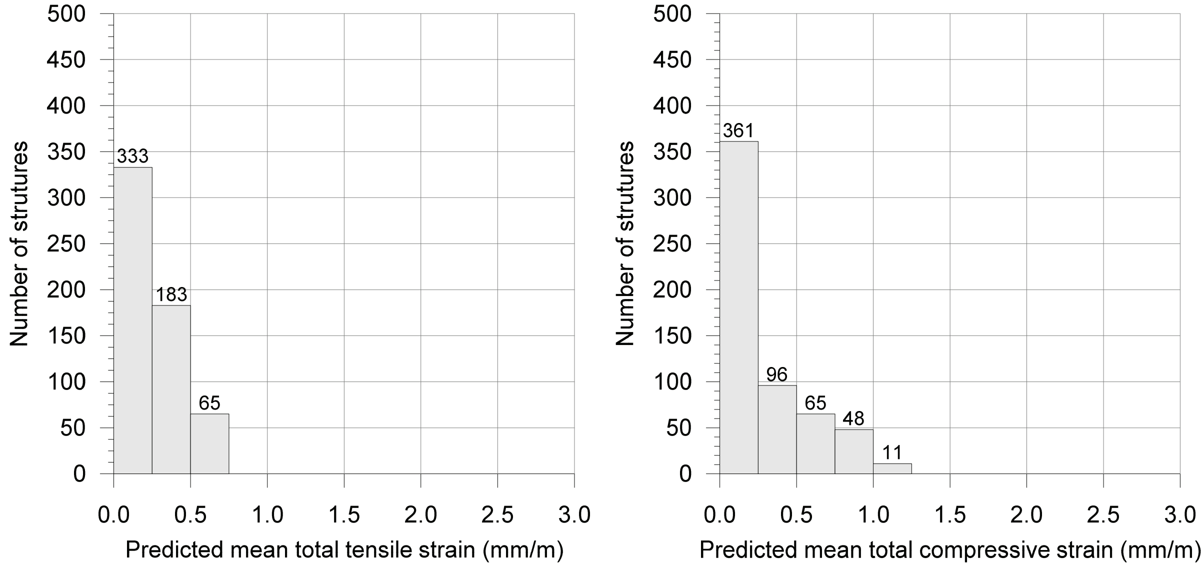


Fig. 6.25 Predicted total tensile strain (left-hand side) and total compressive strain (right-hand side) for the rural structures based on the mean

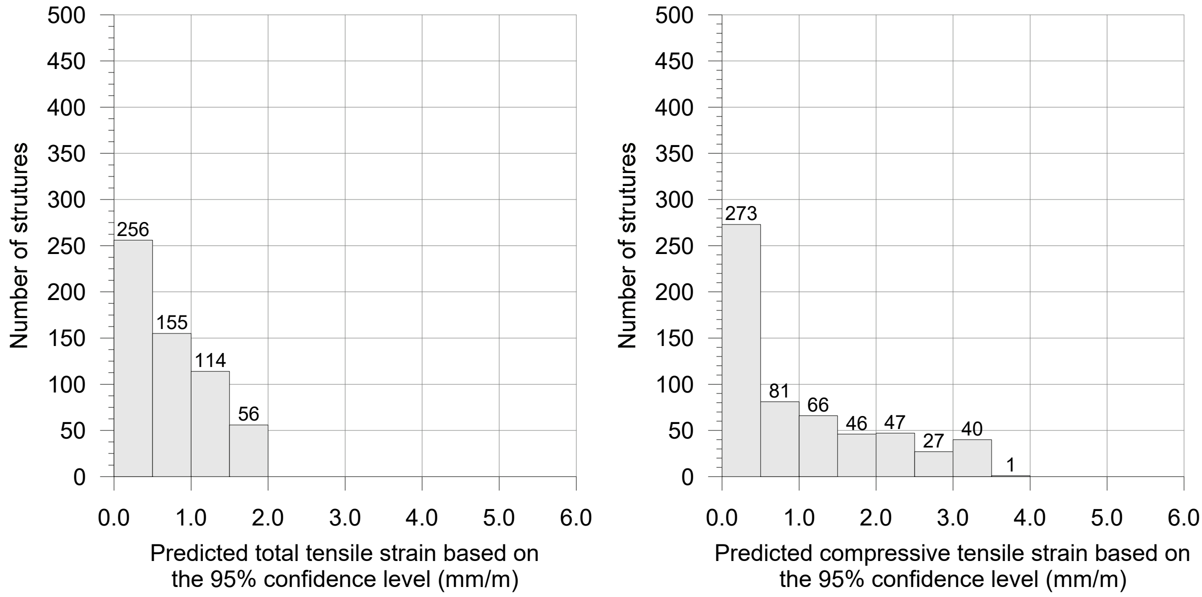


Fig. 6.26 Predicted total tensile strain (left-hand side) and total compressive strain (right-hand side) for the rural structures based on the 95 % confidence level

The rural structures within the Study Area are predicted to experience total tensile strains between 0.2 mm/m and 1.7 mm/m and total compressive strains between 0.2 mm/m and 3.5 mm/m based on the 95 % confidence levels. The predicted mean values range between 0.2 mm/m and 1.1 mm/m tensile and compressive.

6.13.3. Impact assessments for the rural structures

The majority of the rural structures within the Study Area are of lightweight construction and are expected to tolerate the predicted mining-induced tilt. It has been found from past longwall mining experience, that tilts of the magnitudes predicted for the proposed longwalls generally do not result in adverse impacts on rural structures. Some minor serviceability impacts could occur at the higher levels of predicted tilt, including door swings and issues with roof and pavement drainage. These serviceability impacts can generally be remediated using normal building maintenance techniques.

There is extensive experience of mining directly beneath rural structures at Appin Colliery and elsewhere in the Southern Coalfield. This experience indicates that the incidence of impacts on rural structures is very low and these structures have remained in safe and serviceable conditions. This is not surprising as rural structures are generally small in size and of light-weight construction, which makes them less susceptible to impact than houses which are typically more rigid.

The nearby Tahmoor Colliery has mined directly beneath more than 2000 rural structures and 1900 associated residential structures of similar construction during the mining of Longwalls 22 to 31. It has managed the mining-induced impacts with the implementation of suitable management strategies. The structures have remained safe and serviceable during mining.

Based on this experience, it is expected that the rural structures within the Study Area would remain safe and serviceable during the mining period, provided that they are in sound existing condition. The risk of impact could be greater if the structures are in poor existing condition, though the chances of there being a public safety risk remains very low. A number of rural structures that were in poor existing condition have been directly mined beneath and these structures have not experienced adverse impacts during mining.

Impacts on the rural structures that occur due to the mining of the proposed LW709 to LW711 and LW905 are expected to be remediated using well established building techniques. With these remediation measures available, it is unlikely that there would be long term impacts on rural structures due to the extraction of the proposed longwalls.

6.13.4. Recommendations for the rural structures

IMC has approved management plans for building structures for LW701 to LW708B and LW901 to LW903. It is recommended that these management plans are reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

The management plans provide for identification (where landholder access is provided) of buildings in poor pre-mining condition that are hazardous or may become hazardous due to mining, and monitoring of structures during active subsidence. If impacts occur, the structure will be repaired in accordance with the *Coal Mine Subsidence Compensation Act 2017*.

6.14. Tanks

The locations of the tanks are shown in Drawing No. MSEC1117-13.

There are 339 tanks that have been identified within the Study Area. These include water storage and gas tanks on the properties. Details of the tanks are included in Table D.01, in Appendix D. A summary of the tanks within the Study Area is provided in Table 6.25.

Table 6.25 Details of the tanks within the Study Area

Type	Number located above the existing and approved longwalls	Number located above the proposed LW709 to LW711 and LW905	Number located outside the mining area
Tanks	59	138	142

The maximum predicted values of total vertical subsidence, tilt and curvature for each of the tanks within the Study Area are provided in Table D.02, in Appendix D. The predicted tilts represent the maximum values in any direction after the completion of each of the proposed longwalls. The predicted curvatures are the maximum values in any direction at any time during or after the extraction of each of the proposed longwalls.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvatures for the tanks is provided in Table 6.26. The table provides the maximum predicted values for the tanks at any time during or after the extraction of each longwall.

Table 6.26 Maximum predicted total vertical subsidence, tilt and curvatures for the tanks

After longwall	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})
LW709	1400	6.5	0.06	0.13
LW710A	1400	6.5	0.06	0.13
LW710B	1425	6.5	0.06	0.14
LW711	1425	7.0	0.08	0.14
LW905	1425	7.0	0.08	0.14

The maximum predicted tilt for the tanks is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted curvatures are 0.08 km^{-1} hogging and 0.14 km^{-1} sagging, which represent minimum radii of curvature of 13 km and 7 km, respectively.

The maximum predicted conventional strains for the tanks, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly above the mining area are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

The tanks themselves are typically constructed above ground level and, therefore, are unlikely to experience the full ground movements resulting from the proposed mining. It is possible that any buried water pipelines associated with the tanks within the Study Area could be impacted by the ground strains, if they are anchored by the tanks, or by other structures in the ground. Any impacts are expected to be of a minor nature and easily repaired.

IMC has approved management plans for structures (including tanks) for LW701 to LW708B and LW901 to LW903. It is recommended that these management plans are reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.15. Fences

There are fences located across the Study Area. The fences are constructed in a variety of ways, generally using either timber or metal materials. Fences are generally flexible in construction and can usually tolerate mine subsidence movements in the Southern Coalfield.

There is extensive experience of mining beneath fences at Appin Colliery and elsewhere in the Southern Coalfield. A higher incidence of impacts to urban fences has been observed, which is considered to be due to their typical type of construction, namely Colorbond fences and security gates that are fitted tightly between fences and houses. Rural fences are typically more flexible in construction by comparison. No impacts to fences securing livestock were reported. Damaged fences are relatively easy to rectify by re-tensioning of fencing wire, straightening of fence posts, and if necessary, replacing some sections of fencing.

The most vulnerable sections of farm fences are gates, particularly long gates or those with latches, as they are less tolerant to differential horizontal movements and tilts between the gate posts and the ground. If any gates are adversely impacted during the extraction of the proposed longwalls, they can be easily and quickly repaired.

6.16. Farm dams

6.16.1. Descriptions of the farm dams

The locations of the farm dams are shown in Drawing No. MSEC1117-13.

There are 239 farm dams that have been identified within the Study Area. Details of the dams are included in Table D.03, in Appendix D. A summary of the farm dams within the Study Area is provided in Table 6.27.

Table 6.27 Details of the farm dams within the Study Area

Type	Number located above the existing and approved longwalls	Number located above the proposed LW709 to LW711 and LW905	Number located outside the mining area
Farm dams	53	104	82

The details of the farm dams are included in Table D.03, in Appendix D. The dams have maximum dimensions ranging between 4 m and 136 m and plan areas ranging between 13 m^2 and 995 m^2.

The farm dams are typically of earthen construction and have been established by localised cut and fill operations within the natural streams. The dams are generally shallow, with the dam wall heights generally being less than 3 m.

6.16.2. Predictions for the farm dams

Predictions of conventional vertical subsidence, tilt and curvature have been made at the centroid and at the vertices of each farm dam, as well as eight equally spaced points placed radially around the centroid and vertices at a distance of 20 m. In the case of a rectangular shaped dam, predictions have been made at a minimum of 45 points within and around the feature.

The maximum predicted values of total vertical subsidence, tilt and curvature for each of the farm dams within the Study Area are included in Table D.03, in Appendix D. The predicted tilts represent the maximum values in any direction after the completion of each of the proposed LW709 to LW711 and LW905. The predicted curvatures represent the maximum values in any direction at any time during or after the extraction of each of the proposed longwalls.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvatures for the farm dams is provided in Table 6.28. The table provides the maximum predicted values for the dams at any time during or after the extraction of each proposed longwall.

Table 6.28 Maximum predicted total vertical subsidence, tilt and curvatures for the farm dams

After longwall	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})
LW709	1450	7.0	0.07	0.13
LW710A	1450	7.0	0.07	0.13
LW710B	1450	6.5	0.07	0.13
LW711	1450	7.0	0.07	0.14
LW905	1450	7.0	0.07	0.14

The maximum predicted tilt for the farm dams is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted curvatures are 0.07 km^{-1} hogging and 0.14 km^{-1} sagging, which represent minimum radii of curvature of 14 km and 7 km, respectively.

Distributions of the predicted vertical subsidence, tilt and curvatures for the farm dams within the Study Area are illustrated in Fig. 6.27 and Fig. 6.28.

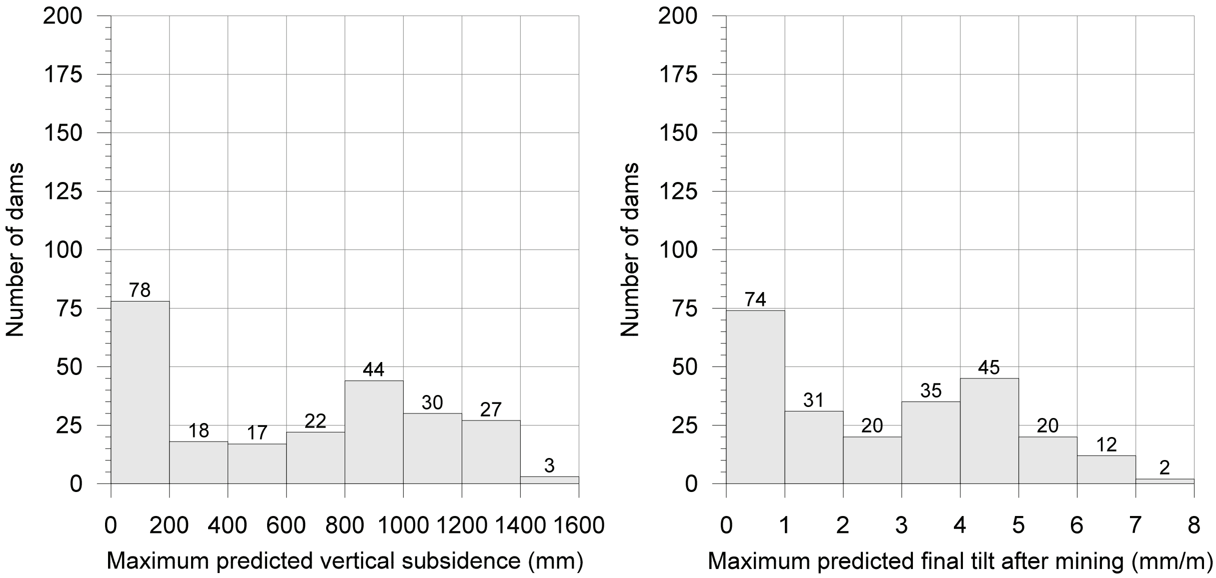


Fig. 6.27 Maximum predicted vertical subsidence (left-hand side) and final tilt (right-hand side) for the farm dams

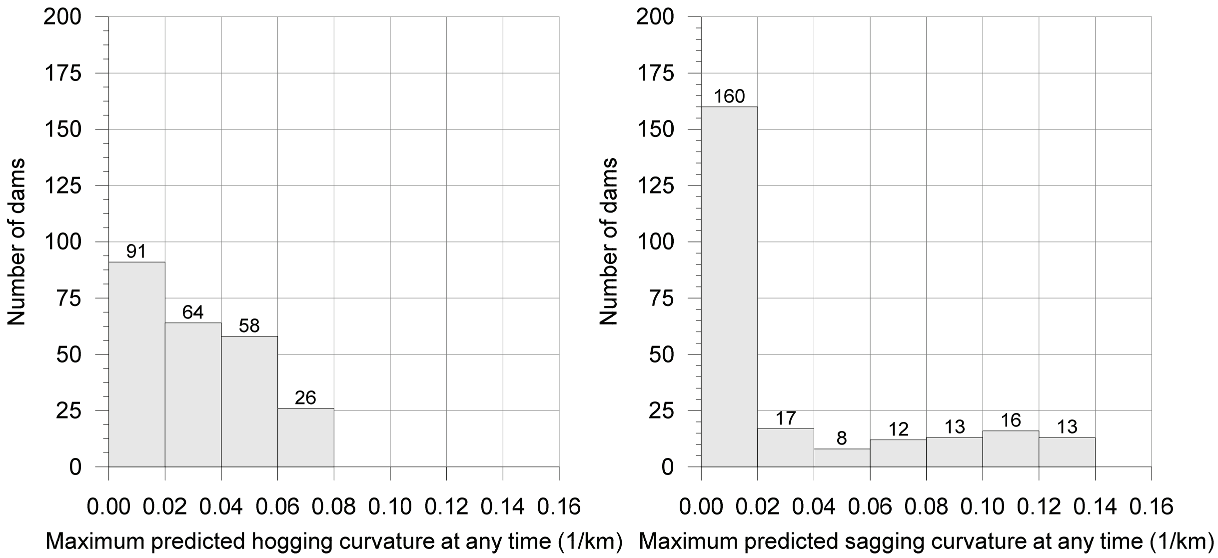


Fig. 6.28 Maximum predicted hogging curvature (left-hand side) and sagging curvature (right-hand side) at any time for the farm dams

The maximum predicted conventional strains for the farm dams, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. Higher strains could develop at the structures due to irregular ground movements or topographic effects.

The predicted distributions of strain due to the proposed mining are described in Chapter 4. The rural structures are at discrete locations and, therefore, the most relevant distribution of strain is the maximum strains measured in individual survey bays above previous longwall mining, which is summarised in Section 4.3.1. The maximum predicted total strains directly above the proposed longwalls are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

The strains have been predicted for each of the farm dams using the method described by Barbato (2017). This method considers the position of each feature relative to the longwalls, the surface slope, surface lithology and the potential for irregular anomalous movements.

The predicted total strains for each of the farm dams within the Study Area are provided in Table D.03, in Appendix D. The distributions of the predicted total strains based on the mean and on the 95 % confidence levels are provided in Fig. 6.29 and Fig. 6.30, respectively.

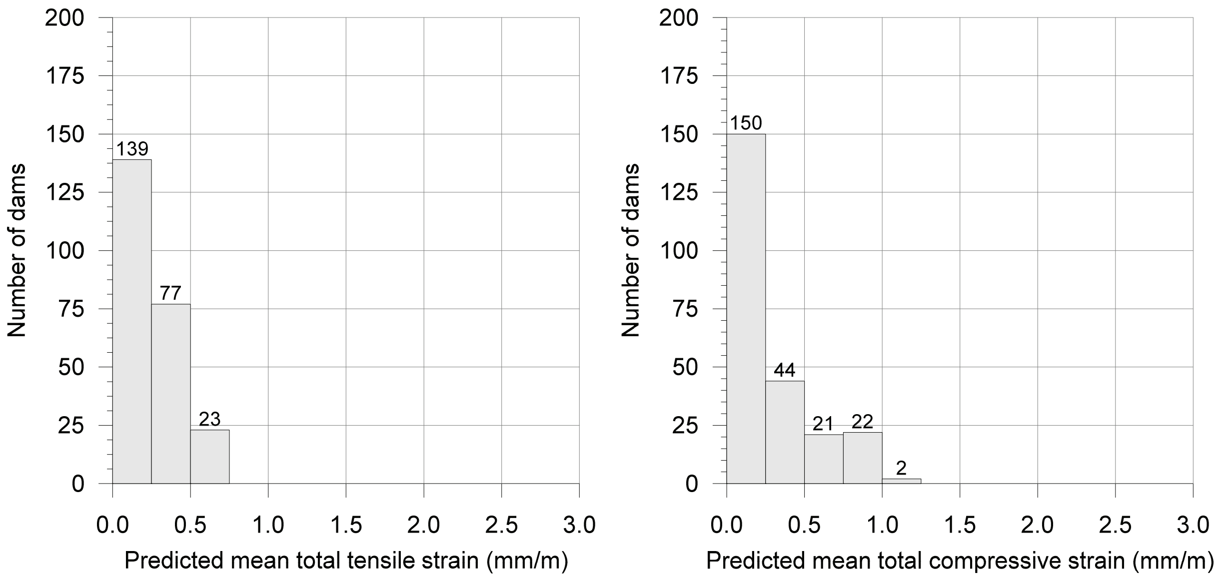
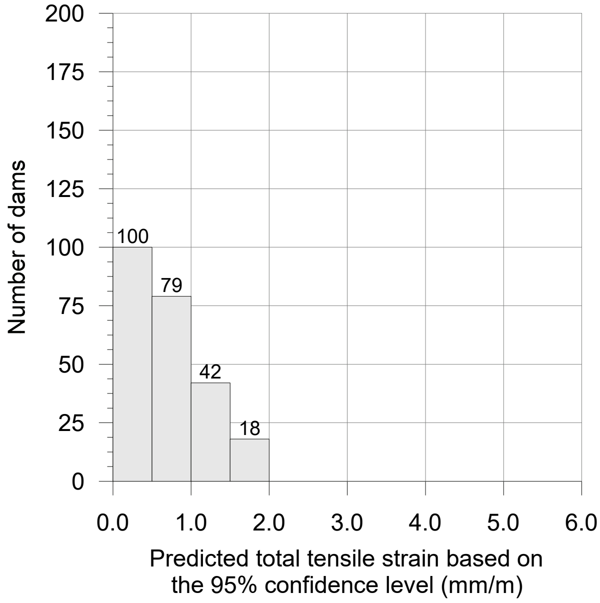


Fig. 6.29 Predicted total tensile strain (left-hand side) and total compressive strain (right-hand side) for the farm dams based on the mean



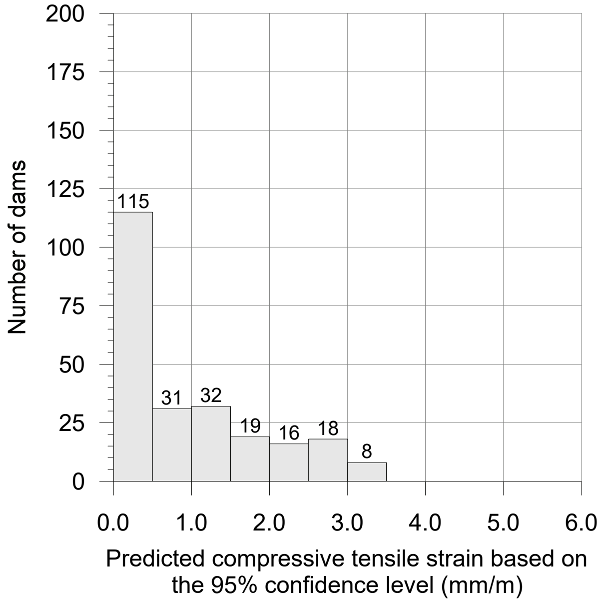


Fig. 6.30 Predicted total tensile strain (left-side) and total compressive strain (right-side) for the farm dams based on the 95 % confidence level

The farm dams within the Study Area are predicted to experience total tensile strains between 0.2 mm/m and 1.7 mm/m and total compressive strains between 0.2 mm/m and 3.4 mm/m based on the 95 % confidence levels. The predicted mean values range between 0.2 mm/m and 1.0 mm/m tensile and compressive.

The farm dams have typically been constructed along the alignments of streams and, therefore, may be subjected to valley-related effects due to the proposed mining. The equivalent valley heights at the dams are small and it is expected, therefore, that the predicted valley-related upsidence and closure movements at the dam walls would be considerably less than the predicted conventional subsidence effects and would not be substantial.

6.16.3. Impact assessments for the farm dams

The maximum predicted tilt for the farm dams within the Study Area is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). Mining-induced tilts can affect the water levels around the perimeters of farm dams, with the freeboard increasing on one side and decreasing on the other. Tilt can potentially reduce the storage capacity of farm dams, by causing them to overflow, or can affect the stability of the dam walls.

The predicted changes in freeboard at the farm dams within the Study Area have been determined by taking the difference between the maximum predicted vertical subsidence and the minimum predicted vertical subsidence anywhere around the perimeter of each farm dam. The maximum predicted changes in freeboard for the farm dams are provided in Table D.03, in Appendix D, and are illustrated in Fig. 6.31.

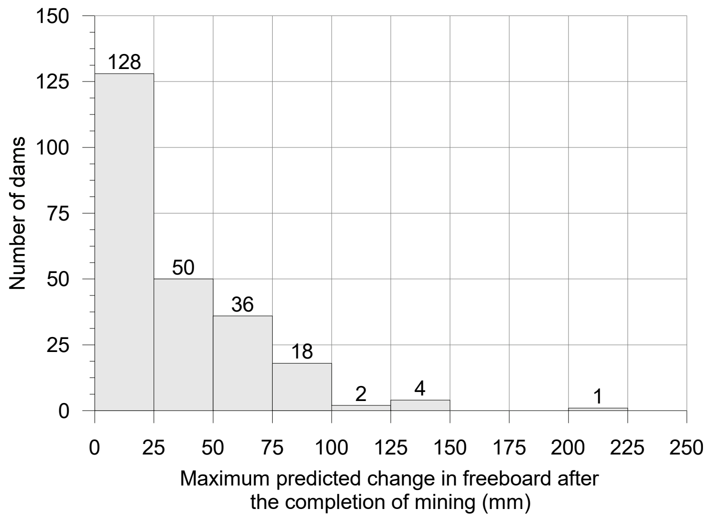


Fig. 6.31 Predicted changes in freeboard for the farm dams within the Study Area

The predicted changes in freeboard for the farm dams within the Study Area are small, varying from less than 50 mm to 200 mm. It is unlikely that the dams would experience adverse impacts on the storage capacities due to these small changes in freeboard.

The farm dams located directly above the proposed mining area could experience cracking in the bases or their walls due to the mining-induced curvatures and strains.

There is extensive experience of mining directly beneath farm dams in the Southern Coalfield, which indicates that the incidence of impacts on these features is low. Farm dams are commonly constructed with cohesive materials in the bases and walls which can absorb the conventional subsidence movements typically experienced in the Southern Coalfield without the development of substantial cracking. Non-conventional movements can result in localised cracking and deformations at the surface and, where coincident with farm dams, could result in impacts.

IMC has mined directly beneath more than 200 farm dams in Appin Areas 3, 4, 7 and 9 and West Cliff Area 5. Loss of water was reported for only a small number of dams. Similarly, Tahmoor Colliery has mined Longwalls 22 to 31 beneath a total of 103 dams. While a small number of landowners have advised of impacts, there has been one claim to SA NSW for impacts on farm dams at the time of the report.

Cracking in the dam bases or walls could be repaired by reinstating them with cohesive materials. If any of the farm dams within the Study Area were to lose water due to the proposed mining, the mine would provide an alternative water source until the completion of repairs in accordance with the *Coal Mine Subsidence Compensation Act 2017*.

6.16.4. Recommendations for the farm dams

IMC has approved management plans for farm dams for LW701 to LW708B and LW901 to LW903. It is recommended that these management plans are reviewed and updated to incorporate the proposed LW709 to LW711 and LW905.

6.17. Groundwater bores

The locations of the registered groundwater bores are shown in Drawing No. MSEC1117-14. The locations and details of these were obtained from the Australian Groundwater Explorer, which is publicly available on line (BOM, 2020).

A summary of the registered groundwater bores identified within the Study Area is provided in Table 6.29.

Table 6.29 Registered groundwater bores within the Study Area

Ground licence number	Location	Depth (m)	Type*
GW072196	270 m north-west of LW711	N/A	HUSE
GW072874	Above the tailgate of LW710B	189	HUSE
GW100289	430 m north-west of LW711	30	STOK
GW100673	400 m south-west of LW710A	104	STOK
GW101986	210 m south-west of LW710B	210	HUSE
GW104661	80 m south-west of LW707A	219	HUSE
GW105376	Directly above LW710B	219	HUSE
GW105388	Directly above LW709	230	HUSE
GW105531	430 m north-west of LW711	210	HUSE
GW105534	Directly above LW709	207	HUSE
GW105574	Directly above LW711	210	HUSE
GW106574	Above the maingate of LW709	238	HUSE
GW106675	120 m north-west of LW711	183	HUSE
GW108907	120 m north-west of LW711	210	HUSE
GW112381	Directly above LW711	152	HUSE / STOK
GW112441	Directly above LW707A	294	*(Decommissioned)*

Note: * denotes type HUSE refers to *Water supply for household needs e.g. washing, toilet Water Access Right* and type STOK refers to *Water supply for livestock Basic Access Right*.

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The groundwater bores could experience adverse impacts due to the extraction of the proposed LW709 to LW711 and LW905, particularly the bores located directly above the proposed mining area. Impacts could include lowering of the piezometric surface, blockage of the bores due to differential horizontal displacements at different horizons within the strata and changes to groundwater quality.

More detailed assessments are provided in the report by the specialist groundwater consultant for the project (SLR, 2021).

6.18. Industrial, commercial and business establishments

The locations of the commercial structures are shown in Drawing No. MSEC1117-13.

There are two commercial structures identified within the Study Area on property F17 (Refs. F17C01 and F17C01). These structures are associated with the telecommunications tower located near the maingate of the proposed LW905. The discussions of these structures are provided in Section 6.11.

6.19. Exploration drill holes

There are exploration drill holes located across the Study Area. Exploration drill holes to seam level are grouted and capped prior to the proposed longwalls mining directly beneath them.

6.20. Aboriginal heritage sites

6.20.1. Descriptions of the Aboriginal heritage sites

The locations of the Aboriginal heritage sites are shown in Drawing No. MSEC1117-14. The details of the heritage sites have been provided by Biosis (2021).

There are three Aboriginal heritage sites that have been identified within the Study Area, being Refs. 52-2-4226, 52-2-4227 and 52-2-4630. There are six additional sites that are located within the 600 m boundary from the proposed mining area, being Refs. 52-2-3191, 52-2-3192, 52-2-3194, 52-2-3687, 52-2-3688 and 52-2-4508.

Details of the Aboriginal heritage sites located within Study Area and the 600 m boundary are provided in Table 6.30.

Table 6.30 Aboriginal heritage sites identified within the Study Area and the 600 m boundary

Reference	Type	Location relative to the longwalls
52-2-4226	Open site	Directly above LW711
52-2-4227	Open site	Directly above LW711
52-2-3191	Open site	470 m north-east of LW711
52-2-3192	Open site	430 m north of LW711
52-2-3194	Open site	470 m north of LW711
52-2-3687	Open site	600 m north of LW710B
52-2-3688	Open site	600 m north of LW710B
52-2-4508	Open site	420 m north of LW711
52-2-4630	Open site	180 m west of LW709

Further details on the Aboriginal heritage sites are provided in the report by Biosis (2021).

6.20.2. Predictions for the Aboriginal heritage sites

A summary of the maximum predicted total vertical subsidence, tilt and curvatures for the Aboriginal heritage sites located within the Study Area and the 600 m boundary is provided in Table 6.31. The values are the maximum predicted subsidence effects within 20 m of the identified locations of each of the sites due to the mining of the existing, approved and proposed longwalls in Areas 7 and 9.

Table 6.31 Maximum predicted total vertical subsidence, tilt and curvatures for the Aboriginal heritage sites

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})
52-2-4226	275	3.0	0.05	0.01
52-2-4227	475	5.5	0.06	0.01
52-2-3191	< 20	< 0.5	< 0.01	< 0.01
52-2-3192	< 20	< 0.5	< 0.01	< 0.01
52-2-3194	< 20	< 0.5	< 0.01	< 0.01
52-2-3687	< 20	< 0.5	< 0.01	< 0.01
52-2-3688	< 20	< 0.5	< 0.01	< 0.01
52-2-4508	< 20	< 0.5	< 0.01	< 0.01
52-2-4630	70	0.5	0.01	< 0.01

Sites 52-2-4226 and 52-2-4227 are located directly above the western end of LW711. The maximum predicted total tilt for these two sites is 5.5 mm/m (i.e. 0.55 %, or 1 in 182). The maximum predicted total conventional curvatures are 0.06 km^{-1} hogging and 0.01 km^{-1} sagging, which represent minimum radii of curvature of 17 km and 100 km, respectively.

The maximum predicted conventional strains for Sites 52-2-4226 and 52-2-4227, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and less than 0.5 mm/m compressive. The distribution of the predicted strains due to the extraction of the longwalls is described in Section 4.3. The maximum predicted strains directly above the mining area are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

Non-conventional movements can also occur and have occurred in the NSW coalfields as a result of, amongst other things, anomalous movements. The analysis of strains provided in Chapter 4 includes those resulting from both conventional and non-conventional anomalous movements.

The remaining sites are located at distances varying between 180 m and 600 m outside the proposed mining area. Site Ref. 52-2-4630 is predicted to experience 70 mm vertical subsidence and the remaining sites are predicted to experience less than 20 mm vertical subsidence due to the proposed mining. The maximum predicted strains outside the mining area are 0.6 mm/m tensile and 0.4 mm/m compressive based on the 95 % confidence levels.

The Aboriginal heritage sites are located on the valley sides of the streams. These sites are unlikely therefore to experience the valley-related upsidence or the compressive strain due to valley closure that occur near the valley base.

6.20.3. Impact assessments for the Aboriginal heritage sites

The Aboriginal heritage sites within the Study Area comprise open sites. Surface cracking could develop above the proposed longwalls. Fracturing of exposed bedrock could also occur along the streams at distances up to approximately 400 m outside the proposed mining area.

It is unlikely that the artefacts and deposits themselves would be impacted by surface cracking. It is possible, however, that if remediation of the surface were required after mining, that these works could potentially impact the Aboriginal heritage sites.

Further assessments of the potential impacts on the Aboriginal heritage sites is provided by the specialist heritage consultant on the project (Biosis, 2021).

6.20.4. Recommendations for the Aboriginal heritage sites

It is recommended that IMC develop an Aboriginal Heritage Management Plan in consultation with the registered parties for the Aboriginal heritage sites.

6.21. Survey control marks

The locations of the survey control marks are shown in Drawing No. MSEC1117-14. The locations and details of the survey control marks were obtained from *Spatial Services* using the *SCIMS Online* website (SCIMS, 2020).

Survey control marks are located across the Study Area. The marks located directly above the proposed mining area could experience the full range of predicted movements. The marks located outside the mining area could experience far-field vertical and far-field horizontal effects.

It is possible that the survey control marks could be affected by far-field horizontal movements at distances of 1 km to 2 km outside the extents of the proposed longwalls. Far-field horizontal movements and the methods used to predict such movements are described further in Sections 3.3 and 4.5.

It is recommended that the survey control marks that are required for future use are re-established after the completion of mining in the area and after the ground has stabilised. Consultation between IMC and Spatial Services will be required to ensure that these survey control marks are reinstated at the appropriate time, as required.

6.22. Houses

6.22.1. Descriptions of the houses

The locations of the houses are shown in Drawing No. MSEC1117-13.

There are 177 houses that have been identified within the Study Area. The details of the houses are included in Table D.01, in Appendix D. The locations, sizes, and construction details of the houses were determined from aerial photographs of the area, kerbside inspections and *Google Street View®*.

A summary of the locations of the houses within the Study Area is provided in Table 6.32.

Table 6.32 Locations of the houses within the Study Area

Type	Number located above the existing and approved longwalls	Number located above the proposed LW709 to LW711 and LW905	Number located outside the mining area
Houses	30	76	71

There are 106 houses (i.e. 60 %) that are located above the existing and proposed longwalls and 71 houses (i.e. 40 %) that are located outside the mining area.

Maximum plan dimension, plan area and height

Distributions of the maximum plan dimensions and plan areas of the houses within the Study Area are provided in Fig. 6.32. The majority of the houses have maximum dimensions between 10 m and 40 m, with an average value of approximately 26 m. The majority of the houses have plan areas between 200 m^2 and 500 m^2, with an average value of approximately 350 m^2.

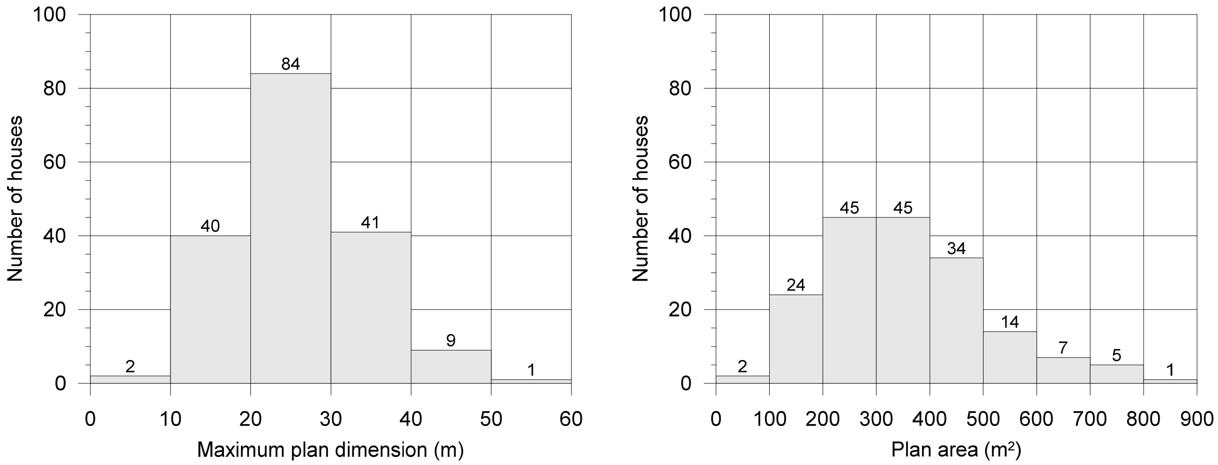

Fig. 6.32 Distribution of houses by maximum plan dimension (left-side) and plan area (right-side)

The houses have been categorised into four groups, on the basis of their maximum plan dimension and the number of stories. A summary of these house type categories is provided in Table 6.33. It is noted that two-storey houses include split-level houses.

Table 6.33 House type categories

House Type	Description	Number	Percentage
H1	Single-storey with maximum plan dimension less than 30 m	108	61 %
H2	Single-storey with maximum plan dimension of 30 m or greater	47	27 %
H3	Two-storey with maximum plan dimension less than 30 m	13	7 %
H4	Two-storey with maximum plan dimension of 30 m or greater	9	5 %

Type of construction

Distributions of the wall and footing constructions of the houses within the Study Area are provided in Fig. 6.33. The majority of the houses within the Study Area comprise brick or brick-veneer structures founded on slabs on ground. There are 39 houses with unknown wall constructions and 31 houses with unknown footing constructions. The impact assessments have conservatively adopted brick structures on strip footings for these houses.

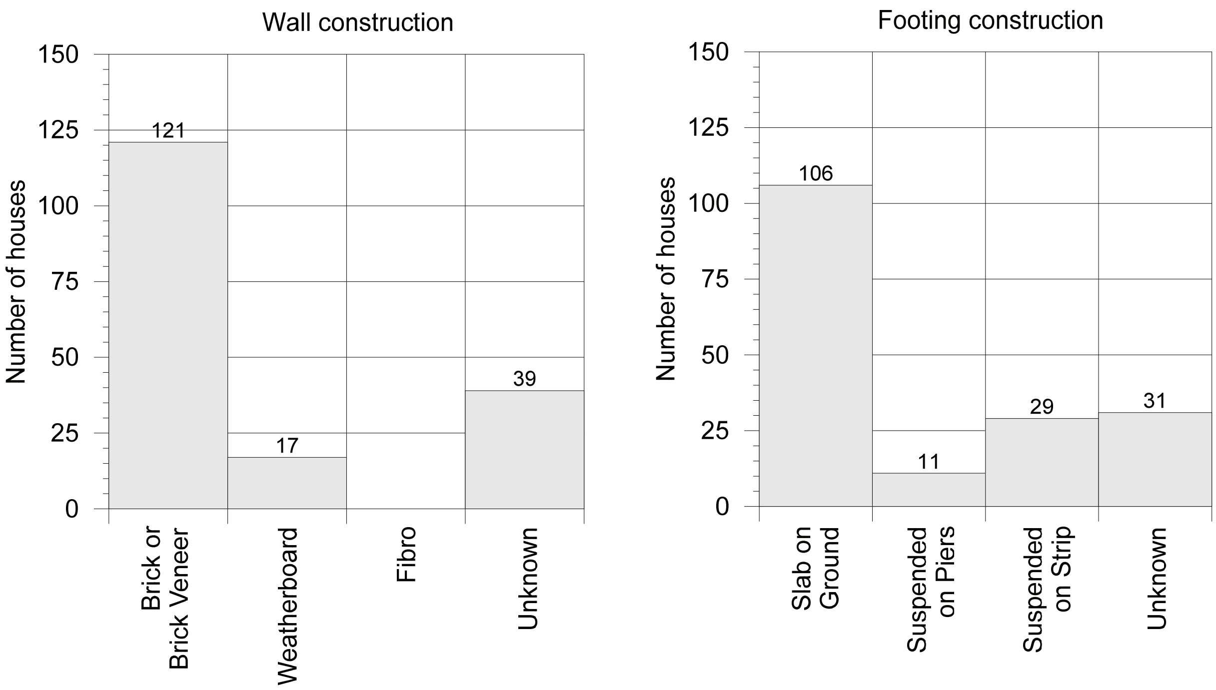

Fig. 6.33 Distributions of wall and footing construction for houses within the Study Area

Following a review of impacts to houses due to longwall mining in the Southern Coalfield, it was found that there was a noticeable difference in structural performance in response to mine subsidence movements between the following construction types:

- brick or brick-veneer houses constructed on a ground slab;
- brick or brick-veneer houses constructed on strip footings; and
- weatherboard or fibro houses constructed on either ground slabs or strip footings.

A summary of houses by construction type is provided in Table 6.34. It is noted that some houses have been constructed with masonry walls at basement level, with weatherboard linings for the main living areas above. These houses have been reported as brick in Table 6.34.

Table 6.34 Distribution of houses by construction type

Description	Number	Percentage
Brick or brick-veneer houses constructed on a ground slab	91	51 %
Brick or brick-veneer houses constructed on strip footings	69	39 %
Weatherboard or fibro houses constructed on either ground slabs or strip footings or other	17	10 %

Age of houses

The ages of the houses have been determined by examination of a series of historical aerial photographs provided by Land and Property Information, IMC and Nearmap. The photographs that were available over the Study Area were taken from 1955 to 2020.

A histogram showing the distribution of houses by age is shown in Fig. 6.34.

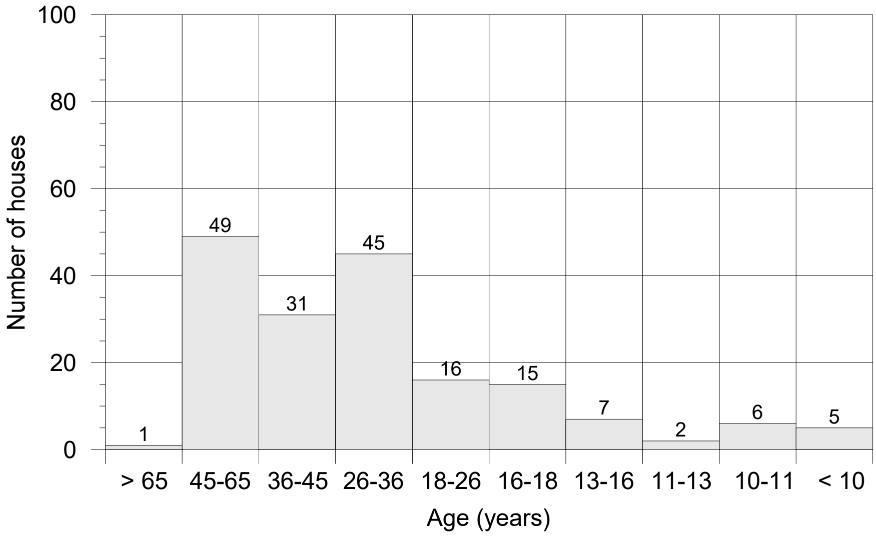

Fig. 6.34 Distribution of houses by age

Houses on steep slopes

Houses are located on or near steep slopes within the Study Area. These include houses at the top and near the base of Razorback Range in the western part of the Study Area. There are also other houses located on or near steep slopes in the eastern part of the Study Area.

The houses located on or within 25 m of the steep slopes are shown in Table D.01, in Appendix D. The locations of these houses are shown in Drawing No. MSEC1117-02. There are 77 houses within the Study Area located on or near the steep slopes, of which 26 are located at the tops, 23 are located on the sides and 28 are located near the bases.

The distribution of the maximum natural surface grades within 25 m of each of the houses within the Study Area is illustrated in Fig. 6.35.

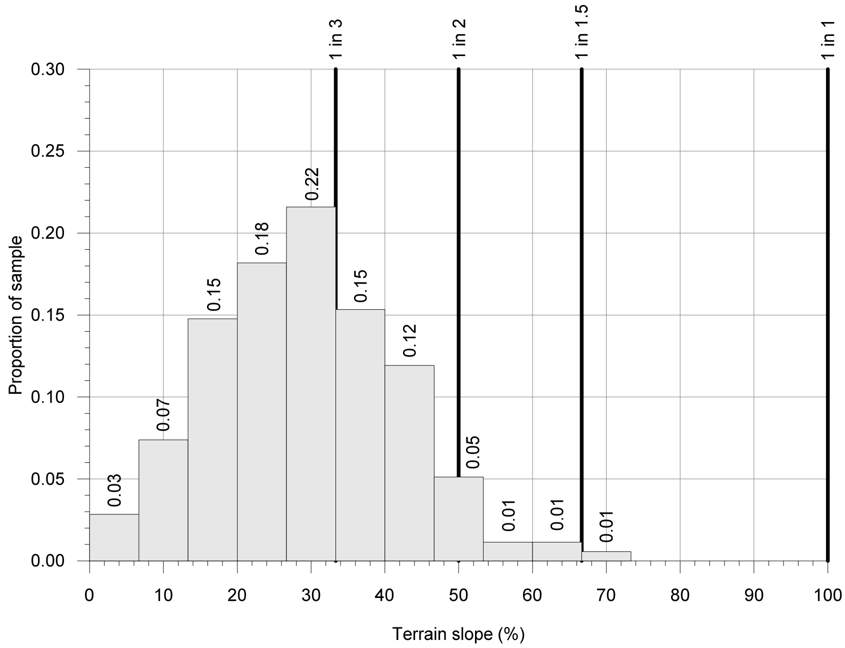

Fig. 6.35 Distribution of the maximum natural surface grades within 25 m of each of the houses within the Study Area

The maximum natural grades for 114 houses (i.e. 65 % of cases) are less than 1 in 3, i.e. less than the value used to define steep slopes. These houses therefore are not considered to be in close proximity to steep slopes. The maximum natural grades for the remaining houses are between 1 in 3 and 1 in 2 for 52 houses (i.e. 30 % of cases), between 1 in 2 and 1 in 1.5 for 9 houses (i.e. 5 % of cases) and greater than 1 in 1.5 for 1 house (i.e. 1 % of cases).

A summary of the 10 houses that are located within 25 m of steep slopes with natural grades of 1 in 2 or greater is provided in Table 6.35.

Table 6.35 Houses located within 25 m of steep slopes with natural grades of 1 in 2 or greater

Reference	Location	Steep slopes within 25 m of house	
		Maximum natural grade (%)	Location relative to steep slope
D44a	Above LW708A	52	On
F06h01	Outside mining area	56	Top
F42a	Outside mining area	68	Bottom
F51h01	Outside mining area	51	On
N15h01	Above LW904	51	Bottom
N16h01	Above LW904	66	Bottom
O08h01	Above LW711	58	Top
O17h01	Above LW710A	51	Top
R01h01	Outside mining area	64	Top
S11h01	Outside mining area	52	On

There are five houses within the Study Area that are located directly above the proposed longwalls and are within 25 m of steep slopes with natural grades of 1 in 2 or greater. Two of these houses (Refs. O08h01 and O17h01) are located at the tops of the steep slopes, one house (Ref. D44a) is located on the steep slope and two houses (Refs. N15h01 and N16h01) are located at the bottoms of the steep slopes.

The remaining five houses (Refs. F06h01, F42a , F51h01, R01h01 and S11h01) are located outside the proposed mining area.

Houses outside declared Mine Subsidence Districts

The locations of the declared Mine Subsidence Districts (MSD) are shown in Drawing No. MSEC1117-13.

There are 164 housed (i.e. 93 %) that are located within the Wilton MSD, which was declared on the 7 November 1979. The remaining 13 houses (i.e. 7%) are located within the South Campbelltown MSD, which was declared on 30 June 1976.

It is estimated that less than 10 % of houses within the Study Area were constructed prior to the declarations of the Wilton MSD and South Campbelltown MSD. The hazard associated with these houses is that they may be less tolerant to mine subsidence movements as their designs have not been checked and approved by SA NSW (formally the Mine Subsidence Board). Some older houses may also be in poor condition. Many of the houses are constructed with timber frames and weatherboard panels or fibro sheets.

The analysis of impacts to structures as part of ACARP Research Project C12015 did not find any significant correlation between the rate of impact and structure age. In any case, IMC will conduct a building and/or structural inspection of the houses (where access is allowed) that were constructed prior to the declaration of the mine subsidence districts and that are predicted to experience more than 20 mm of subsidence due to the extraction of the proposed longwalls.

6.22.2. Predictions for the houses

Predictions of conventional vertical subsidence, tilt and curvature have been made at the centroid and at the vertices of each house, as well as eight equally spaced points placed radially around the centroid and vertices at a distance of 20 m. In the case of a rectangular shaped structure, predictions have been made at a minimum of 45 points within and around the structure.

The maximum predicted values of total vertical subsidence, tilt and curvature for each of the houses within the Study Area are included in Table D.02, in Appendix D. The predicted tilts represent the maximum values in any direction after the completion of each of the proposed LW709 to LW711 and LW905. The predicted curvatures represent the maximum values in any direction at any time during or after the extraction of each of the proposed longwalls.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvatures for the houses is provided in Table 6.36. The table provides the maximum predicted values for the houses at any time during or after the extraction of each longwall.

Table 6.36 Maximum predicted total vertical subsidence, tilt and curvatures for the houses

After longwall	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})
LW709	1375	6.5	0.07	0.13
LW710A	1375	6.5	0.07	0.13
LW710B	1400	6.5	0.07	0.14
LW711	1400	7.0	0.07	0.14
LW905	1400	7.0	0.07	0.14

The maximum predicted tilt for the houses is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted curvatures are 0.07 km^{-1} hogging and 0.14 km^{-1} sagging, which represent minimum radii of curvature of 14 km and 7 km, respectively.

Distributions of the predicted vertical subsidence, tilt and curvatures for the houses within the Study Area are illustrated in Fig. 6.36, Fig. 6.37 and Fig. 6.38.

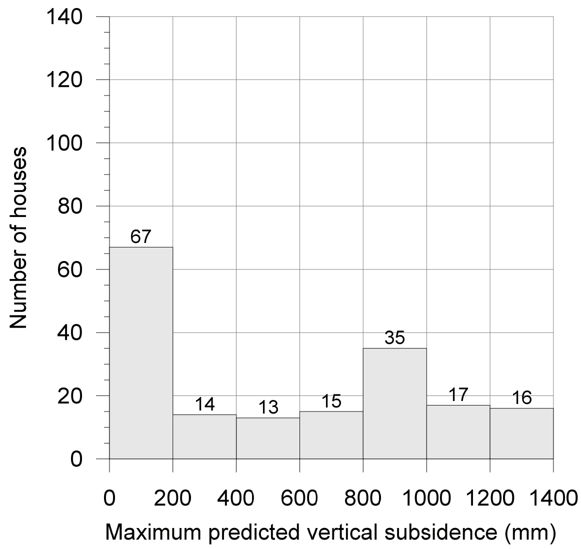

Fig. 6.36 Maximum predicted vertical subsidence for the houses

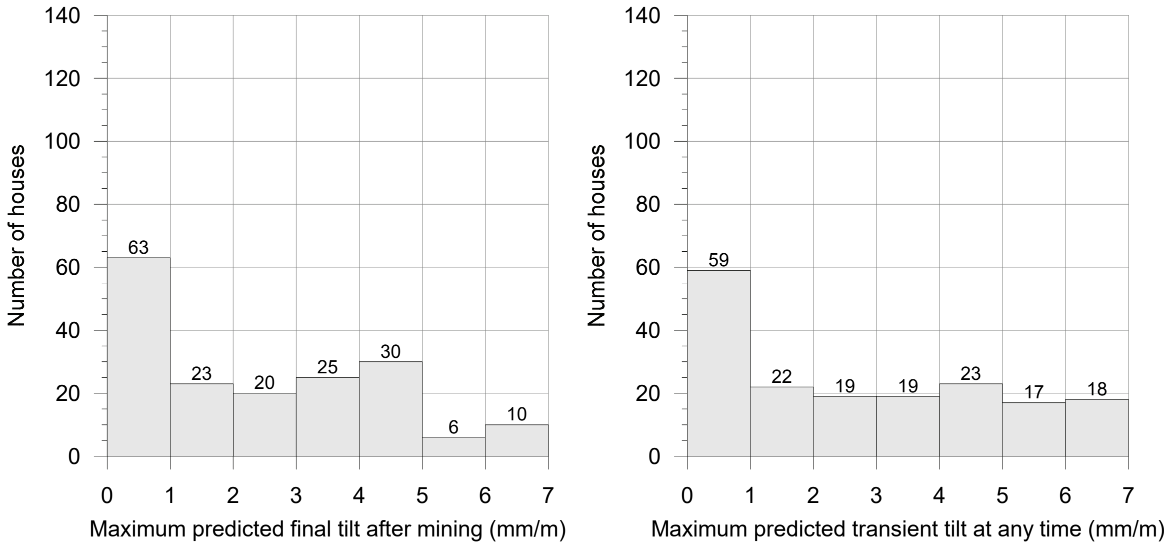

Fig. 6.37 Maximum predicted final tilt (left-side) and transient tilt (right-side) for the houses

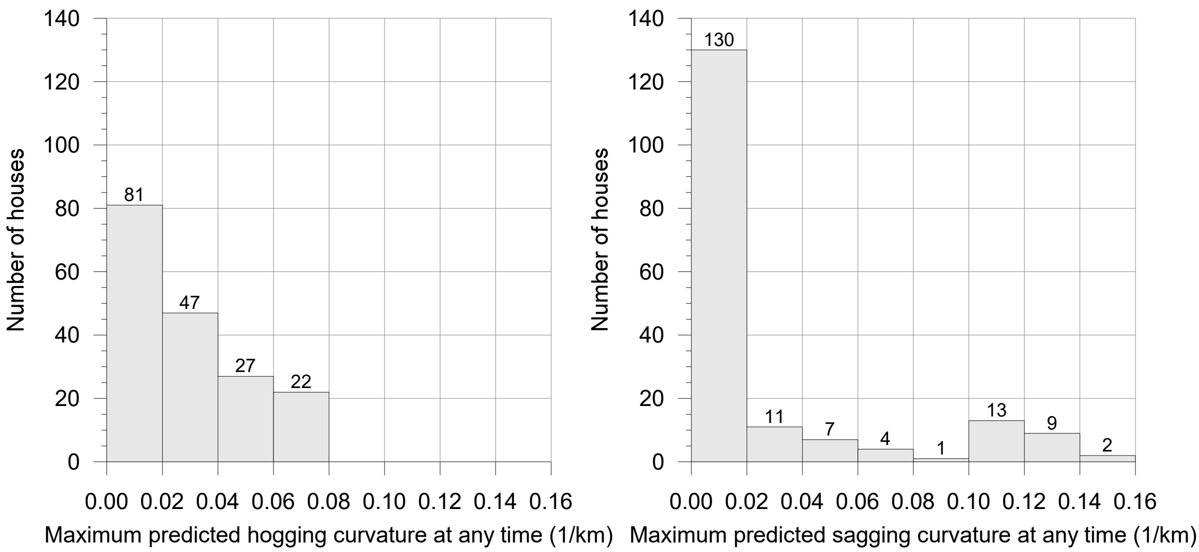

Fig. 6.38 Maximum predicted hogging curvature (left-side) and sagging curvature (right-side) at any time for the houses

The maximum predicted conventional strains for the houses, based on applying a factor of 15 to the maximum predicted conventional curvatures, are 1.0 mm/m tensile and 2.0 mm/m compressive. Higher strains could develop at the houses due to irregular ground movements or topographic effects.

The predicted distributions of strain due to the extraction of LW709 to LW711 and LW905 are described in Chapter 4. The houses are at discrete locations and, therefore, the most relevant distribution of strain is the maximum strains measured in individual survey bays above previous longwall mining, which is summarised in Section 4.3.1. The maximum predicted total strains directly above the proposed longwalls are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

The strains have been predicted for each of the houses using the method described by Barbato (2017). This method considers the position of each house relative to the longwalls, the surface slope, surface lithology and the potential for irregular anomalous movements.

The predicted total strains for each of the houses within the Study Area are provided in Table D.02, in Appendix D. The distributions of the predicted total strains based on the mean and on the 95 % confidence levels are provided in Fig. 6.39 and Fig. 6.40, respectively.

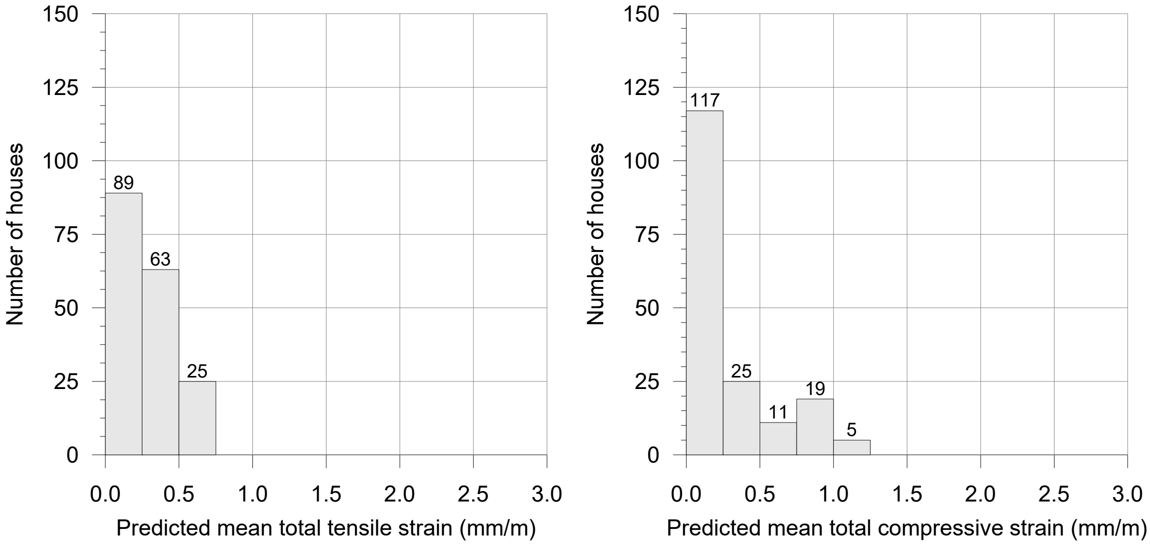

Fig. 6.39 Predicted total tensile strain (left-hand side) and total compressive strain (right-hand side) for the houses based on the mean

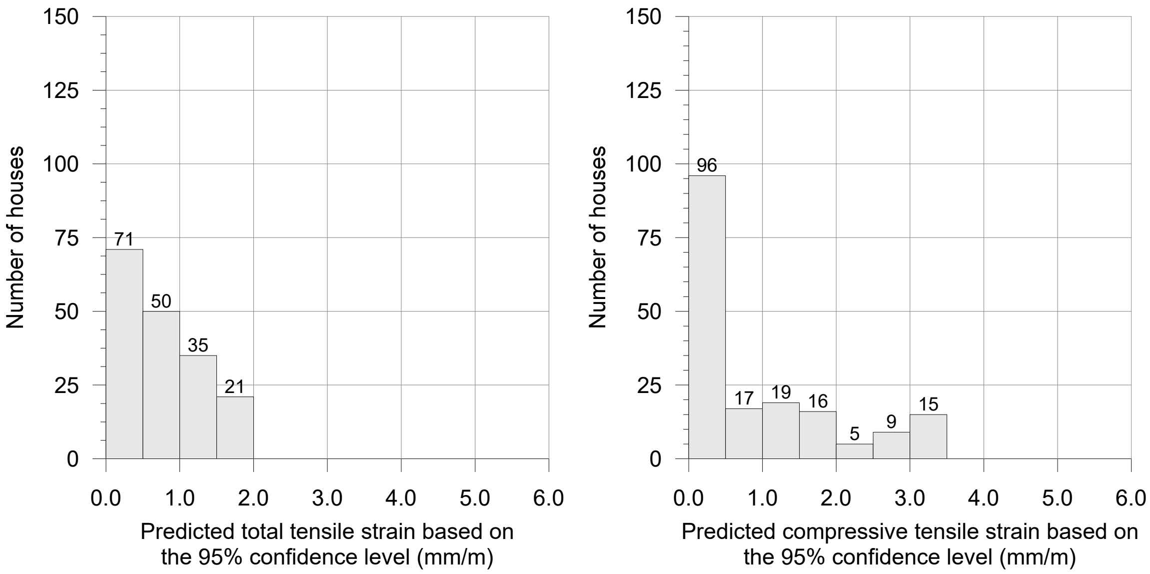

Fig. 6.40 Predicted total tensile strain (left-hand side) and total compressive strain (right-hand side) for the houses based on the 95 % confidence level

The houses within the Study Area are predicted to experience total tensile strains between 0.2 mm/m and 1.7 mm/m and total compressive strains between 0.2 mm/m and 3.5 mm/m based on the 95 % confidence levels. The predicted mean values range between 0.2 mm/m and 1.0 mm/m tensile and compressive.

6.22.3. Reported impacts for houses at Appin Area 7

The existing LW702 to LW708A have mined directly beneath 37 houses and there is an additional 52 houses located outside the mining area and within the 35° angle of draw. The impacts to these houses due to this existing mining should provide a guide to the potential impacts due to the proposed longwalls.

IMC has provided MSEC with details of the damage to houses that has been reported to them due to the mining of LW702 to LW708A. There are 20 claims that relate to damage of the houses that have been categorised into repair categories R0 to R5, as described in Appendix B.

A summary of the reported impacts for houses due to LW702 to LW708A is provided in Table 6.37.

Table 6.37 Reported impacts for the houses due to LW702 to LW708A

Location	Repair category			
	No Claim or R0	R1 or R2	R3 or R4	R5
Houses directly above the mining area (37 total)	49 % (18 houses)	24 % (9 houses)	22 % (8 houses)	5 % (2 houses)
Houses outside the mining area and within the 35° angle of draw (52 total)	98 % (51 houses)	2 % (1 house)	0 % (0 houses)	0 % (0 houses)
All houses within the 35° angle of draw (89 total)	78 % (69 houses)	11 % (10 houses)	9 % (8 houses)	2 % (2 houses)

It has been reported that 78 % of houses experienced Nil or Category R0 impacts, being 18 of the 37 houses located above the mining area and 51 of the 52 houses located outside the mining area. There were 10 houses (i.e. 11 %) that experienced Category R1 or R2 impacts, of which 9 were located above the longwalls and 1 was outside the mining area. There were also 8 houses (i.e. 9 %) that experience Category R3 or R4 impacts and 2 houses (i.e. 2 %) that experienced Category R5 impacts, all of which were located above the mining area.

In all cases, the houses remained in safe and serviceable conditions. The property owners were not exposed to immediate or sudden safety hazards due to the mining of LW702 to LW708A.

6.22.4. Impact assessments for the Houses

The following sections provide the impact assessments for the houses within the Study Area.

Potential impacts resulting from vertical subsidence

Vertical subsidence does not directly affect the stability or serviceability of houses. The potential for impacts on houses is affected by differential subsidence, which includes tilt, curvature and strain, and the impact assessments based on these parameters are described in the following sections.

Vertical subsidence can, in some cases, affect the heights of houses above the flood level. A detailed surface water assessment has been carried out by the special consultant on the project (SLR, 2020).

Potential impacts resulting from tilt

The maximum predicted tilt for the houses within the Study Area is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). The distribution of predicted final tilts for the houses within the Study Area is provided in Fig. 6.41. The greatest tilts occur at the houses located adjacent to the maingates of the existing and proposed longwalls.

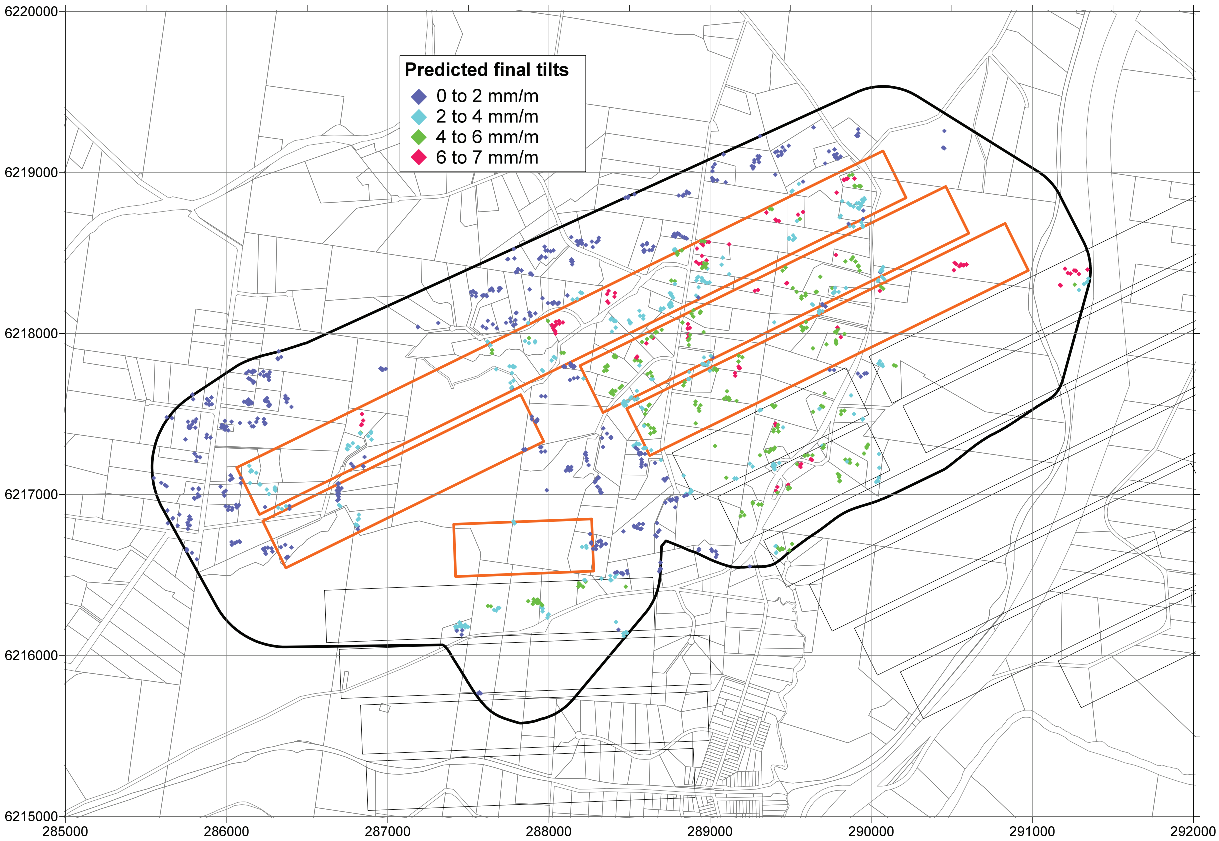

Fig. 6.41 Distribution of predicted final total tilts for the houses within the Study Area

It has been found from past longwall mining experience that tilts of 7 mm/m or less generally do not result in adverse impacts on houses. Some minor serviceability impacts can occur at these levels of tilt, including door swings and issues with roof gutter and wet area drainage, all of which can be remediated using normal building maintenance techniques.

It is expected, therefore, that only minor serviceability impacts would occur for the houses within the Study Area as a result of the mining-induced tilt. It is possible, however, that more substantial serviceability impacts could develop at some houses, as a result of non-conventional ground movements, which could require the relevelling of wet areas or, in some cases, the relevelling of parts of the building structures.

It is expected that, in all cases, the houses within the Study Area will remain in safe and serviceable condition as a result of the mining induced tilts, as tilts by themselves rarely impact on the stability of building structures at the levels that are predicted to occur.

Potential impacts resulting from curvature and strain

It has been found from past longwall mining experience that the majority of impacts on houses are a result of the mining-induced curvature and strains. The maximum predicted curvatures for the houses within the Study Area are 0.07 km^{-1} hogging and 0.14 km^{-1} sagging, which represent minimum radii of curvatures of 14 km and 7 km, respectively.

The distributions of the maximum predicted total hogging and sagging curvatures for the houses within the Study Area are provided in Fig. 6.42 and Fig. 6.43. The greatest predicted hogging curvatures occur adjacent to the maingates and the greatest predicted sagging curvatures occur near the centrelines of the existing and proposed longwalls.

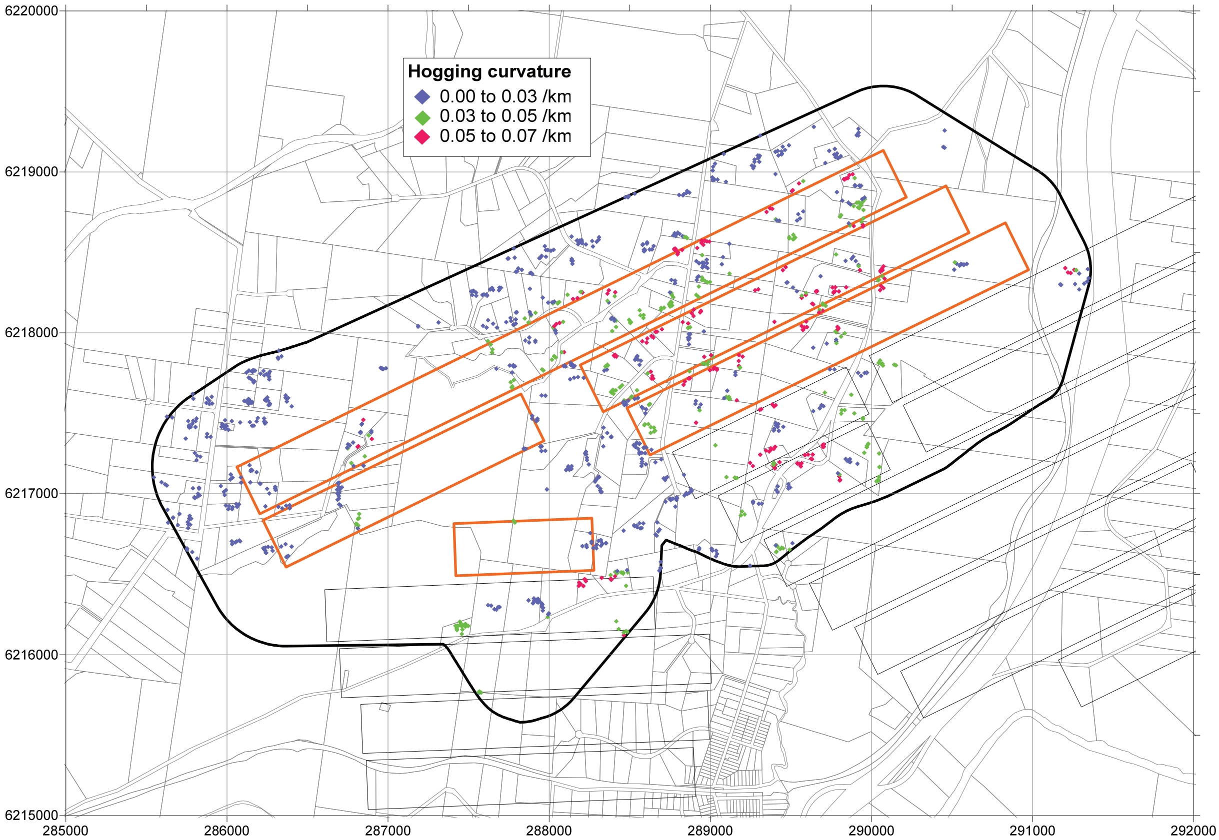

Fig. 6.42 Distribution of maximum predicted total hogging curvature for the houses within the Study Area

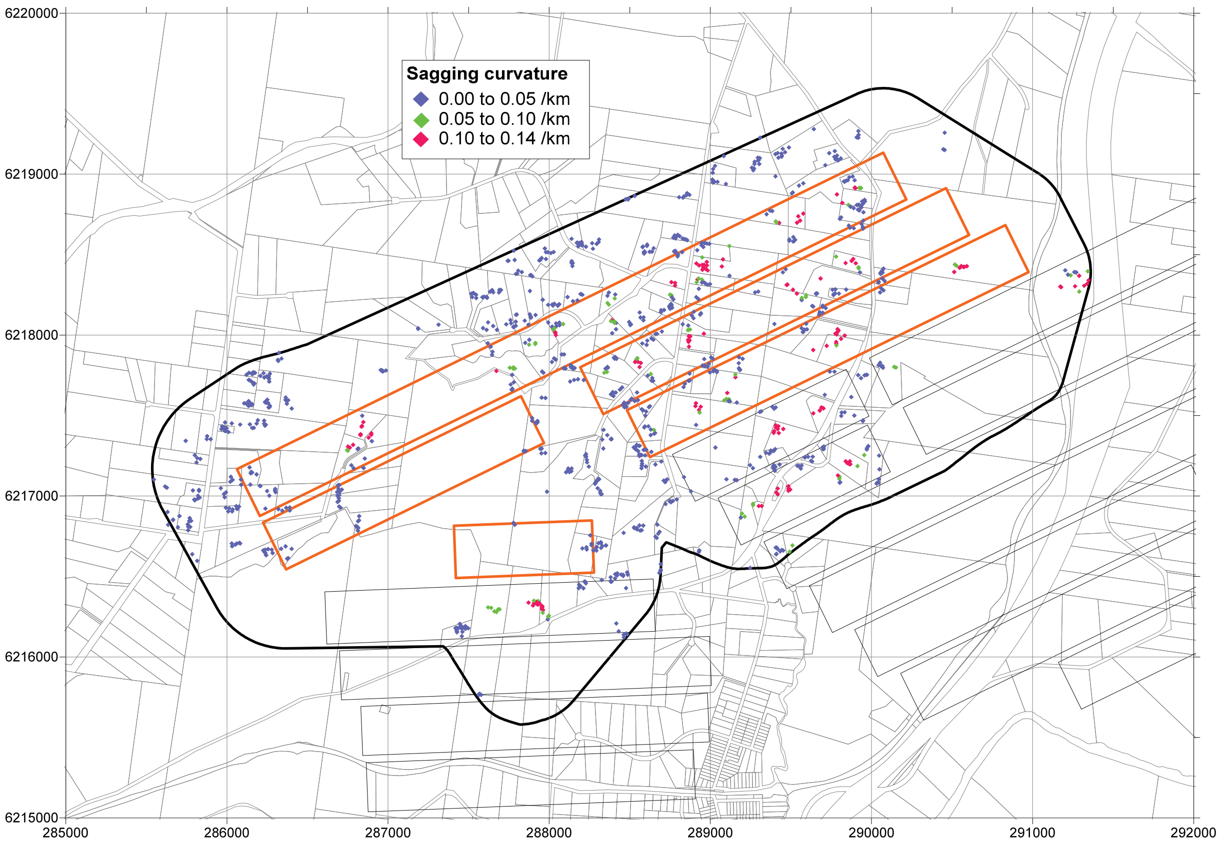

Fig. 6.43 Distribution of maximum predicted total sagging curvature for the houses within the Study Area

Building structures have been directly mined beneath at a number of collieries throughout the NSW coalfields. The experience gained has provided substantial information that has been used to continually develop the methods of impact assessment for houses. The assessments provided in this report are based on the latest research, which is summarised in Appendix B.

The probabilities of impacts for each house 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 observations of impacts in the Southern Coalfield up to 2016. This method uses the primary parameters of predicted ground curvature and type of construction for each house, as identified and described in Section 6.22.1.

Trend analyses following the mining of longwalls in the Southern Coalfield indicate that the chance of impact is higher for the following houses:

- houses predicted to experience higher strains and curvatures;
- houses with masonry walls;
- masonry walled houses that are constructed on strip footings;
- larger houses; and
- houses with variable foundations, such as those with extensions added.

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 observations of impacts in the Southern Coalfield up to 2016. This method uses the primary parameters of ground curvature and type of construction and is described in Appendix B. The parameter of strain is indirectly used in this method due to its relationship with curvature.

The maximum natural grades within 25 m of each of the houses within the Study Area are less than 1 in 3 for 65 % of cases, between 1 in 3 and 1 in 2 for 30 % of cases and greater than 1 in 2 in 5 % of cases. The natural grades in close proximity to the houses within the Study Area are reasonably similar to those where houses have been directly mined beneath elsewhere in the Southern Coalfield. The ACARP method for assessing impacts on houses should therefore provide a reasonable indication of the overall levels of potential impact for the houses within the Study Area. However, some houses that are located on or near the steep slopes could experience higher impacts and this is discussed separately in Section 6.22.5.

A summary of the maximum predicted subsidence effects and the assessed impacts for the houses within the Study Area is provided in Table D.03, in Appendix D. The overall distribution of the assessed impacts for the houses within the Study Area is provided in Table 6.38. The assessments have been conservatively based on all houses comprising brick structures on strip footings.

Table 6.38 Assessed impacts for the houses within the Study Area

Location	Repair category			
	No Claim or R0	R1 or R2	R3 or R4	R5
Houses directly above the mining area (103 total)	50 % ~ 60 %	25 % ~ 31 %	11 % ~ 15 %	3 % ~ 5 %
Houses outside the mining area (71 total)	83 % ~ 93 %	6 % ~ 12 %	1 % ~ 5 %	0 % ~ 1 %
All houses within the Study Area (175 total)	63 % ~ 73 %	17 % ~ 23 %	7 % ~ 11 %	2 % ~ 3 %

The repair categories R0 to R5 are described in Appendix B.

It has been assessed that approximately 63 % to 73 % of the houses within the Study Area will experience Nil or Category R0 impacts, approximately 17 % to 23 % will experience Category R1 or R2 impacts, approximately 7 % to 11 % will experience Category R3 or R4 impacts and approximately 2 % to 3 % will experience Category R5 impacts.

The reported impacts to houses due to the mining of LW702 to LW708A is described in Section 6.22.3. There were 89 houses located within the 35° angle of draw, of which, 78 % experienced Nil or Category R0 impacts, 11 % experienced Category R1 or R2 impacts, 9 % experienced Category R3 or R4 impacts and 2 % experienced Category R5 impacts.

The assessed impacts for the houses within the Study Area due to the proposed LW709 to LW711 and LW905 are similar to that reported for the existing LW702 to LW708A. While the assessed rate for minor impacts (i.e. R1 or R2) is greater for the proposed longwalls, the assessed rates for major impacts (i.e. R3, R4 or R5) are similar.

Severe impacts have previously occurred as a result of substantial non-conventional movements and in plateau areas away from incised valleys, the locations of which cannot be predicted prior to mining. The impacts, however, develop gradually such that they can be detected early and repairs can be undertaken incrementally to ensure that the houses remain safe and serviceable during mining.

As noted in Appendix B, at the time of writing ACARP Research Project C12015, the observed proportion of houses where SA NSW and affected landowners had decided to rebuild rather than repair (Category R5) impacts was less than 0.5 %. Since the publication of the research report, the proportion of houses where a decision has been made to rebuild has increased to approximately 0.7 %.

The observed proportion of houses with Category R1 to R4 impacts have also increased since the original ACARP study. This is partly due to the time lag effect between the mining impact, when damage is claimed by residents and when the nature and level of the damage requiring repairs is assessed in detail by SA NSW. The latest review includes observations up to the end of Tahmoor Longwall 29 in 2016, which was approximately two years after the completion of Tahmoor Longwall 27 and one year after the completion of Longwall 28, which was the last panel to directly mine beneath the urban areas of Tahmoor.

The primary risk associated with mining beneath houses is public safety. Historically, residents have not been exposed to immediate and sudden safety hazards as a result of impacts that occur due to mine subsidence movements in the NSW coalfields, where the depths of cover were greater than 400 m, such as the case above the proposed longwalls.

Emphasis is placed on the words “immediate and sudden” as in rare cases, some structures have experienced severe impacts, but the impacts did not present an immediate risk to public safety as they developed gradually with ample time for residents to relocate.

All houses within the Study Area are expected to remain safe throughout the mining period, provided that effective management measures are adopted during mining and these are described in the following section.

6.22.5. Houses located on or near steep slopes

Houses are located on or near steep slopes within the Study Area. These include houses at the top and near the base of Razorback Range in the western part of the Study Area. There are also other houses located on or near steep slopes in the eastern part of the Study Area.

The houses located on or within 25 m of the steep slopes are shown in Table D.01, in Appendix D. There are 77 houses within the Study Area located on or near the steep slopes, of which 26 are located at the tops, 23 are located on the sides and 28 are located near the bases. The majority of these houses are located on or near steep slopes with natural grades between 1 in 3 and 1 in 2. The assessment method for houses is based on observations of mining beneath houses on steep slopes with similar ranges of grades.

A summary of the 8 houses located at the top of Razorback Range is provided in Table 6.39.

Table 6.39 Houses at the top of Razorback Range and directly above the proposed longwalls

Reference	Location	Maximum predicted total vertical subsidence (mm)	
		After LW710A	After LW711
O03h01	Directly above LW710A	225	600
O04h01	Directly above LW710A	150	625
O05h01	Directly above LW711	60	675
O06h01	Directly above LW711	50	950
O08h01	Directly above LW711	50	925
O17h01	Directly above LW710A	70	160
O18h01	Adjacent to LW711	40	90
O18h02	Adjacent to LW711	30	80

The steep slopes on Razorback Range could experience increased horizontal movements in the downslope direction, causing tension cracks to appear at the tops and along the sides of the slopes and compression ridges to form at the bottoms of the slopes. The houses located at the top of Razorback Range could experience increased effects due to the potential for non-conventional ground movements.

A Landslide Risk Assessment (LRA) for the proposed LW709 to LW711 and LW905 has been carried out by GHD (2021d). The key conclusion of the LRA is that the "*results of the preliminary investigations indicate that the structures located on the identified steep slopes should be able to be effectively managed, using the techniques and management tools available and previously employed in similar geotechnical circumstances, to permit Appin Mine to extract the proposed longwalls*".

Geotechnical inspections have been carried out by GHD for three of the properties located at the top of Razorback Range (Refs. O02, O17 and O18). The geotechnical assessment reports (GHD 2021a, 2021b and 2021c) state that:

> "*For the nominated structures, the risk-to-property (in a landslide risk management sense) under current conditions has been appraised as VERY LOW. This risk level is expected to be adopted by a regulator as acceptable.*
>
> *The proposed longwall mining has been judged to produce a minor adverse additional impact upon the assessed risk-to-property estimates across the sites...*" and that
>
> "*The [landslide] risk levels assessed for current conditions, upon which mining related impact are imposed, remain unchanged from the currently existing risk levels.*
>
> *Risk-to-life has been appraised for selected relevant scenarios. The appraised risk-to-life levels were found to be lower than levels that would be ACCEPTABLE to a regulator.*"

GHD (2021d) has categorised other properties within the Study Area into "*those not requiring additional appraisal, those requiring a brief site visit (contingent upon landholder approval for access) to confirm the site setting not observable from the public roadways, to more detailed appraisals for residences in high hazard environments*". GHD (2021d) states that the "*residential sites that require appraisals can be conducted on a longwall-by-longwall basis*" so that "*the hazards can be managed through each subordinate longwall's Structures Management Plan*".

Monitoring has been established for the houses located at the top of Razorback Range for the mining of LW904, as shown in Drawing No. MSEC1117-01.

The existing ground monitoring lines (red points shown on Drawing No. MSEC1117-01) include the: Early Warning Line above the western end of LW904, five monitoring lines on the side of Razorback Range located above and to the north of the maingate of LW904, and far-field 3D monitoring points located at the top of Razorback Range. Monitoring points will also be established around the houses located at the top of Razorback Range, subject to the approval of the individual property owners.

There are existing Global Navigation Satellite System (GNSS) units (blue points shown on Drawing No. MSEC1117-01) located above the mining area and on the side of Razorback Range, and proposed GNSS units (green points shown on Drawing No. MSEC1117-01) for three properties located at the top of Razorback Range, subject to the approval of the individual property owners.

Further ground monitoring lines and GNSS units will be established for LW709 to LW711 and LW905 as part of the Structures Management Plans for these proposed longwalls.

6.22.6. Management of potential impacts on houses

IMC has extensive experience of mining beneath houses at Appin and West Cliff Collieries. It has developed and acted in accordance with risk management plans to manage potential impacts to residential structures during the mining of LW701 to LW708 and LW901 to LW903.

The Subsidence Management Process has been developed in consideration of the following facts and observations:

1. Australian standards have been available for use in the design of structures since 1948. The majority of the houses within the Study Area have been constructed within and after the declaration of the Wilton MSD and South Campbelltown MSD;
2. there is sufficient redundancy in structural design such that ductile deformation will develop and be noticeable to residents before structural failure occurs;
3. subsidence movements develop gradually over time at Appin Colliery as they have above other previously extracted longwalls at similar depths of cover;
4. experiences during the mining at Appin Colliery and other collieries in the Southern Coalfield have found that the most effective method of managing potential impacts on the safety and serviceability of structures are by way of community consultation. Residents living within the active subsidence zone have often provided early feedback to Appin Colliery and/or SA NSW about impacts developing at their houses or along their local roads. Contact is made well before impacts develop to a level of severity sufficient to become a safety hazard;
5. on the basis of the above, there is sufficient time for residents to notify IMC or SA NSW of significant displacement or deflection well before structural failure will occur;

6. the conclusions are supported by the observation that residents have not been exposed to immediate and sudden safety hazards as a result of impacts that occur due to mine subsidence movements at Appin Colliery or other collieries in the Southern Coalfield at similar depths of cover. This includes the recent experience at Tahmoor Mine during the mining of Longwalls 22 to 32, which have affected more than 2000 houses and civil structures; and
7. while severe impacts have developed during mining, there is sufficient redundancy in structural design such that when structures have experienced severe impacts, they have developed gradually with ample time for residents to notify IMC or SA NSW to repair the structure and/or relocate residents before structural failure occurs.

While the three most important factors in managing risks to public safety are redundancy in structural design, gradual development of subsidence movements and an effective community consultation program, a number of additional management measures have been undertaken, including site specific investigations, regular surveys and inspections during mining and triggered response measures.

With appropriate management plans in place, it is considered that the houses will remain safe at all times during the extraction of the proposed longwalls, even if actual subsidence movements were greater than the predictions or substantial non-conventional movements occurred.

Impacts to the houses would be repaired or, if required, replaced in accordance with the *Coal Mine Subsidence Compensation Act 2017*.

6.23. Associated residential structures

6.23.1. Non-residential building structures

The descriptions, predictions and impact assessments for the rural structures are provided in Section 6.13.

6.23.2. Swimming pools

The locations of the swimming pools are shown in Drawing No. MSEC1117-13.

There are 70 privately owned swimming pools that have been identified within the Study Area. Details of the pools are included in Table D.01, in Appendix D. A summary of the swimming pools within the Study Area is provided in Table 6.40.

Table 6.40 Details of the swimming pools within the Study Area

Type	Number located above the existing and approved longwalls	Number located above the proposed LW709 to LW711 and LW905	Number located outside the mining area
Pools	9	26	35

There are 35 pools (i.e. 50 %) that are located above the existing and proposed longwalls and 35 pools (i.e. 50 %) that are located outside the mining area.

Predictions of conventional subsidence, tilt and curvature have been made at the centroid and around the perimeters of each pool. A summary of the maximum predicted values of conventional subsidence, tilt and curvature for each pool within the Study Area is provided in Table D.02, in Appendix D.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvatures for the swimming pools is provided in Table 6.41. The table provides the maximum predicted values for the pools at any time during or after the extraction of each longwall.

Table 6.41 Maximum predicted total vertical subsidence, tilt and curvatures for the pools

After longwall	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})
LW709	1300	5.5	0.06	0.12
LW710A	1300	5.5	0.06	0.12
LW710B	1375	5.5	0.06	0.12
LW711	1375	7.0	0.07	0.12
LW905	1375	7.0	0.07	0.12

The maximum predicted tilt for the pools is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted curvatures are 0.07 km^{-1} hogging and 0.13 km^{-1} sagging, which represent minimum radii of curvature of 14 km and 8 km, respectively.

The predicted distributions of strain due to the proposed mining are described in Chapter 4. The pools are at discrete locations and, therefore, the most relevant distribution of strain is the maximum strains measured in individual survey bays above previous longwall mining, which is summarised in Section 4.3.1. The maximum predicted total strains directly above the proposed longwalls are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

Mining-induced tilts are more noticeable in pools than other structures due to the presence of the water line and the small gap to the edge coping, particularly when the pool lining has been tiled. Skimmer boxes are also susceptible to being lifted above the water line due to mining tilt.

The Australian Standard AS2783-1992 (Use of reinforced concrete for small swimming pools) requires that pools be constructed level ± 15 mm from one end to the other. This represents a tilt of approximately 3.3 mm/m for pools that are 10 metres in length. Australian Standard AS/NZS 1839:1994 (Swimming pools – Pre-moulded fibre-reinforced plastics – Installation) also requires that pools be constructed with a tilt of 3 mm/m or less.

It can be seen from Table D.02, that 20 pools within the Study Area (i.e. 29 % of the total) are predicted to experience final tilts greater than 3 mm/m, at the completion of the proposed longwalls, which is greater than the Australian Standard. It is likely, therefore that these pools would require remediation of the pool copings after the completion of active subsidence. It is possible, if the tilts were fully realised at the pools with the higher predicted tilts, that the final tilts could be difficult to remediate and, in these cases, the pools would need to be rebuilt.

The ranges of predicted maximum curvatures and strains for the pools are similar to those previously experienced at Appin Colliery and other nearby collieries in the Southern Coalfield. The incidence and levels of impacts on the pools within the Study Area, therefore, are expected to be similar to those previously experienced in the Southern Coalfield.

Observations during the mining of Tahmoor Mine Longwalls 22 to 32 have shown that pools, particularly in-ground pools, are more susceptible to severe impacts than houses and other structures. Pools cannot be easily repaired and most of the impacted pools need to be replaced in order to restore them to pre-mining condition or better.

As of June 2017, a total of 157 pools have experienced mine subsidence movements during the mining of Longwalls 22 to 30, of which 141 were located directly above the extracted longwalls. A total of 36 pools have reported impacts, all of which were located directly above the extracted longwalls. This represents an impact rate of approximately 23 %. A higher proportion of impacts have been observed for in-ground pools, particularly fibreglass pools. The majority of the impacts related to tilt or cracking, though in a small number of cases the impacts were limited to damage to skimmer boxes or the edge coping.

In addition to the above, a number of pool gates have been impacted by mine subsidence during the mining of Longwall 22 to 32. While the gates can be easily repaired, the consequence of breaching pool fence integrity is considered to be severe. As a result, with landholder agreement, IMC inspects the integrity of pool fences regularly during the active subsidence period.

Impacts to the pools, fences and gates would be repaired or, if required, replaced in accordance with the *Coal Mine Subsidence Compensation Act 2017*.

6.23.3. Tennis Courts

The locations of the tennis courts are shown in Drawing No. MSEC1117-13.

There are 9 tennis courts that have been identified within the Study Area. Details of the tennis courts are included in Table D.01, in Appendix D. A summary of the tennis courts within the Study Area is provided in Table 6.42.

Table 6.42 Details of the tennis courts within the Study Area

Type	Number located above the existing and approved longwalls	Number located above the proposed LW709 to LW711 and LW905	Number located outside the mining area
Tennis Courts	1	6	2

There are 7 tennis courts (i.e. 78 %) that are located above the existing and proposed longwalls and 2 tennis courts (i.e. 22 %) that are located outside the mining area.

Predictions of conventional subsidence, tilt and curvature have been made at the centroid and around the perimeters of each tennis court. A summary of the maximum predicted values of conventional subsidence, tilt and curvature for each tennis court within the Study Area is provided in Table D.02, in Appendix D.

A summary of the maximum predicted values of total vertical subsidence, tilt and curvatures for the tennis court is provided in Table 6.43. The table provides the maximum predicted values for the tennis courts at any time during or after the extraction of each longwall.

Table 6.43 Maximum predicted total vertical subsidence, tilt and curvatures for the tennis courts

After longwall	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})
LW709	1100	6.0	0.05	0.10
LW710A	1100	6.0	0.05	0.10
LW710B	1275	5.0	0.06	0.12
LW711	1325	7.0	0.07	0.12
LW905	1325	7.0	0.07	0.12

The maximum predicted tilt for the pools is 7.0 mm/m (i.e. 0.7 %, or 1 in 143). The maximum predicted curvatures are 0.07 km^{-1} hogging and 0.12 km^{-1} sagging, which represent minimum radii of curvature of 14 km and 8 km, respectively.

The predicted distributions of strain due to the proposed mining are described in Chapter 4. The tennis courts are at discrete locations and, therefore, the most relevant distribution of strain is the maximum strains measured in individual survey bays above previous longwall mining, which is summarised in Section 4.3.1. The maximum predicted total strains directly above the proposed longwalls are 1.0 mm/m tensile and 1.6 mm/m compressive based on the 95 % confidence levels.

The tennis courts within the Study Area comprise both grass and concrete surfaces. It possible that the maximum predicted curvatures and strains could result in minor cracking in the grass surfaced tennis courts; however, cracking is expected to be minor and easily repairable. It is expected that ground strains of these magnitudes would arch around the concrete tennis courts and not be fully transferred into the pavements. It is possible, that some minor surface cracking could occur in the concrete surfaces, but it is expected to be of a minor nature and easily repairable.

6.23.4. Rigid external pavements

Adverse impacts on rigid external pavements, such as driveways and footpaths, are often reported to SA NSW in the Southern Coalfield. This is because pavements are typically thin relative to their length and width. The design of external pavements is also not regulated by Council or SA NSW.

A study by MSEC of 120 properties at Tahmoor and Thirlmere indicated that 98 % of the properties with external concrete pavements demonstrated some form of cracking prior to mining. These cracks are sometimes difficult to distinguish from cracks caused by mine subsidence. It is therefore uncertain how many claims for damage can be genuinely attributed to mine subsidence impacts.

Impacts to external pavements would be repaired or, if required, replaced in accordance with the *Coal Mine Subsidence Compensation Act 2017*.

6.24. Conclusion

The assessments provided in this report indicate that the assessed levels of impact on the natural and built features can be managed by the preparation and implementation of appropriate management strategies. It should be noted, however, that more detailed assessments of some natural and built features have been undertaken by other specialist consultants, and the findings in this report should be read in conjunction with the findings in all other relevant reports.

7.0 GLOSSARY OF TERMS AND DEFINITIONS

Some of the more common mining terms used in the report are defined below:

Angle of draw	The angle of inclination from the vertical of the line connecting the goaf edge of the workings and the limit of subsidence (which is usually taken as 20 mm of subsidence).
Chain pillar	A block of coal left unmined between the longwall extraction panels.
Cover depth (H)	The depth from the surface to the top of the seam. Cover depth is normally provided as an average over the area of the panel.
Closure	The reduction in the horizontal distance between the valley sides. The magnitude of closure, which is typically expressed in the units of *millimetres (mm)*, is the greatest reduction in distance between any two points on the opposing valley sides. It should be noted that the observed closure movement across a valley is the total movement resulting from various mechanisms, including conventional mining-induced movements, valley closure movements, far-field effects, downhill movements and other possible strata mechanisms.
Critical area	The area of extraction at which the maximum possible subsidence of one point on the surface occurs.
Curvature	The change in tilt between two adjacent sections of the tilt profile divided by the average horizontal length of those sections, i.e. curvature is the second derivative of subsidence. Curvature is usually expressed as the inverse of the **Radius of Curvature** with the units of *1/kilometres (km-1)*, but the value of curvature can be inverted, if required, to obtain the radius of curvature, which is usually expressed in *kilometres (km)*. Curvature can be either **hogging** (i.e. convex) or **sagging** (i.e. concave).
Extracted seam	The thickness of coal that is extracted. The extracted seam thickness is thickness normally given as an average over the area of the panel.
Effective extracted seam thickness (T)	The extracted seam thickness modified to account for the percentage of coal left as pillars within the panel.
Face length	The width of the coalface measured across the longwall panel.
Far-field movements	The measured horizontal movements at pegs that are located beyond the longwall panel edges and over solid unmined coal areas. Far-field horizontal movements tend to be bodily movements towards the extracted goaf area and are accompanied by very low levels of strain.
Goaf	The void created by the extraction of the coal into which the immediate roof layers collapse.
Goaf end factor	A factor applied to reduce the predicted incremental subsidence at points lying close to the commencing or finishing ribs of a panel.
Horizontal displacement	The horizontal movement of a point on the surface of the ground as it settles above an extracted panel.
Inflection point	The point on the subsidence profile where the profile changes from a convex curvature to a concave curvature. At this point the strain changes sign and subsidence is approximately one half of S max.
Incremental subsidence	The difference between the subsidence at a point before and after a panel is mined. It is therefore the additional subsidence at a point resulting from the excavation of a panel.
Panel	The plan area of coal extraction.
Panel length (L)	The longitudinal distance along a panel measured in the direction of mining from the commencing rib to the finishing rib.
Panel width (Wv)	The transverse distance across a panel, usually equal to the face length plus the widths of the roadways on each side.
Panel centre line	An imaginary line drawn down the middle of the panel.
Pillar	A block of coal left unmined.
Pillar width (Wpi)	The shortest dimension of a pillar measured from the vertical edges of the coal pillar, i.e. from rib to rib.

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Shear deformations	The horizontal displacements that are measured across monitoring lines and these can be described by various parameters including; horizontal tilt, horizontal curvature, mid-ordinate deviation, angular distortion and shear index.
Strain	The change in the horizontal distance between two points divided by the original horizontal distance between the points, i.e. strain is the relative differential displacement of the ground along or across a subsidence monitoring line. Strain is dimensionless and can be expressed as a decimal, a percentage or in parts per notation. **Tensile Strains** are measured where the distance between two points or survey pegs increases and **Compressive Strains** where the distance between two points decreases. Whilst mining-induced **strains** are measured **along** monitoring lines, ground **shearing** can occur both vertically, and horizontally **across** the directions of the monitoring lines.
Sub-critical area	An area of panel smaller than the critical area.
Subsidence	The vertical movement of a point on the surface of the ground as it settles above an extracted panel, but, 'subsidence of the ground' in some references can include both a vertical and horizontal movement component. The vertical component of subsidence is measured by determining the change in surface level of a peg that is fixed in the ground before mining commenced and this vertical subsidence is usually expressed in units of *millimetres (mm)*. Sometimes the horizontal component of a peg's movement is not measured, but in these cases, the horizontal distances between a particular peg and the adjacent pegs are measured.
Super-critical area	An area of panel greater than the critical area.
Tilt	The change in the slope of the ground as a result of differential subsidence, and is calculated as the change in subsidence between two points divided by the horizontal distance between those points. Tilt is, therefore, the first derivative of the subsidence profile. Tilt is usually expressed in units of *millimetres per metre (mm/m)*. A tilt of 1 mm/m is equivalent to a change in grade of 0.1 %, or 1 in 1000.
Uplift	An increase in the level of a point relative to its original position.
Upsidence	Upsidence results from the dilation or buckling of near-surface strata at or near the base of the valley. The magnitude of upsidence, which is typically expressed in the units of *millimetres (mm)*, is the difference between the observed subsidence profile within the valley and the conventional subsidence profile which would have otherwise been expected in flat terrain.

APPENDIX A. REFERENCES

References

Barbato (2017). *Development of improved methods for the prediction of horizontal movement and strain at the surface due to longwall coal mining*. James Barbato. PhD thesis, University of New South Wales. http://www.unsworks.unsw.edu.au/UNSWORKS:unsworks_search_scope:unsworks_47542

Biosis (2021). *Appin Longwalls 709, 710A, 710B, 711 and 905. Heritage Impact Assessment*. Biosis Pty Ltd, Project No. 33531, dated April 2021.

BOM, (2020). *Australian Groundwater Explorer*, as viewed in July 2020. Bureau of Meteorology at http://www.bom.gov.au/water/groundwater/explorer/map.shtml

BSO (2011). *Project Approval – Section 75J of the Environmental Planning and Assessment Act 1979*. Application Number: 08_0150, Proponent: BHP Billiton Illawarra Coal Holdings Pty Ltd, Project: Bulli Seam Operations Project.

Cardno (2020). *Memorandum: Twin Bridges over Nepean River at Douglas Park – Review of Effects of Mining at End of LW902*. Cardno, memorandum, dated 6 May 2020.

Cardno (2021). *Aquatic Flora and Fauna Assessment, Appin Area 7&9 Longwalls 709, 710A, 710B, 711 and 905*. Cardno, Reference 59919104, dated April 2021.

DeBono et al. (2014) *A review of the accuracy and reliability of empirical subsidence predictions*. In: Proceedings of the ninth triennial MSTS conference on mine subsidence. Mine Subsidence Technological Society, Vol. 2, pp. 461-472.

DoP (2008). *Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield: Strategic Review*. NSW Department of Planning, July 2008.

DB4YD (2020). Dial Before You Dig search, dated July 2020.

DPIE (2008). *Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield - Strategic Review*. State of New South Wales through the NSW Department of Planning.

DPIE (2012). *Standard and Model Conditions for Underground Mining*. NSW Department of Planning, Industry and Environment. http://www.planning.nsw.gov.au/Portals/0/Development/SSD_-_Draft_Model_Conditions_-_Underground_Mine.pdf

GHD (2021a). *LW709, LW710A, LW710B, LW711, LW904 and LW905 "Steep slopes" Landslide Risk Assessment 5 Gibraltar Drive, Razorback NSW*. GHD report, dated January 2021.

GHD (2021b). *LW709, LW710A, LW710B, LW711, LW904 and LW905 "Steep slopes" Landslide Risk Assessment 8 Gibraltar Drive, Razorback NSW*. GHD report, dated January 2021.

GHD (2021c). *LW709, LW710A, LW710B, LW711, LW904 and LW905 "Steep slopes" Landslide Risk Assessment 10 Gibraltar Drive, Razorback NSW*. GHD report, dated January 2021.

GHD (2021d). *Appin Area 7 and 9 Proposed Longwalls Landslide Risk Assessment relating to Mine Subsidence Influences*. GHD report, dated April 2021.

Jaeger (1969). *Elasticity, fracture and flow*. Springer, 1969.

Kay, D.R. and Waddington, A.A. (2014). *Effects of mine subsidence, geology and surface topography on observed valley closure movements and development of an updated valley closure prediction method*. ACARP Research Project No. C18015, July 2014.

Niche (2021). *Appin – Longwalls 709 to 711 and 905 Biodiversity Impact Assessment*. Niche Environment and Heritage, Project No. 6049, dated April 2021.

Patton and Hendren (1972). *General Report on Mass Movements*. Patton F.D. and Hendren A.J. Second International Congress of Engineering Geology, V-GR1-V-GR57.

SCIMS (2020). *SCIMS – SIX Maps* website, viewed on the 24 July 2020. Spatial Services, NSW Government. https://maps.six.nsw.gov.au/scims.html

SLR (2020). *Appin Mine Extraction Plan Surface Water Assessment Longwalls 709, 710A, 710B, 711 and 905*. SLR Reference: 630.30102-R01-v.6, dated April 2021.

SLR (2021). *Appin Mine Extraction Plan Groundwater Impact Assessment*. SLR Reference: 665.10015.00003-R01-V5.0.docx, dated April 2021.

Waddington, A.A. and Kay, D.R. (2002). *Management Information Handbook on the Undermining of Cliffs, Gorges and River Systems*. ACARP Research Projects Nos. C8005 and C9067, September 2002.

Waddington, A.A. (2009). *ACARP The Prediction of Mining Induced Movements in Building Structures and the Development of Improved Methods of Subsidence Impact Assessment.* ACARP Research Project C12015, March 2009.

APPENDIX B. METHOD OF IMPACT ASSESSMENTS FOR HOUSES

APPENDIX B METHOD OF IMPACT ASSESSMENT FOR HOUSES

B.1. Introduction

The methods for predicting and assessing impacts on building structures have developed over time as knowledge and experience has grown. MSEC has provided predictions and impact assessments for the building structures within the *Study Area* using the latest methods available at this time.

Longwall mining has occurred directly beneath building structures at a number of collieries in the Southern Coalfield, including Appin, West Cliff, Tower and Tahmoor Collieries. The most extensive data has come from extraction of Tahmoor Mine Longwalls 22 to 29, where approximately 1900 houses have experienced subsidence movements. The experiences gained during the mining of these longwalls, as well as longwalls at other collieries in the Southern and Newcastle Coalfields, have provided substantial additional information that has been used to further develop the methods.

The information was initially collected during the mining of Tahmoor Mine Longwalls 22 to 24A and reviewed in two parallel studies, one as part of a funded ACARP Research Project C12015 (Waddington, 2009), and the other at the request of Industry and Investment NSW (now the Department of Planning and Environment – Resources Regulator).

The outcomes of these studies include:-

- Review of the performance of the previous method,
- Recommendations for improving the method of Impact Classification, and
- Recommendations for improving the method of Impact Assessment.

Additional information was collected in 2016 after the completion of Longwall 29 and impact assessments for the houses in this report have been based on the updated information provided. A summary is provided in the following sections.

B.2. Review of the Performance of the Previous Method

The previous method of impact assessment applied predictions of curvature on the overall length of each house to predict a crack width in the external walls that was classified based primarily in accordance with Table C1 of Australian Standard 2870-1996. This method did not include impacts to other elements, finishes or services.

Extensive data on house impacts has come from extraction of Tahmoor Mine Longwalls 22 to 25 and a comparison between predicted and observed impacts is provided in Table B.1. The comparison is based on pre-mining predictions that were provided in SMP Applications for these longwalls and the observations of impacts using the previous method of impact classification. The comparison is based on information up to 30 November 2008. At that point in time, the length of extraction of Longwall 25 was 611 metres.

A total of 1037 houses and civil structures were affected by subsidence due to the mining of Tahmoor Mine Longwalls 22 to 25 at that time. A total of 175 claims had been received by the MSB, now SA NSW (not including claims that were refused) of which 14 claims did not relate to the main residence or civil structure.

Table B.1 Summary of comparison between observed and predicted impacts for each structure

Strain Impact Category	Total no. of observed impacts for structures predicted to be strain impact Category 0	Total no. of observed impacts for structures predicted to be strain impact Category 1	Total no. of observed impacts for structures predicted to be strain impact Category 2	Total
No impact	483	373	20	876
Cat 0	31	70	6	107
Cat 1	8	9	1	18
Cat 2	7	11	2	20
Cat 3	2	2	0	4
Cat 4	3	5	0	8
Cat 5	3	1	0	4
Total	537	471	29	1037
% claim	**10 %**	**21 %**	**31 %**	16 %
% Obs > Pred	**4 %**	**4 %**	**0 %**	-
% Obs <= Pred	**96 %**	**96 %**	**100 %**	-

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Given that observed impacts are less than or equal to predicted impacts in 96 % of cases, it is considered that the previous methods are generally conservative even though non-conventional movements were not considered in the predictions and assessments. However, when compared on a house by house basis, the predictions have been substantially exceeded in a small proportion of cases.

The majority, if not all, of the houses that have experienced Category 3, 4 or 5 impacts are considered to have experienced substantial non-conventional subsidence movements. The consideration is based on nearby ground survey results, where localised bumps are observed in subsidence profiles and high localised strain is observed. The potential for impact from non-conventional movements were discussed generally and not included in the specific impact assessments for each structure.

The inability to specify the number or probability of impacts due to the potential for non-conventional movements is a shortcoming of the previous method. It was considered that there was substantial room for improvement in this area and recommendations are provided to improve the previous method.

The comparison shows a favourable observation that the overall proportion of claims increased for increasing observed ground movements. This suggests that the main parameters currently used to make impact assessments (namely predicted conventional curvature and maximum plan dimension of each structure) are credible. Please note that we have stated predicted conventional curvature rather than strain, as predictions of strain were directly based on predictions of conventional curvature.

A substantial over-prediction is observed at the low end of the spectrum of impacts (Category 0 and 1). A number of causes and/or possible causes for the deviations have been identified:

- Construction methods and standards may mitigate against small differential ground movements.
- The impacts may have occurred but the residents have not made a claim for the following reasons:-
  - All structures contain some existing, pre-mining defects. A pre-mining field investigation of 119 structures showed that it is very rare for all elements of a building to be free of cracks. Cracks up to 3 mm in width are commonly found in buildings. Cracks up to 1 mm in width are very common. There is a higher incidence of cracking in brittle forms of construction such as masonry walls and tiled surfaces.
  - In light of the above, additional very slight Category 0 and 1 impacts may not have been noticed by residents. A forensic investigation of all structures before or after mining may reveal that the number of actual impacts is greater than currently known.
  - Similarly, impacts have been noticed but some residents may consider them to be too trivial to make a claim. While difficult to prove statistically, it is considered that the frequency of claims from tenanted properties is less than the frequency of claims from owner-occupied properties.
- The impacts have been noticed but some residents are yet to make a claim at this stage. It has been observed that there is a noticeable time lag between the moment of impact and the moment of making a claim. At the time of the original study in 2008, more claims were therefore expected to be received in the future within areas that have already been directly mined beneath. This has been confirmed by the findings of the most recent study based on information received in 2016. It has also been found that as assessments and repairs were progressively determined at each house, the level of impacts at each house has generally been greater than was originally reported.
- The predictive method is deliberately conservative in a number of ways.
  - Predicted subsidence movements for each structure are based on the maximum predicted subsidence movements within 20 metres of the structure.
  - An additional 0.2 mm/m of strain was added
  - Maximum strains were applied to the maximum plan dimension, regardless of the maximum predicted strain orientation.
  - The method of impact assessment does not provide for “nil impacts”. The minimum assessed level of impact is Category 0.
  - The impact data was based on double-storey full masonry structures in the UK.

Finally, it is considered that the previous method impact classification has masked the true nature and extent of impacts. It is recommended that an improved method of classification be adopted before embarking on any further analysis. This is discussed in the next chapter of this report.

B.3. Method of Impact Classification

B.3.1. Previous Method

The impacts to structures were previously classified in accordance with Table C1 of Australian Standard 2870-1996, but the table has been extended by the addition of Category 5 and is reproduced below.

Table B.2 Classification of damage with reference to strain

Impact category	Description of typical damage to walls and required repair	Approximate crack width limit
0	Hairline cracks.	< 0.1 mm
1	Fine cracks which do not need repair.	0.1 mm to 1.0 mm
2	Cracks noticeable but easily filled. Doors and windows stick slightly	1 mm to 5 mm
3	Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weather-tightness often impaired	5 mm to 15 mm, or a number of cracks 3 mm to 5 mm in one group
4	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window or door frames distort. Walls lean or bulge noticeably. Some loss of bearing in beams. Service pipes disrupted.	15 mm to 25 mm but also depends on number of cracks
5	As above but worse, and requiring partial or complete rebuilding. Roof and floor beams lose bearing and need shoring up. Windows broken with distortion. If compressive damage, severe buckling and bulging of the roof and walls.	> 25 mm

Note 1 of Table C1 states that *"Crack width is the main factor by which damage to walls is categorized. The width may be supplemented by other factors, including serviceability, in assessing category of damage.*

Impacts relating to tilt were classified according to matching impacts with the description in Table B.3, not the observed actual tilt. This is because many houses that had experience tilts greater than 5 mm had not made a claim to the MSB (now SA NSW).

Table B.3 Classification of damage with reference to tilt

Impact category	Tilt (mm/m)	Description
A	< 5	Unlikely that remedial work will be required.
B	5 to 7	Adjustment to roof drainage and wet area floors might be required.
C	7 to 10	Minor structural work might be required to rectify tilt. Adjustments to roof drainage and wet area floors will probably be required and remedial work to surface water drainage and sewerage systems might be necessary.
D	> 10	Considerable structural work might be required to rectify tilt. Jacking to level or rebuilding could be necessary in the worst cases. Remedial work to surface water drainage and sewerage systems might be necessary.

B.3.2. Need for improvement to the previous method of impact classification

It is very difficult to design a method of impact classification that covers all possible scenarios and permutations. The application of any method is likely to find some instances that do not quite fit within the classification criteria.

Exposure to a large number of affected structures has allowed the mining industry to appreciate where improvements can be made to all aspects including the identification of areas for improvement in the previous method of impact classification.

A number of difficulties have been experienced with the previous method during the mining period. The difficulty centres on the use of crack width as the main classifying factor, as specified in Table C1 of Australian Standard 2870-1996.

A benefit of using crack width as the main factor is that it provides a clear objective measure by which to classify impact. However, experience has shown that crack width is a poor measure of the overall impact and extent of repair to a structure. The previous method of impact classification may be useful for assessing impact to newly built structures in a non-subsidence environment but further improvement and clarification is recommended before it can be effectively applied to houses impacted by mine subsidence.

The following aspects highlight areas where the previous classification system could be improved.-

- *Slippage on Damp Proof Course*

  Many houses have experienced slippage along the damp proof course in Tahmoor. Slippage on some houses is relatively small (less than 10 mm) though substantial slippage has been observed in a number of cases, such as shown in Fig. B.1 below.

Fig. B.1 Example of slippage on damp proof course

Under the previous classification method, the “crack” width of the slippage may be very small (Category 1) but the distortion in the brickwork is substantial. Moreover, the extent of work required to repair the impact is substantial as it usually involves re-lining the whole external skin of the structure. Such impacts would be considered Category 4 based on extent of repair but only Category 1 or 2 based on maximum crack width.

There is no reference to slippage of damp proof course in the previous method of impact classification. However, if the extent of repair was used instead of using crack width as the main factor, the impact category would be properly classified as either Category 4 or Category 5.

It was recommended that slippage of damp proof courses be added to the previous impact classification table.

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- *Cracks to brickwork*

  In some cases, cracks are observed in mortar only. For example, movement joints in some structures have been improperly filled with mortar instead of a flexible sealant, as shown in Fig. B.2. In these situations, the measured crack width may be substantial but the impact is relatively simple to repair regardless of the crack width.

Fig. B.2 Example of crack in mortar only

In other cases, a small number of isolated bricks have been observed to crack or become loose. This is usually straightforward to repair. Under the previous impact classification method, a completely loose brick could be strictly classified as Category 5 as the crack width is infinitely large. This is clearly not the intention of the previous method but clarification is recommended to avoid confusion.

If a panel of brickwork is cracked, the method of repair is the same regardless of the width. While it is considered reasonable to classify large and severe cracks by its width, it is recommended that cracks less than 5 mm in width be treated the same rather than spread across Categories 0, 1 and 2.

If a brick lined structure contains many cracks of width less than 3 mm, the impact would be classified as no more than Category 2 under the previous method of impact classification. The extent of repair may be substantially more than a house that has experienced only one single 5 mm crack. However, it is recognised that it is very difficult to develop a simple method of classifying impacts based on multiple cracks in wall panels. How many cracks are needed to justify an increase in impact category?

- *Structures without masonry walls*

  Timber framed structures with lightweight external linings such weatherboard panels and fibro sheeting are not referenced in the previous classification table. If crack widths were strictly adopted to classify impacts, it may be possible to classify movement in external wall linings beyond Category 3 when in reality the repairs are usually minor.

  It was recommended that the impact classification table be extended to include structures with other types of external linings.

- *Minor impacts such as door swings*

  Experience has shown that one of the earliest signs of impact is the report of a sticking door. In some instances, the only observed impact is one or two sticking doors. It takes less than half an hour to repair a sticking door and impact is considered negligible.

  Such an impact would be rightly classified as Category 0 based on the previous method of impact classification as there is no observed crack. However, the previous classification table suggests that sticking doors and windows occur when Category 2 crack widths develop. It was recommended that the impact classification table be amended in this respect.

B.3.3. Broad recommendations for improvement of previous method of impact classification

It was recommended that crack width no longer be used as the main factor for classifying impacts. This does not mean that the use of crack width should be abandoned altogether. Crack width remains a good indicator of the severity of impacts and should be used to assist classification, particularly for impacts that are moderate or greater.

By focussing on crack width, the previous impact classification table appears to be classifying impacts from a structural stability perspective. It was recommended that a revised impact classification table be more closely aligned with all aspects of a building, including its finishes and services. Residents who are affected by impacts are concerned as much about impacts to internal linings, finishes and services as they are about cracks to their external walls and a revised impact classification method should reflect this.

With crack width no longer used as the main factor, it was recommended that the wording of the descriptions of impact in the classification table be extended to cover impacts to more elements of buildings. In keeping with the previous method of assessment, the level of impact should distinguish between cosmetic, serviceability and stability related impacts:-

- Low impact levels should relate to cosmetic impacts that do affect the structural integrity of the building and are relatively straight-forward to repair,
- Mid-level impact categories should relate to impacts to serviceability and minor structural issues, and
- High level impacts should be reserved for structural stability issues and impacts requiring extensive repairs.

B.3.4. Revised method of impact classification

The following revised method of impact classification has been developed.

Table B.4 Revised classification based on the extent of repairs

Repair Category	Extent of Repairs
Nil	No repairs required
R0 **Adjustment**	One or more of the following, where the damage does not require the removal or replacement of any external or internal claddings or linings:- - **Door** or **window** jams or swings, or - Movement of **cornices**, or - Movement at external or internal **expansion joints**.
R1 **Very Minor Repair**	One or more of the following, where the damage can be repaired by filling, patching or painting without the removal or replacement of any external or internal brickwork, claddings or linings:- - Cracks in **brick mortar** only, or isolated cracked, broken, or loose **bricks** in the external façade, or - Cracks or movement < 5 mm in width in any external or internal wall **claddings**, **linings**, or **finish**, or - Isolated cracked, loose, or drummy floor or wall **tiles**, or - Minor repairs to any **services** or **gutters**.
R2 **Minor Repair**	One or more of the following, where the damage affects a small proportion of external or internal claddings or linings, but does not affect the integrity of external brickwork or structural elements:- - Continuous cracking in **bricks** < 5 mm in width in one or more locations in the total external façade, or - Slippage along the **damp proof course** of 2 to 5 mm anywhere in the total external façade, or - Cracks or movement ≥ 5 mm in width in any external or internal wall **claddings**, **linings**, **finish**, or - Several cracked, loose or drummy floor or wall **tiles**, or - Replacement of any **services**.
R3 **Substantial Repair**	One or more of the following, where the damage requires the removal or replacement of a large proportion of external brickwork, or affects the stability of isolated structural elements:- - Continuous cracking in **bricks** of 5 to 15 mm in width in one or more locations in the total external façade, or - Slippage along the **damp proof course** of 5 to 15 mm anywhere in the total external façade, or - Loss of bearing to isolated walls, piers, columns, or other load-bearing elements, or - Loss of stability of isolated structural elements.
R4 **Extensive Repair**	One or more of the following, where the damage requires the removal or replacement of a large proportion of external brickwork, or the replacement or repair of several structural elements:- - Continuous cracking in **bricks** > 15 mm in width in one or more locations in the total external façade, or - Slippage along the damp proof course of 15 mm or greater anywhere in the total external façade, or - Relevelling of building, or - Loss of stability of several structural elements.
R5 **Re-build**	Extensive damage to house where the MSB (now SA NSW) and the owner have agreed to rebuild as the cost of repair is greater than the cost of replacement.

As discussed at the start of this chapter, it is very difficult to design a method of impact classification that covers all possible scenarios and permutations. While the method has been floated among some members of the mining industry, it is recommended that this table be reviewed broadly.

The recommended method has attempted to follow the current Australian Standard in terms of the number of impact categories and crack widths for Categories 3 and 4. The method is based on the extent of repairs required to repair the physical damage that has occurred, and does not include additional work that is occasionally required because replacement finishes cannot match existing damaged ones. It is therefore likely that the actual cost of repairs will vary greatly between houses depending on the nature of the existing level and type of finishes used.

The impacts experienced at Tahmoor Mine have been classified in accordance with the revised method of classification with good results. The method allowed clearer trends to be found when undertaking statistical analyses.

A comparison between the previous and revised methods is shown in Fig. B.3.

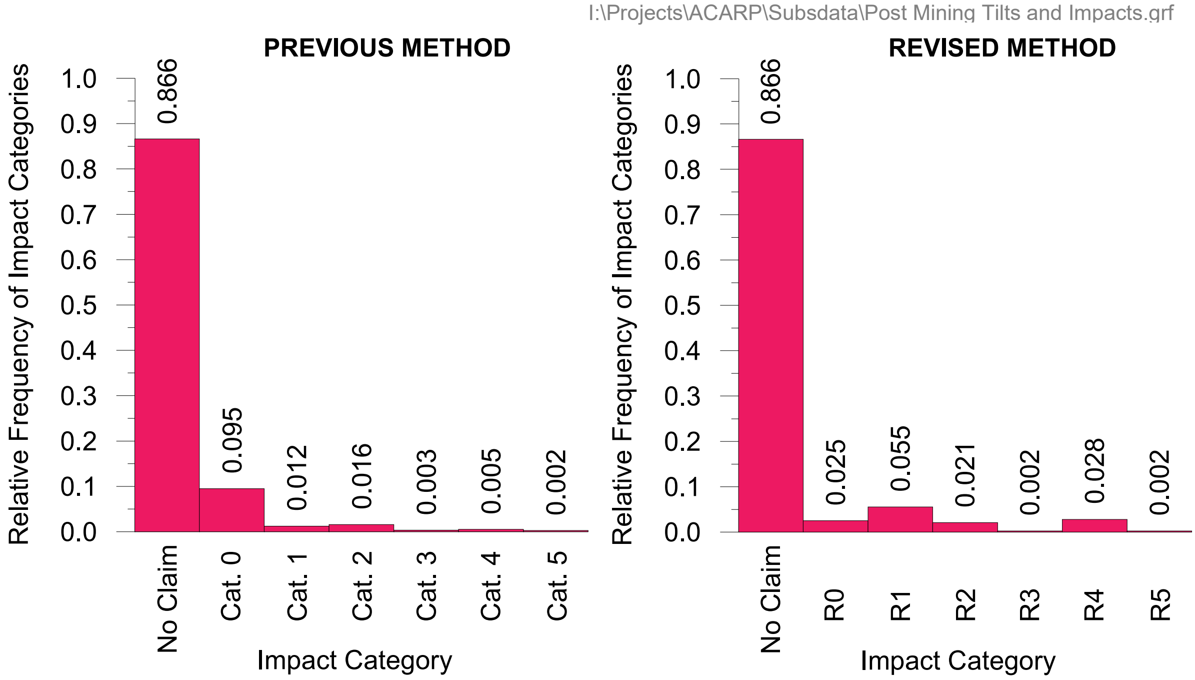

Fig. B.3 Comparison between previous and revised methods of impact classification

It can be seen that there was an increased proportion in the higher impact categories using the revised method. This is brought about mainly by the recorded slippage on damp proof courses, which are classified as either Category 3 or Category 4 when they were previously classified as Category 1 or 2.

There was also a noticeable reduction in proportion of Category 0 impacts and noticeable increase in proportion of Category 1 impacts using the revised method. This is because the revised method reserves Category 0 impacts for impacts that did not result in cracking any linings, while the previous method allows hairline cracking to occur.

The consistent low proportion of Category 3 impacts under both the previous and current methods raises questions as to whether this category should be merged with Category 4.

B.4. Method of impact assessment

B.4.1. Need for improvement of the previous method

The previous method of impact assessment provided specific quantitative predictions based on predicted conventional subsidence movements and general qualitative statements concerning the potential for impacts due to non-conventional movements. These non-conventional movements are additional to the predicted conventional movements.

This message was quite complex and created the potential for confusion and misunderstanding among members of the community who may easily focus on numbers and letters in a table that deal specifically with their house and misunderstand the message contained in the accompanying words of caution about the low level of reliability concerning predictions of conventional strain and potential for non-conventional movements.

This was unfortunately a necessary shortcoming of the previous method at the time as there was very little statistical information available to quantify the potential for impacts due to non-conventional movement. However, a great deal of statistical information was available following the mining of Tahmoor Mine Longwalls 22 to 24A at the time of the 2009 ACARP study and the method and message to the community could be improved. Additional statistical information was collected in 2016, which was approximately two years after the completion of Longwall 27 and one year after the completion of Longwall 28, which was the last panel to directly mine beneath the urban areas of Tahmoor. The timing of the data is such that it accounts for much of the time lag effect that occurs between the time of impact, when damage is claimed by residents and when the nature and level of the damage requiring repairs is assessed in detail by SA NSW.

While additional statistical information is now available, there remains limited knowledge at this point in time to accurately predict the locations of non-conventional movement. Substantial gains are still to be made in this area.

In the meantime, therefore, a probabilistic method of impact assessment has been developed. The method combines the potential for impacts from both conventional and non-conventional subsidence movement.

B.4.2. Factors that could be used to develop a probabilistic method of prediction

Trend analyses have highlighted a number of factors that could be used to develop a probabilistic method. The trends examined were:-

- *Ground tilt*

  This was found to be an ineffective parameter at Tahmoor Mine as ground tilts have been relatively benign and a low number of claims have been made solely in relation to tilt.

- *Ground strain*

  There appears to be a clear link between ground strain and impacts, particularly compressive strain. The difficulty with adopting ground strain as a predictive factor lies in the ability to accurately predict ground strain at a point.

  Another challenge with using strain to develop a probabilistic method is that there is limited information that links maximum observed strains with observed impacts at a structure. Horizontal strain is a two-dimensional parameter and it has been measured along survey lines that are oriented in one direction only.

  The above issues are less problematic for curvature and the statistical analysis on the relationship between strain and curvature shows that the observed frequency of high strains increased with increasing observed curvature.

- *Ground curvature*

  Curvature appears to be the most effective subsidence parameter to develop a probabilistic method. The trend analysis showed that the frequency of impacts increased with increasing observed curvature.

  It should be noted that we are referring to conventional curvature and not curvatures that have developed as a result of non-conventional subsidence behaviour. This is because conventional curvature can be readily predicted with reasonable correlation with observations. It is also a relatively straight-forward exercise to estimate the observed smoothed or "conventional" mining-induced curvature that has previously been experienced at houses provided some ground monitoring is undertaken across and along extracted longwalls.

  Non-conventional curvature cannot be predicted prior to mining and is accounted for by using a probabilistic method of impact assessment.

  It has also been shown that the observed frequency of high strains increased with increasing observed curvature.

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- *Position of structure relative to longwall*

  A clear trend was understandably found that structures located directly above goaf were substantially more likely to experience impact. The calculated probabilities may be applicable for mining conditions that are similar to those experienced at Tahmoor Mine but will be less applicable for other mining conditions. An effective probabilistic method should create a link between the magnitude of differential subsidence movements and impact.

- *Construction type*

  Two trends have been observed. Not surprisingly, structures constructed with lightweight flexible external linings are able to accommodate a far greater range of subsidence movements than brittle inflexible linings such as masonry. The analyses merely quantified what was already well known. The second observation was that houses constructed with strip footings were noticeably more likely to experience impacts than houses constructed with a ground slab, particularly in relation to higher levels of impact. This is because houses with strip footings are more susceptible to slippage along the damp proof course.

- *Structure size*

  Trend analysis showed that larger structures attract a higher likelihood of impact. This is understandable as the chance of impacts increases with increasing footprint area. However, it is noted that the probability of severe impacts was not substantially greater for larger structures even though this would be expected if considering probabilities theoretically rather than empirically. It may be worthwhile including structure size as a factor in the development of a probabilistic method, though it is considered that it is a third order effect behind subsidence movements and construction type.

- *Structure age*

  The trend analysis for structure age did not reveal any noticeable trends.

- *Extensions, variable foundations and building joints*

  There is a clear trend of a higher frequency of impacts for structures that include extensions, variable foundations and building joints. The increased frequency appears to be related mainly to lower impact categories.

- *Urban or rural setting*

  While trends were observed, it is considered that they can be explained by other factors. However, consideration can be made to provide a more conservative estimate of probabilities in rural areas if structure size has not been considered.

B.4.3. Revised method of impact assessment

A revised method of impact assessment has been developed, based on information received in 2016 at a time when the extraction of Longwall 29 had been completed. The method is probabilistic and currently includes conventional ground curvature and construction type as input factors.

At the time of the original 2009 ACARP study, the trends in the data were difficult to determine within small ranges of curvature because of the relatively low number of buildings that reported damage at this time. A decision was therefore taken to analyse the data in a limited number of curvature ranges, so that where possible a reasonable sample size would be available in each range. The ranges of curvature originally chosen were 5 to 15 kilometres, 15 to 50 kilometres and greater than 50 kilometres.

Additional information provided in 2016 has demonstrated that the proportion of houses reporting impacts has increased. This has allowed statistical analyses to be conducted using narrower bands of observed curvatures though some inconsistencies remain in some bands due to the sample sizes. The ranges of curvature provided in this report are 2.5 to 15 kilometres, 15 to 50 kilometres and greater than 50 kilometres.

Because the incidence of damage for different construction types showed strong trends and because the sample size was reasonable for each type of structure, the data were analysed to determine the effect of radius of curvature on the incidence of damage for each of the three structure types and for each of the three curvature ranges.

The following probabilities are proposed in Table B.5.

Table B.5 Probabilities of impact based on curvature and construction type based on the revised method of impact classification

R (km)	Repair Category			
	No Repair or R0	R1 or R2	R3 or R4	R5
Brick or brick-veneer houses with Slab on Ground				
> 50	90 ~ 95 %	3 ~ 10 %	1 %	< 0.5 %
15 to 50	70 ~ 75 %	20 ~ 25 %	5 ~ 10 %	< 0.5 %
2.5 to 15	45 ~ 65 %	25 ~ 35 %	10 ~ 15 %	1 ~ 3 %
Brick or brick-veneer houses with Strip Footing				
> 50	85 ~ 90 %	5 ~ 15 %	1 ~ 3 %	< 2 %
15 to 50	60 ~ 75 %	20 ~ 30 %	5 ~ 15 %	1 ~ 3 %
2.5 to 15	45 ~ 65 %	25 ~ 30 %	5 ~ 15 %	5 ~ 10 %
Timber-framed houses with flexible external linings of any foundation type				
> 50	90 ~ 95 %	3 ~ 10 %	1 %	< 0.5 %
15 to 50	75 ~ 85 %	10 ~ 20 %	5 ~ 10 %	< 0.5 %
2.5 to 15	70 ~ 80 %	20 ~ 25 %	7 ~ 12 %	< 0.5 %

The results have been expressed as a range of values rather than a single number, recognising that the data had considerable scatter within each curvature range. While structure size and building extensions have not been included in the predictive tables, it is recommended to adopt percentages at the higher end of the range for larger structures or those with building extensions.

The percentages stated in each table are the percentages of building structures of that type that would be likely to be damaged to the level indicated within each curvature range. The levels of damage in the tables are indicated with reference to the repair categories described in the damage classification given in Table B.4.

The ranges provided in Table B.5 have been converted into a set of probability curves to remove artificial discontinuities that are formed by dividing curvatures into three categories. These are shown in Fig. B.4. The probability curves are applicable for all houses and civil structures.

At the time of writing ACARP Research Project C12015 (Waddington, 2009), the observed proportion of houses where the MSB (now SA NSW) and affected landowners had agreed to rebuild rather than repair (Category R5) impacts was less than 0.5 %. Since the publication of the research report, the proportion of houses where a decision has been made to rebuild has increased to approximately 1.1% overall and 3.2% above Longwalls 24A to 27 within the observed zone of increased subsidence. The decision to rebuild rather than repair a house is based on a variety of factors. Whilst acknowledging the significance of a decision to rebuild compared to repair a house, all houses previously impacted at Tahmoor Mine could have been repaired rather than replaced, including those where a decision has been made to rebuild them. This does not diminish the significance of this category from a social and economic impact point of view and it is important to continue recording the number of instances where a decision has been made to rebuild a house.

B.4.4. Review of observed probabilities as mining continues

Reviews of observed probabilities are continually undertaken as Tahmoor Mine and other mines continue to extract beneath houses. The provision of additional information on impact on houses in 2016 has improved the level of understanding on the nature and frequency of impacts during the mining of Longwalls 22 to 29 compared to the information that was collected for the previous 2009 ACARP study, which was conducted after the mining of Longwalls 22 to 24A.

Additional statistical information was collected in 2016, which was approximately two years after the completion of Longwall 27 and one year after the completion of Longwall 28, which was the last panel to directly mine beneath the urban areas of Tahmoor.

A finding from the additional information is that the proportion of houses that have experienced impacts has increased over time. The reasons for the increase are due to the time lag effect that occurs between the mining impact, when damage is claimed by residents and when the nature and level of the damage requiring repairs is assessed in detail by SA NSW.

In light of the above, it is recommended that the probabilities be revisited in the future.

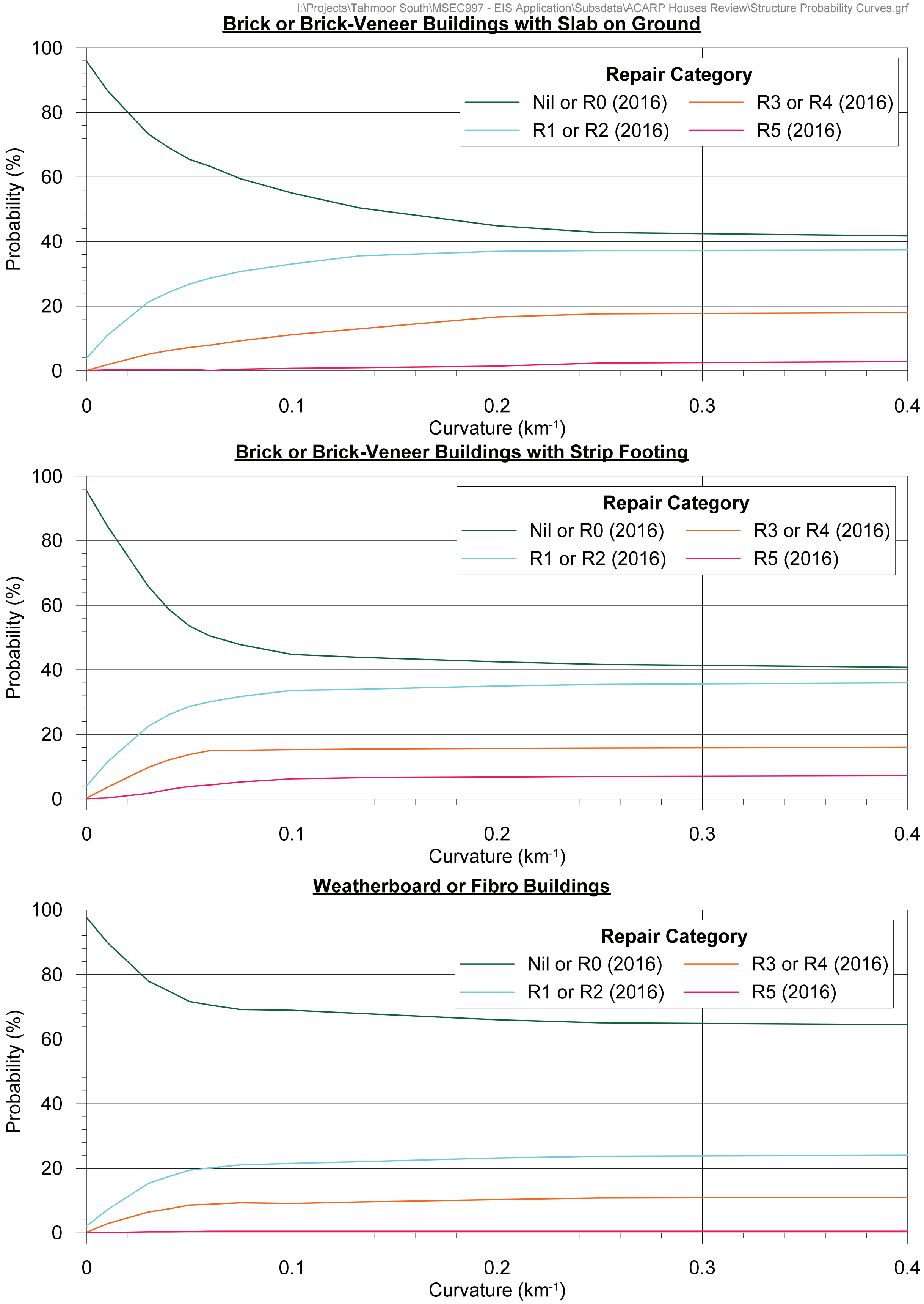

Fig. B.4 Probability curves for impacts to buildings

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APPENDIX C. FIGURES

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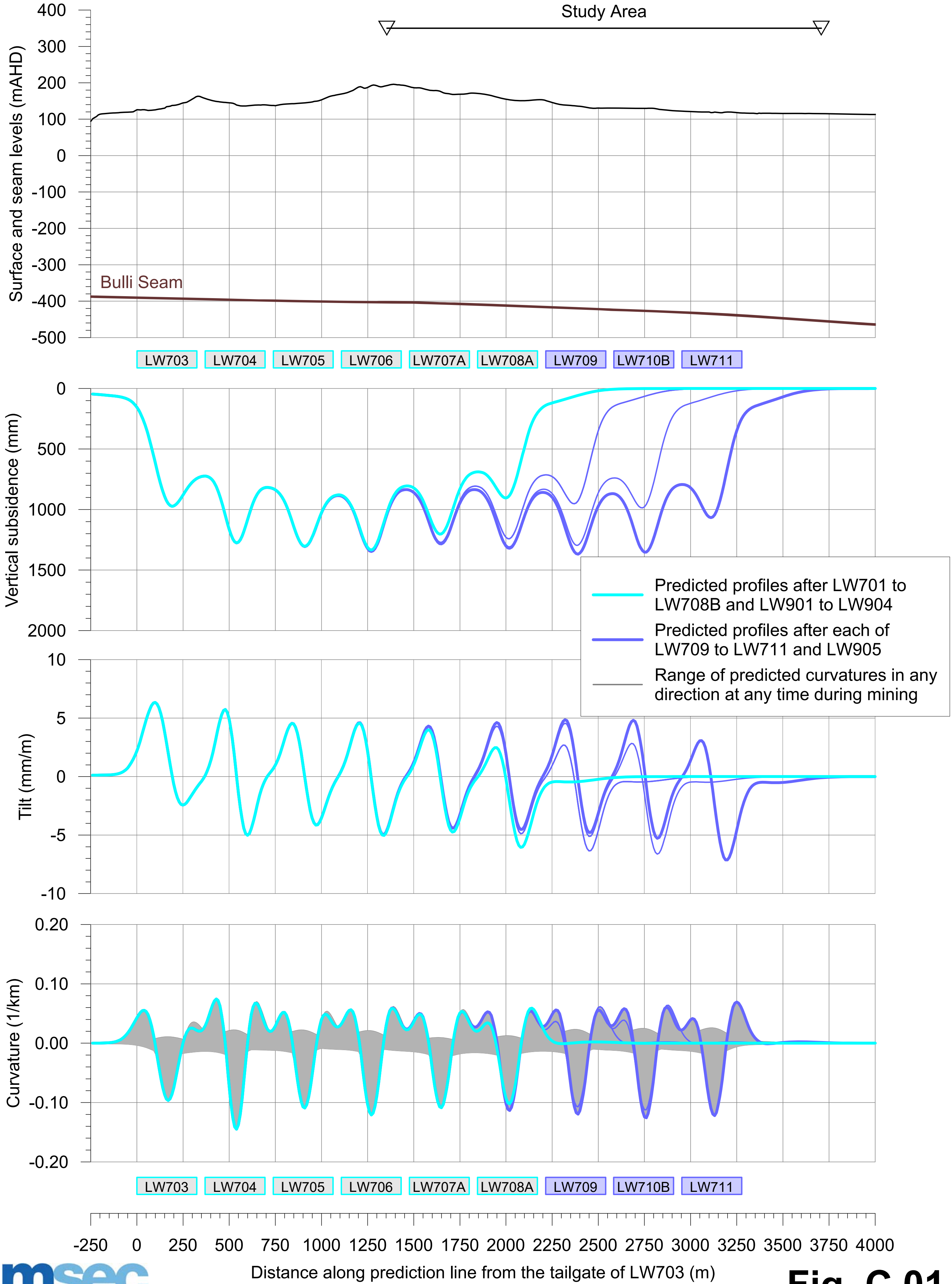
Predicted profiles of vertical subsidence, tilt and curvature along Prediction Line 1 due to mining in Appin Areas 7 and 9



msec

Fig. C.01

Predicted profiles of vertical subsidence, tilt and curvature along Prediction Line 2 due to mining in Appin Areas 7 and 9

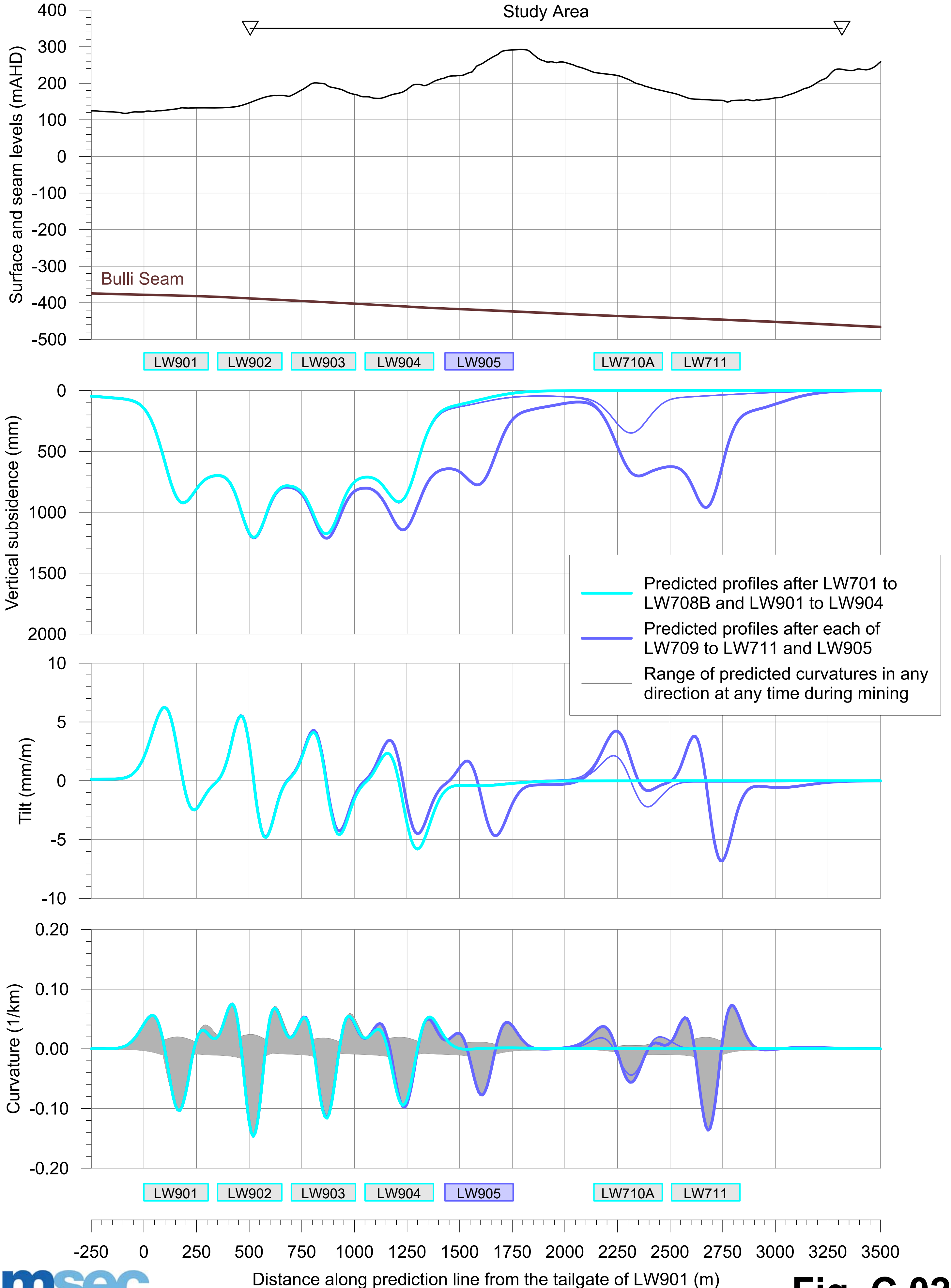


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Fig. C.02

Predicted profiles of vertical subsidence, upsidence and closure along Foot Onslow Creek due to mining in Appin Areas 7 and 9

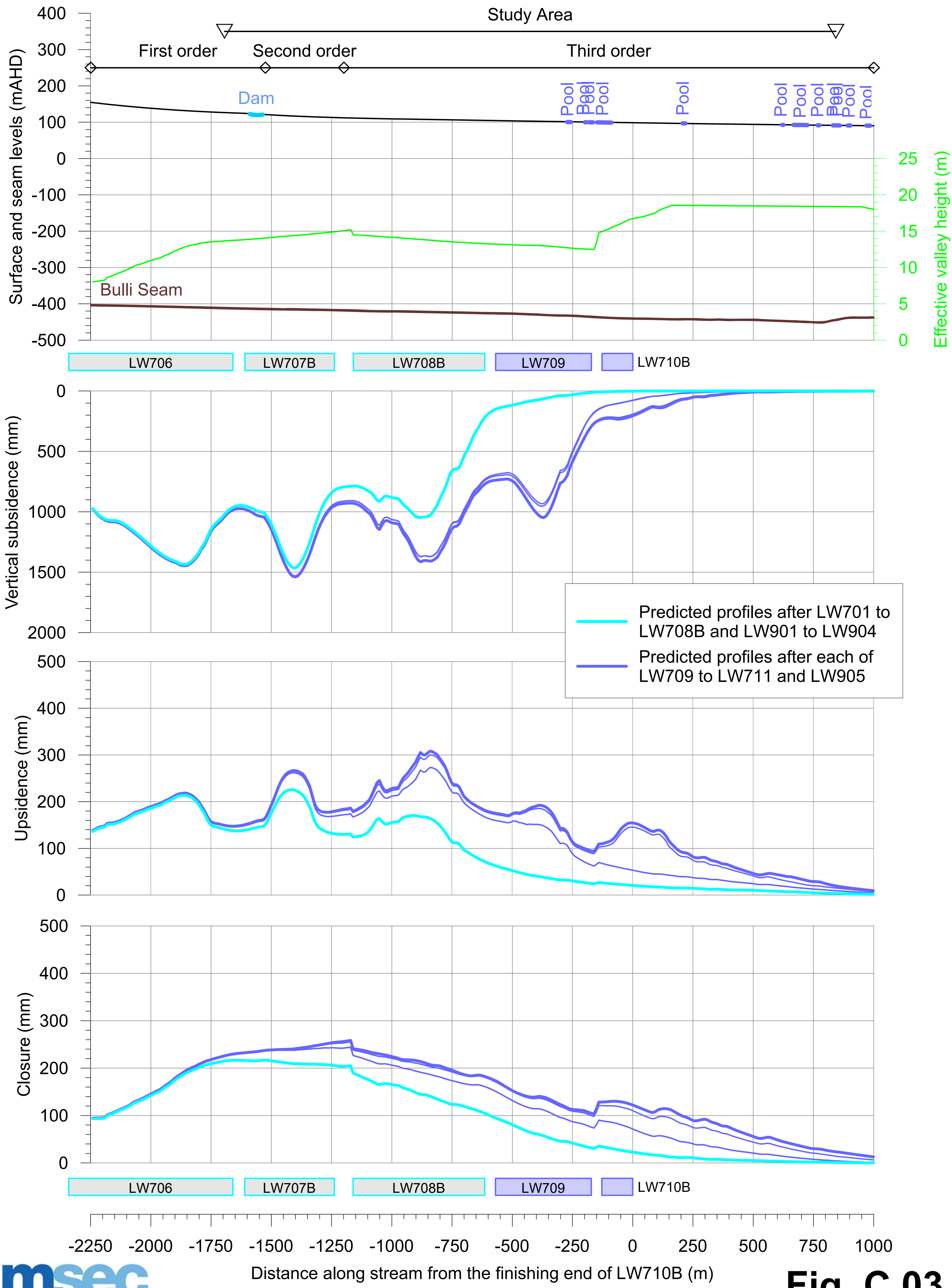

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Fig. C.03

Predicted profiles of vertical subsidence, upsidence and closure along Harris Creek due to mining in Appin Areas 7 and 9

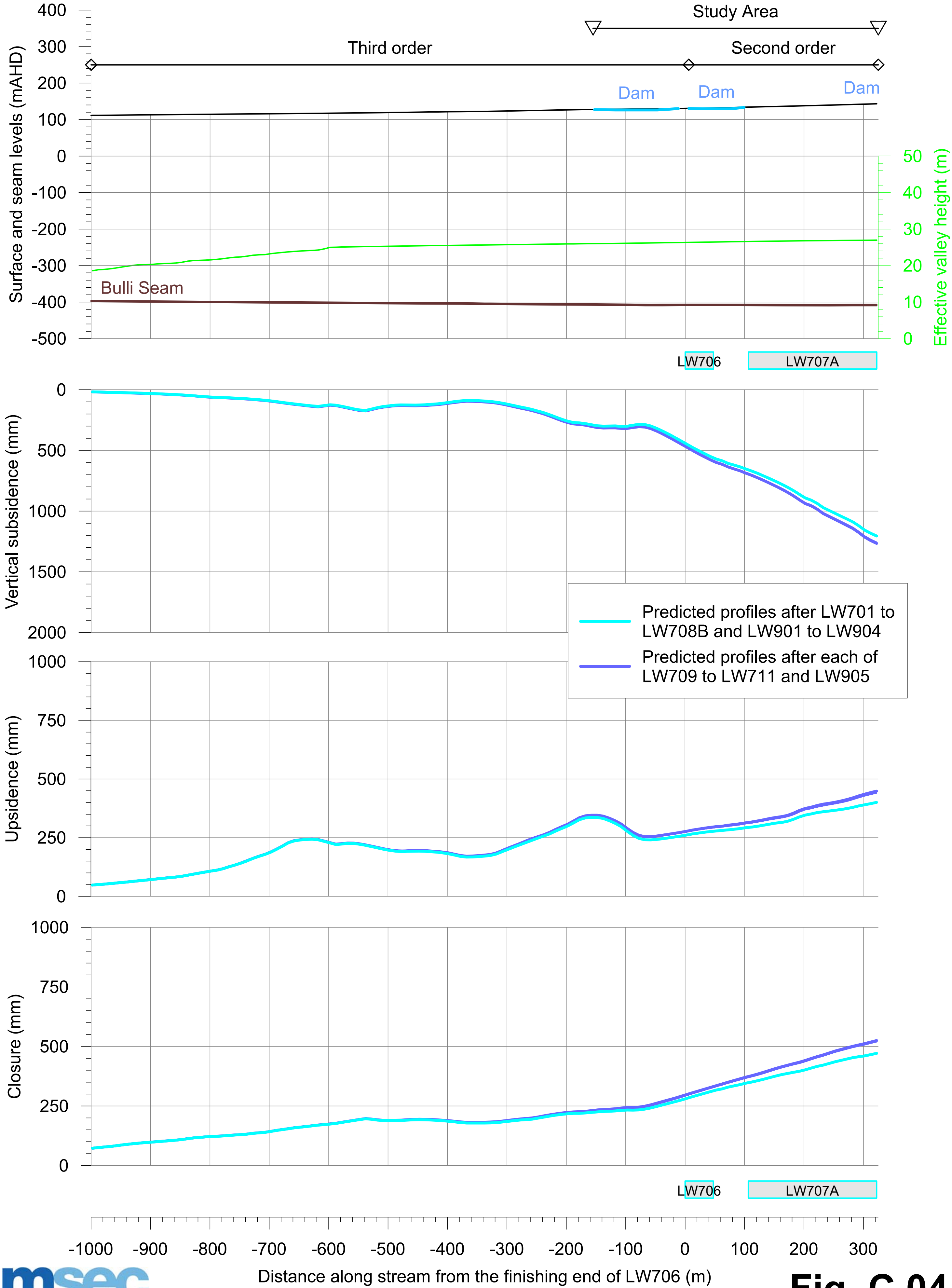

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Fig. C.04

Predicted profiles of vertical subsidence, upsidence and closure along Navigation Creek due to mining in Appin Areas 7 and 9

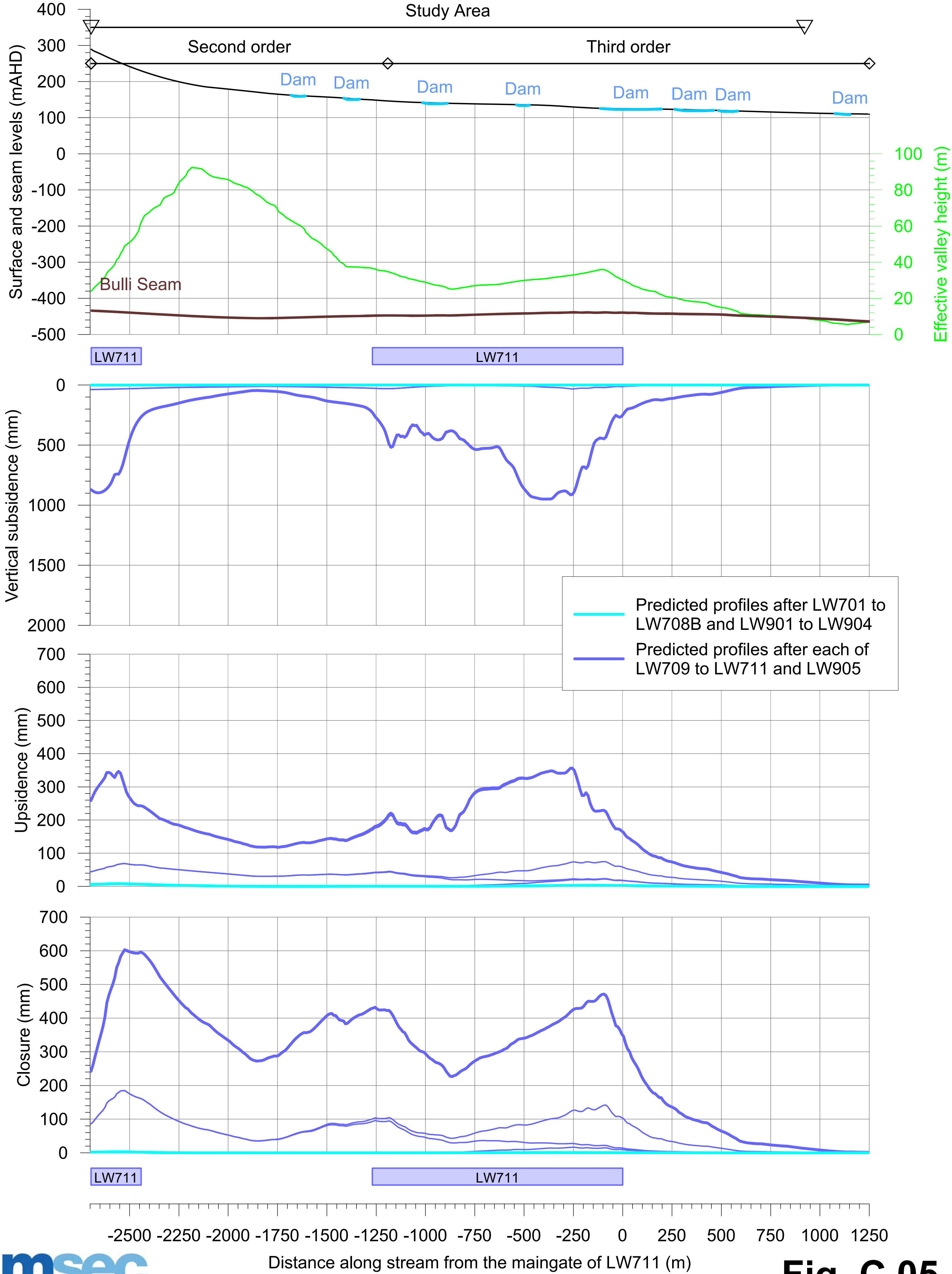

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Fig. C.05

Predicted profiles of vertical subsidence, upsidence and closure along Navigation Creek Tributary 1 due to mining in Appin Areas 7 and 9

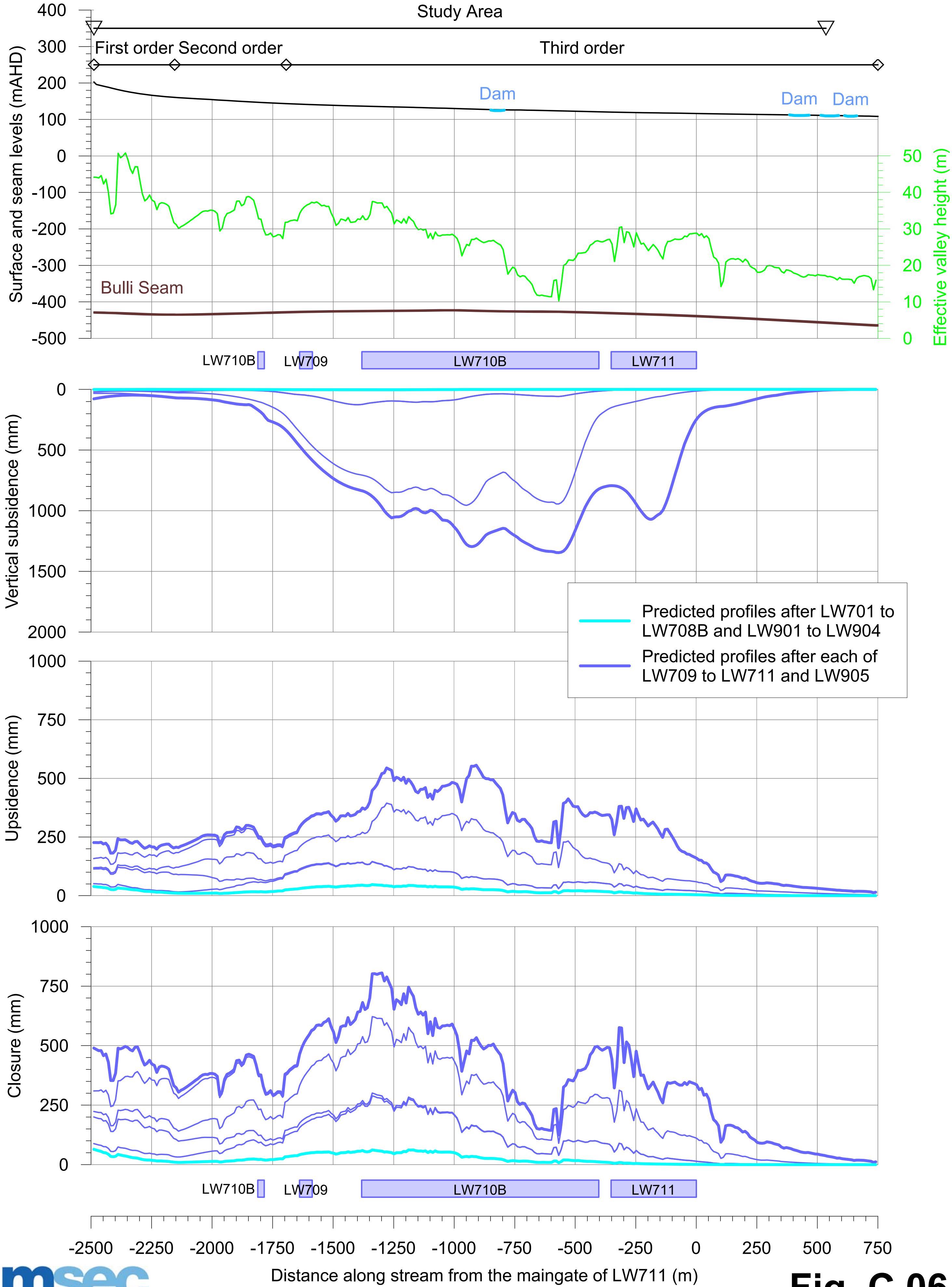

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Fig. C.06

Predicted profiles of vertical subsidence, tilt and curvature along the Main Southern Railway due to mining in Appin Areas 7 and 9

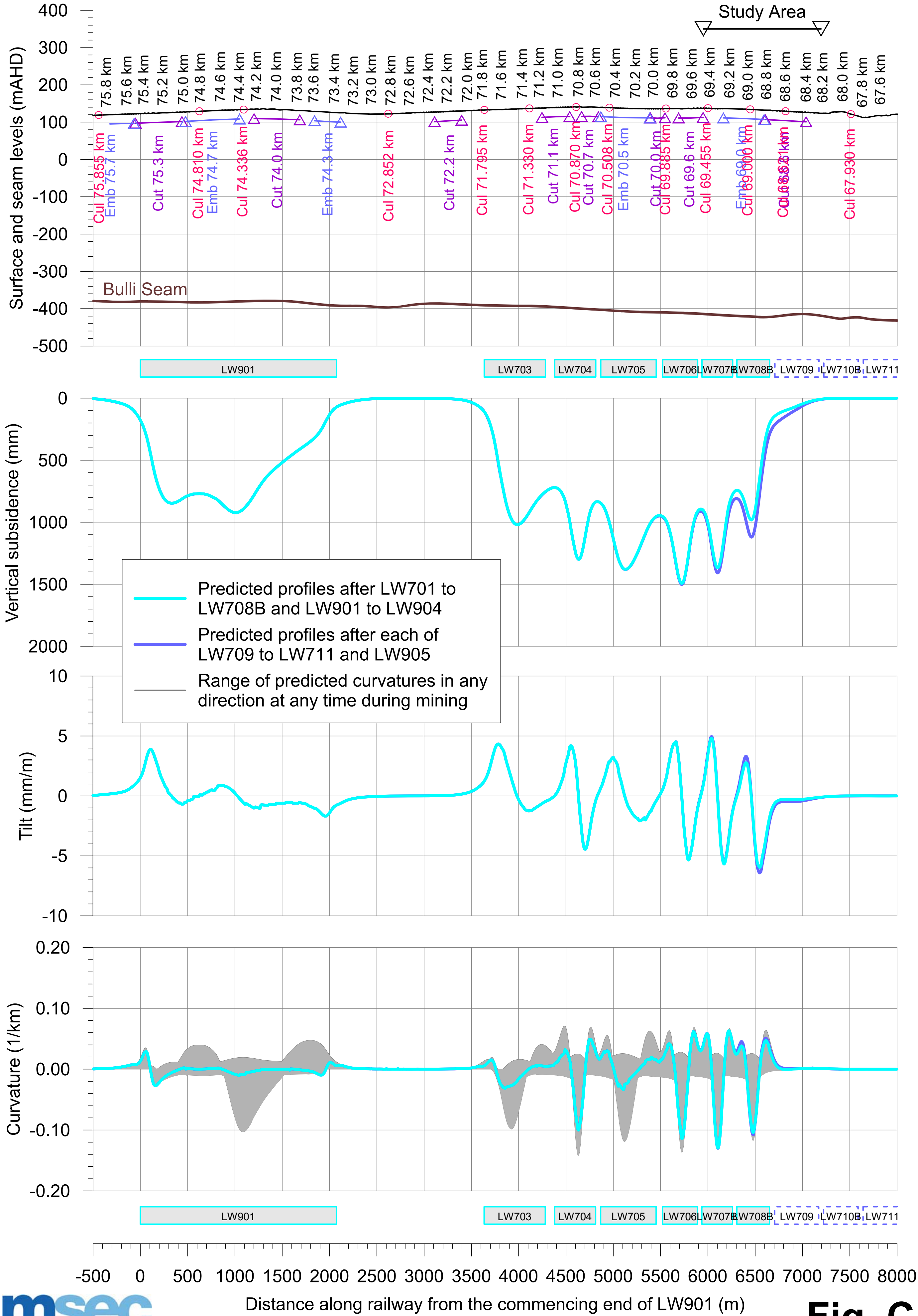

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Fig. C.07

Predicted profiles of vertical subsidence, tilt and curvature along Menangle Road due to mining in Appin Areas 7 and 9

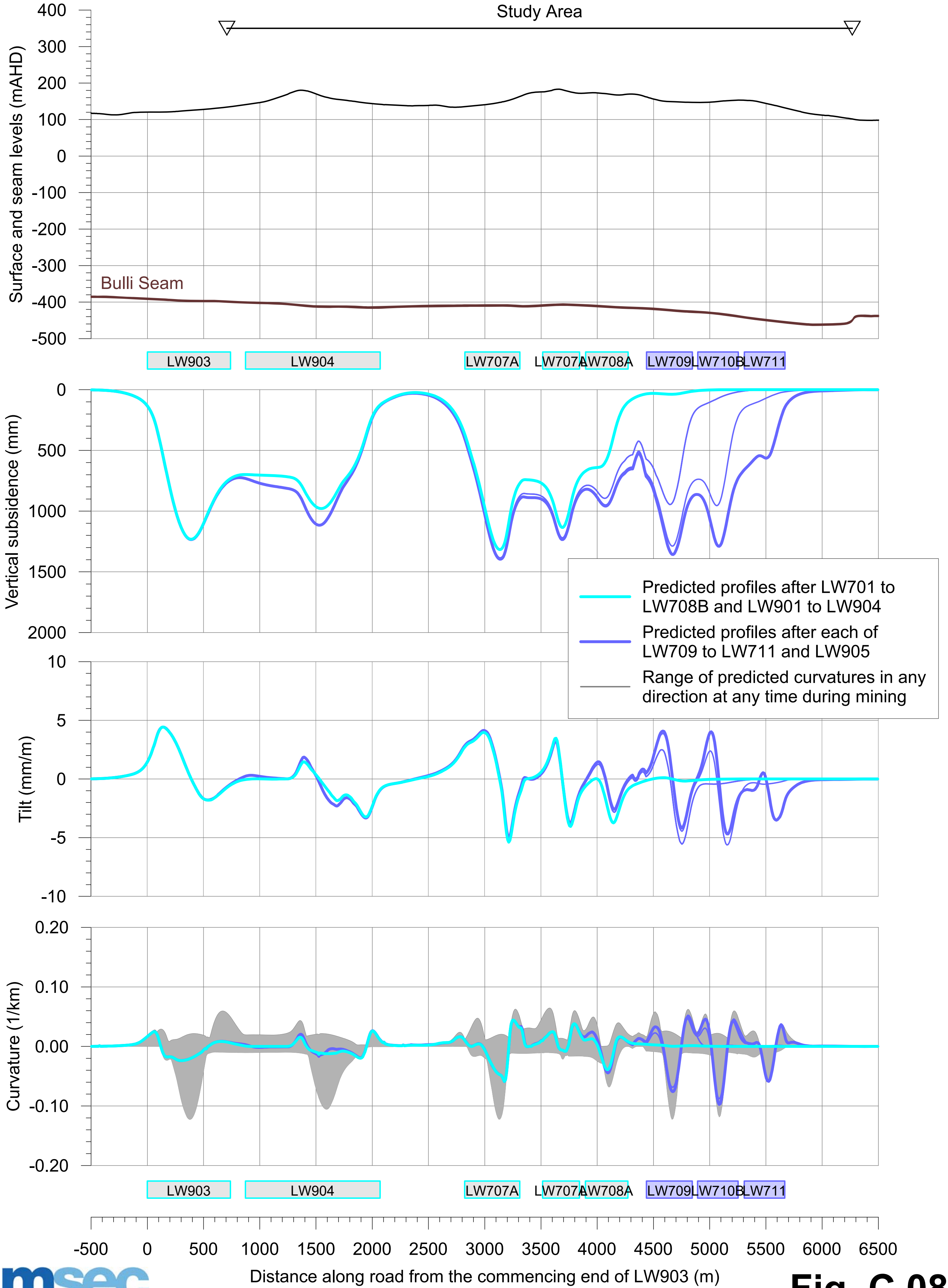

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Fig. C.08

Predicted profiles of vertical subsidence, tilt and curvature along Carrolls Road due to mining in Appin Areas 7 and 9

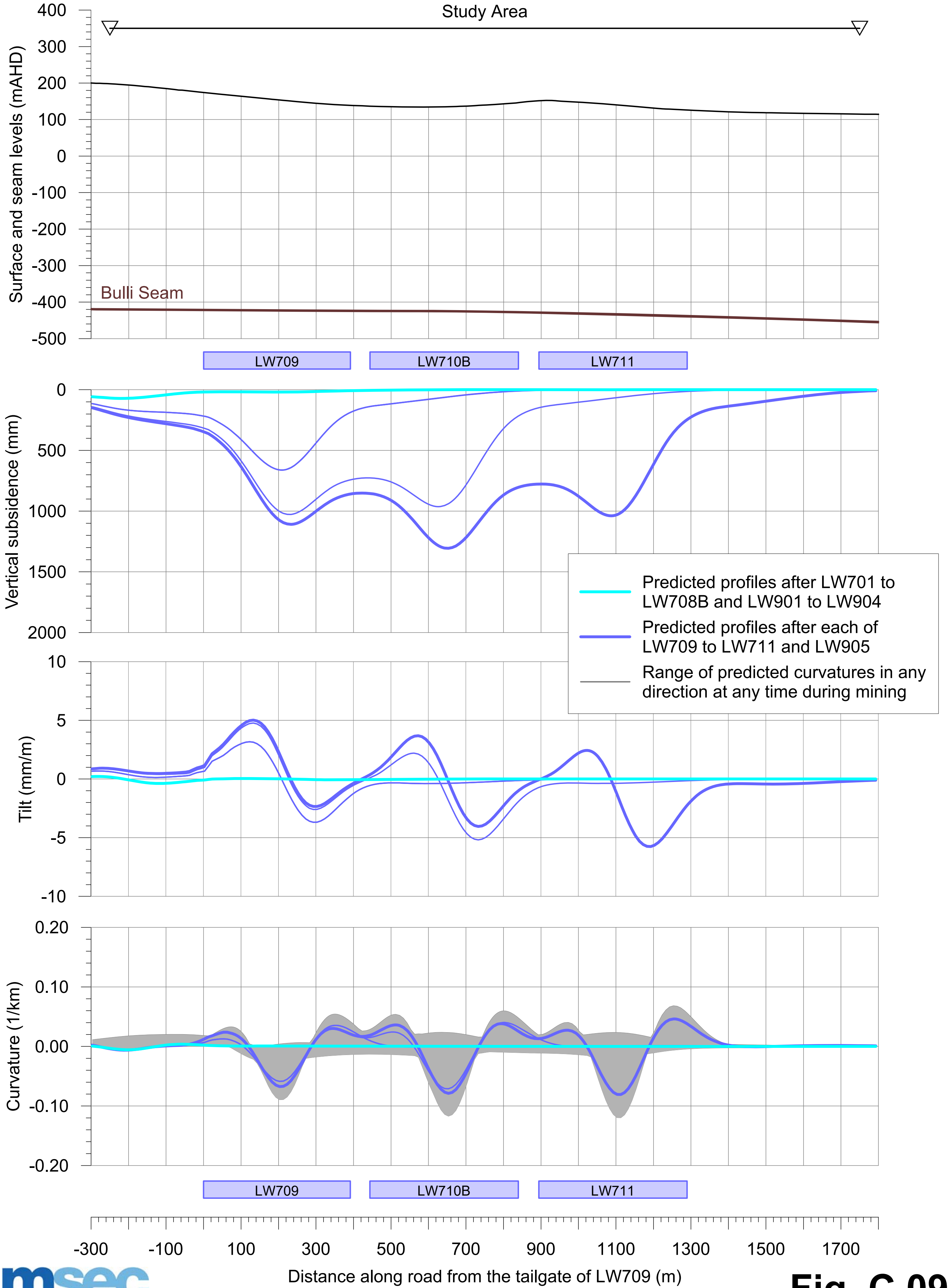

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Fig. C.09

Predicted profiles of vertical subsidence, tilt along and tilt across the 66 kV Powerline Branch 1 due to mining in Appin Areas 7 and 9

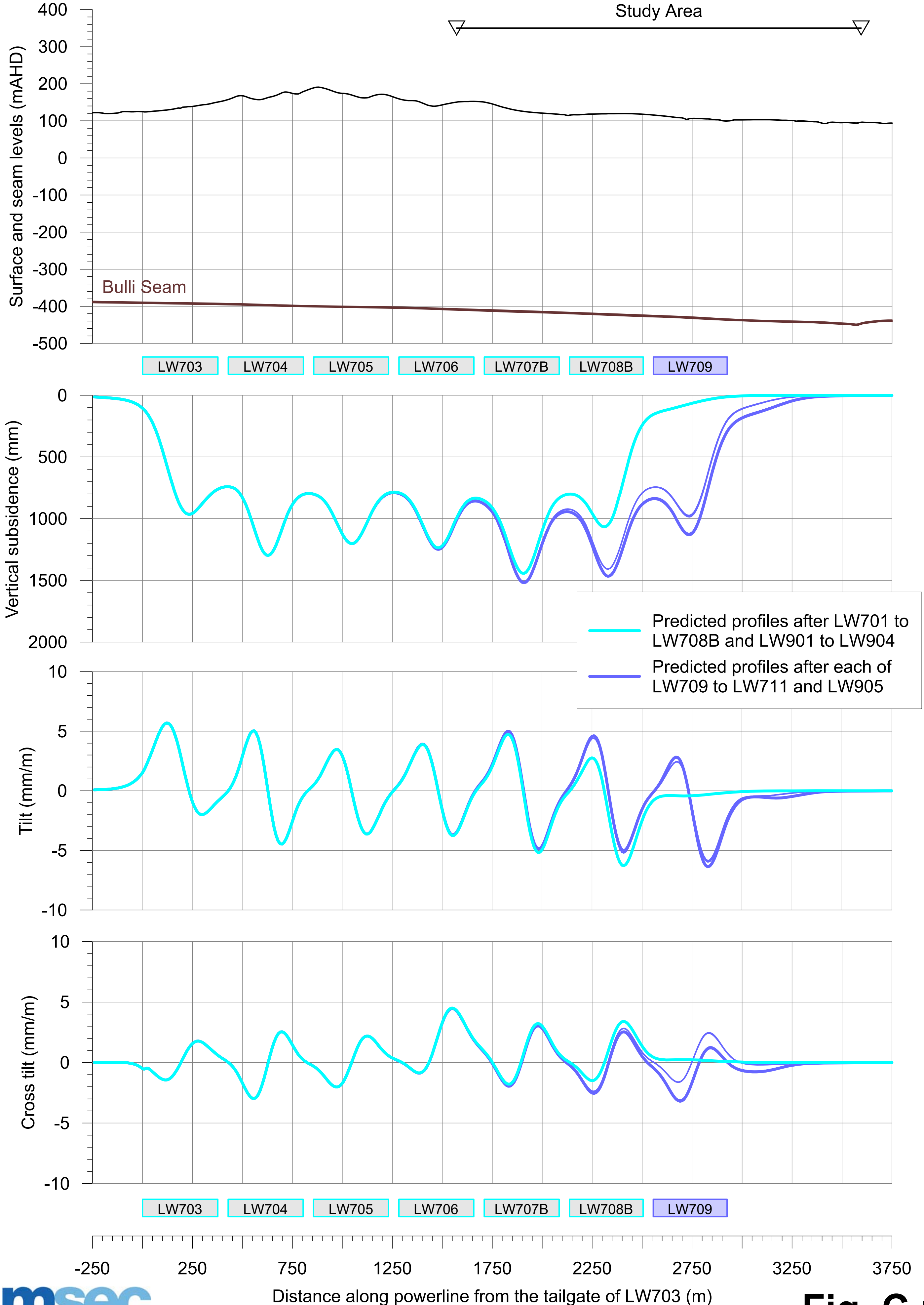

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Fig. C.10

Predicted profiles of vertical subsidence, tilt along and tilt across the 66 kV Powerline Branch 2 due to mining in Appin Areas 7 and 9

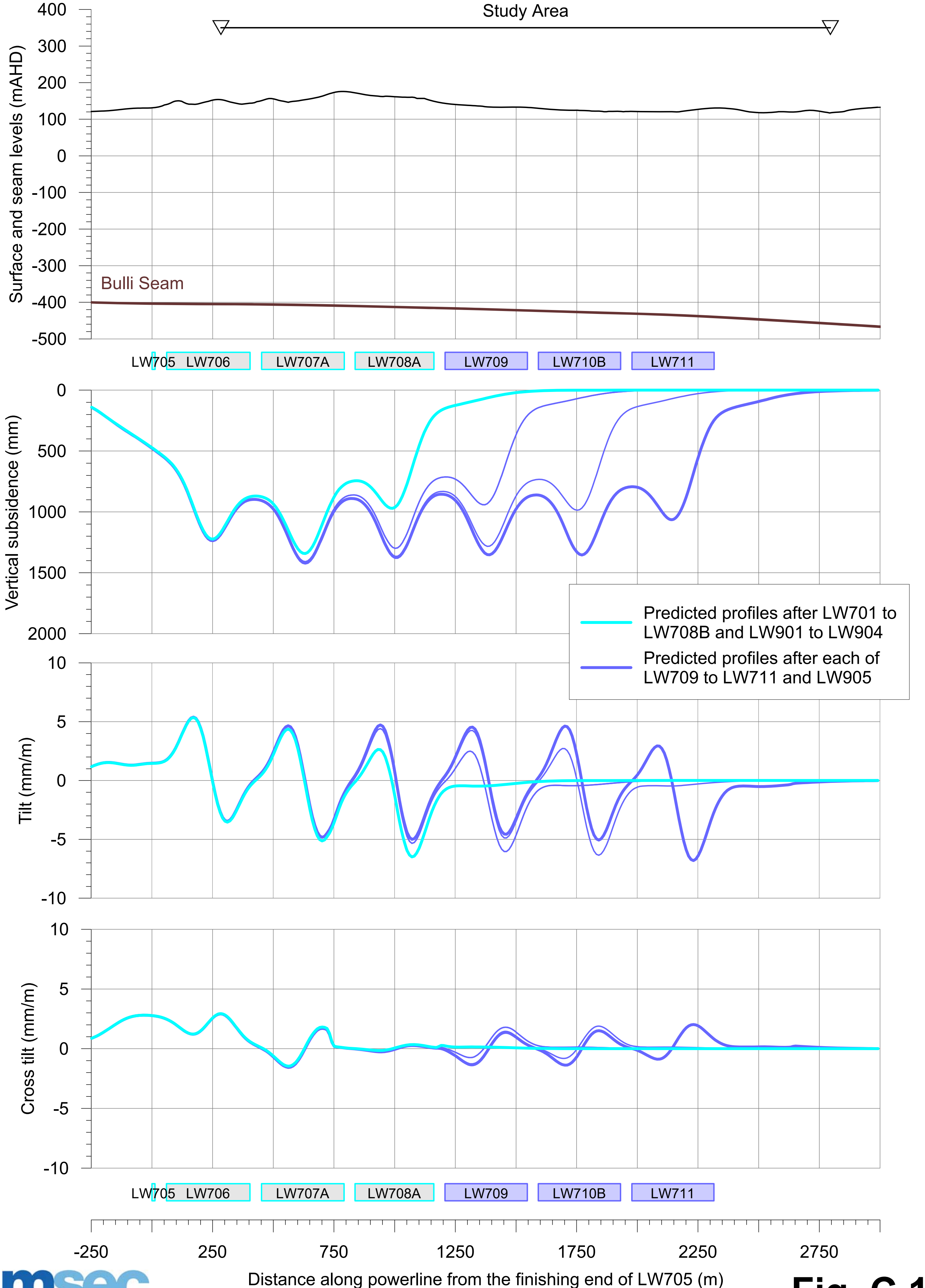

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Fig. C.11

Predicted profiles of vertical subsidence, tilt along and tilt across the 66 kV Powerline Branch 3 due to mining in Appin Areas 7 and 9

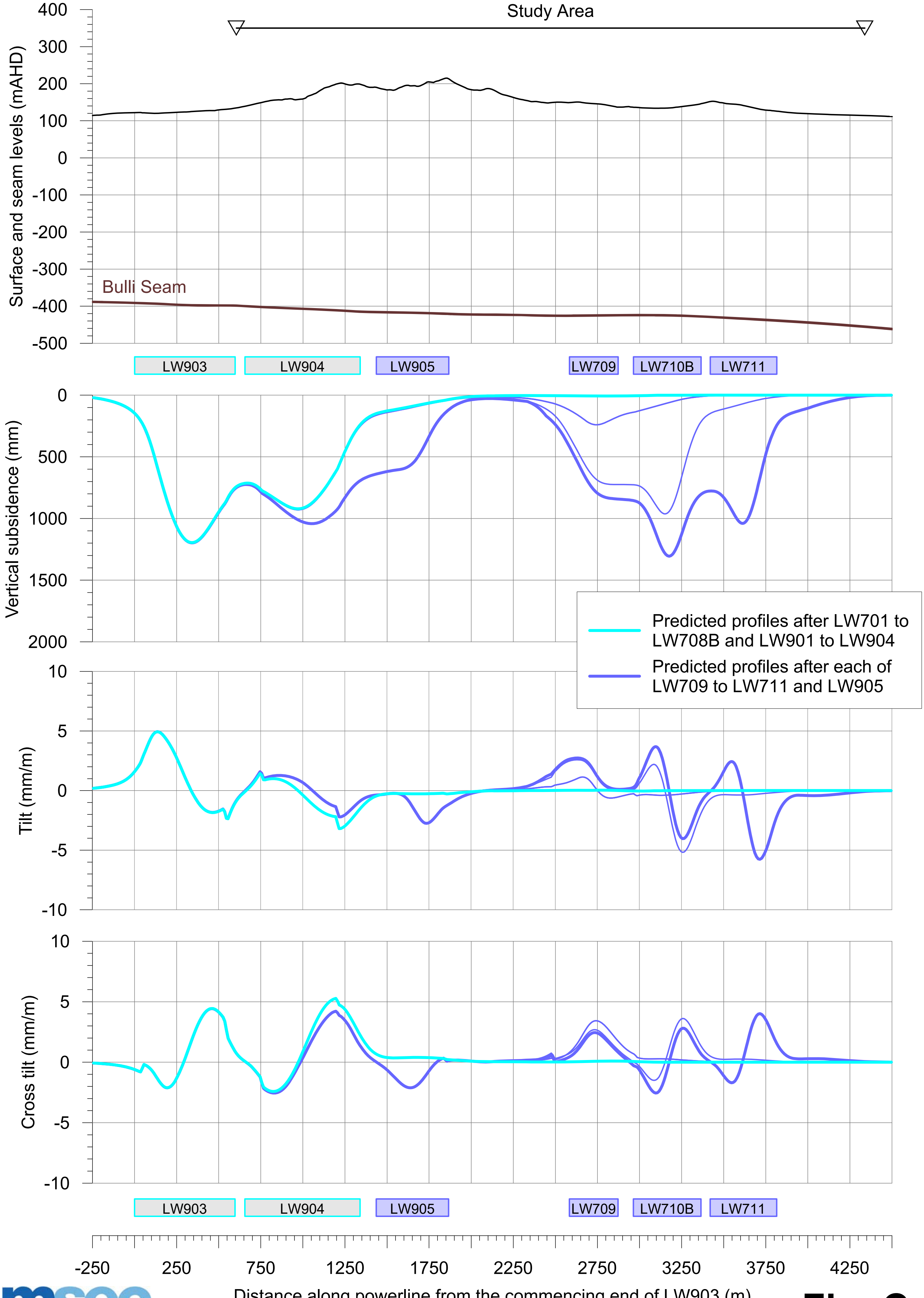

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Fig. C.12

Predicted profiles of vertical subsidence, tilt and curvature along the Telstra Optical Fibre Cable (2) due to mining in Appin Areas 7 and 9

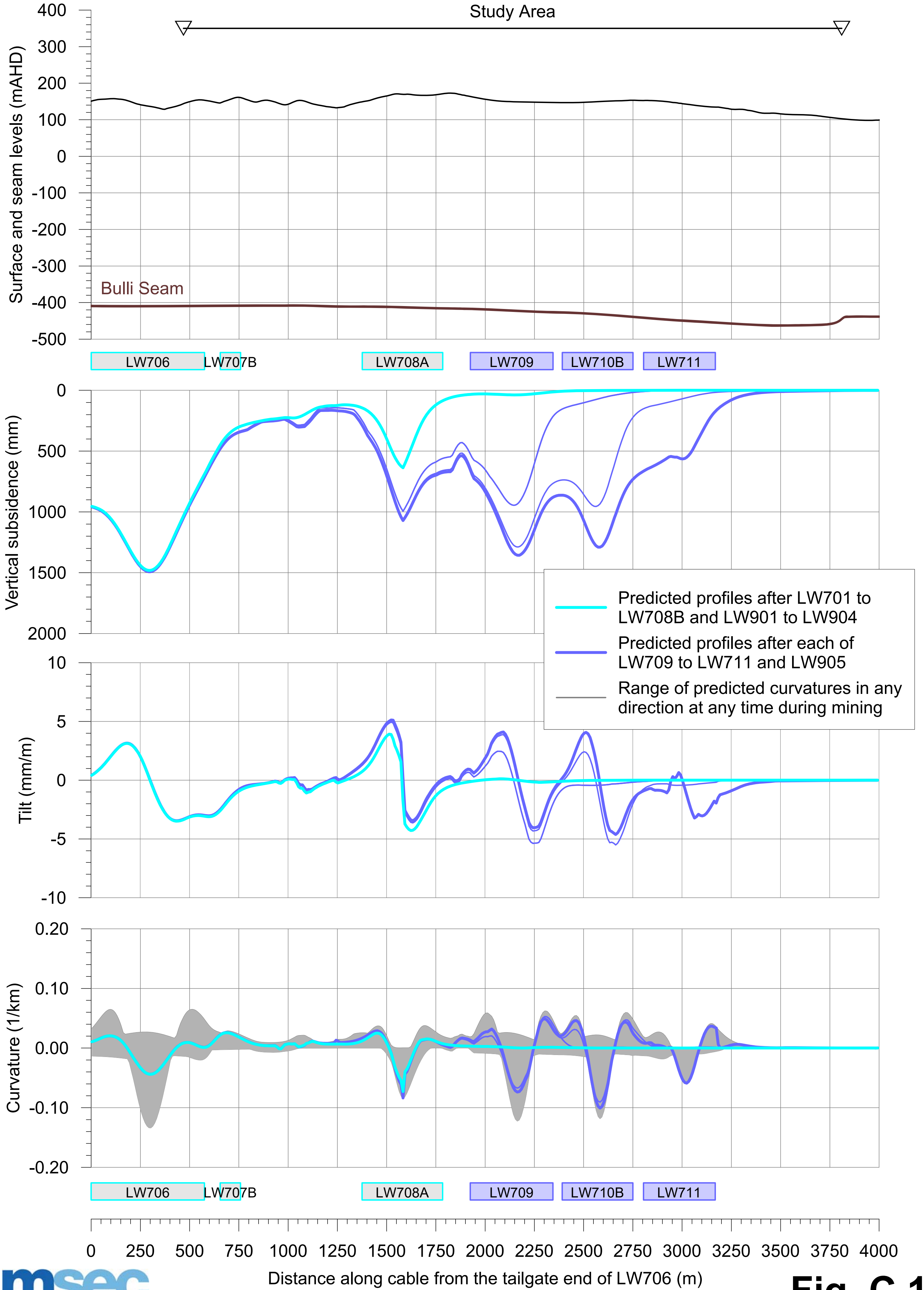

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Fig. C.13

Predicted profiles of vertical subsidence, tilt and curvature along the Telstra Optical Fibre Cable (3) due to mining in Appin Areas 7 and 9

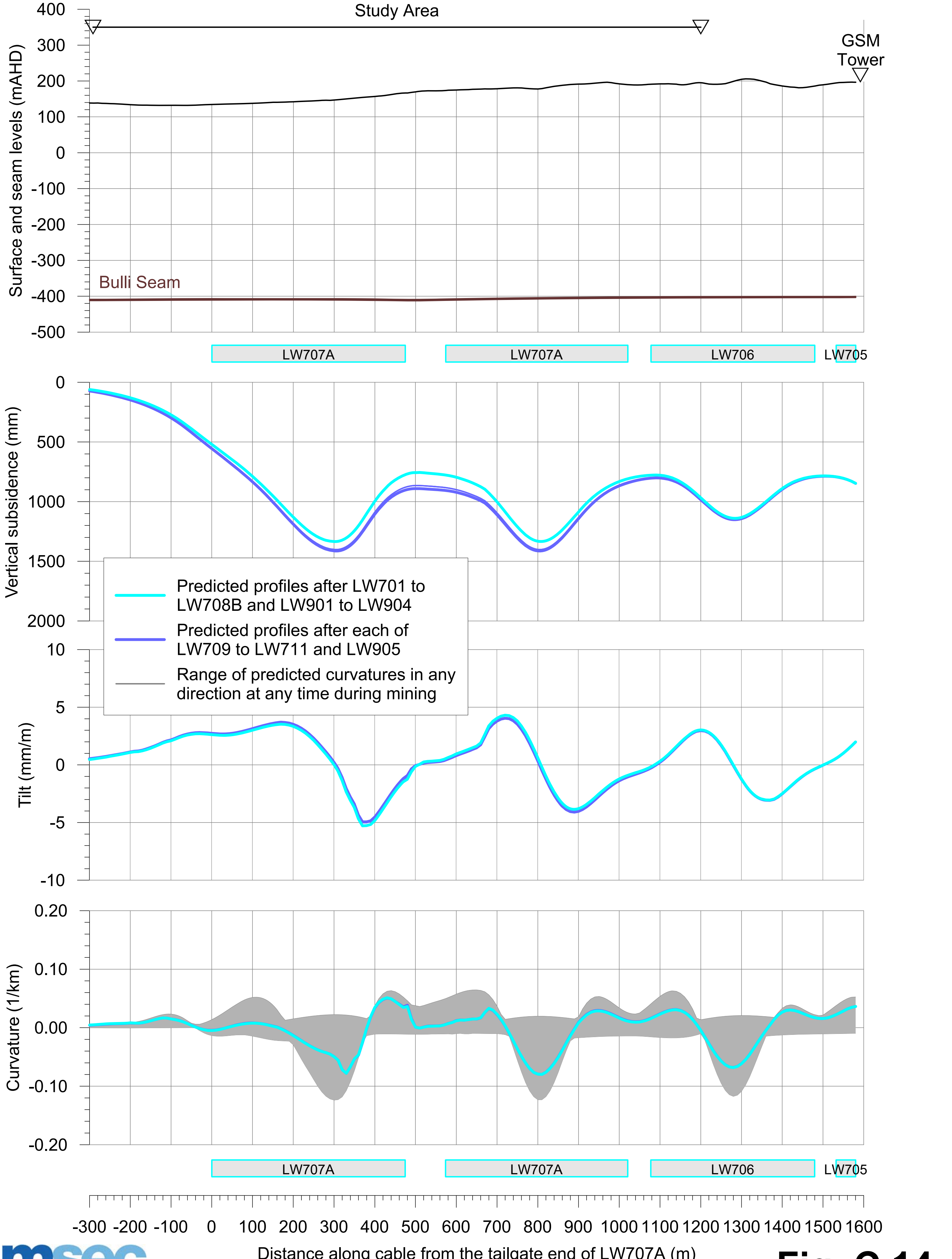

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Fig. C.14

Predicted profiles of vertical subsidence, tilt and curvature along the Tesltra Optical Fibre Cable (4) due to mining in Appin Areas 7 and 9

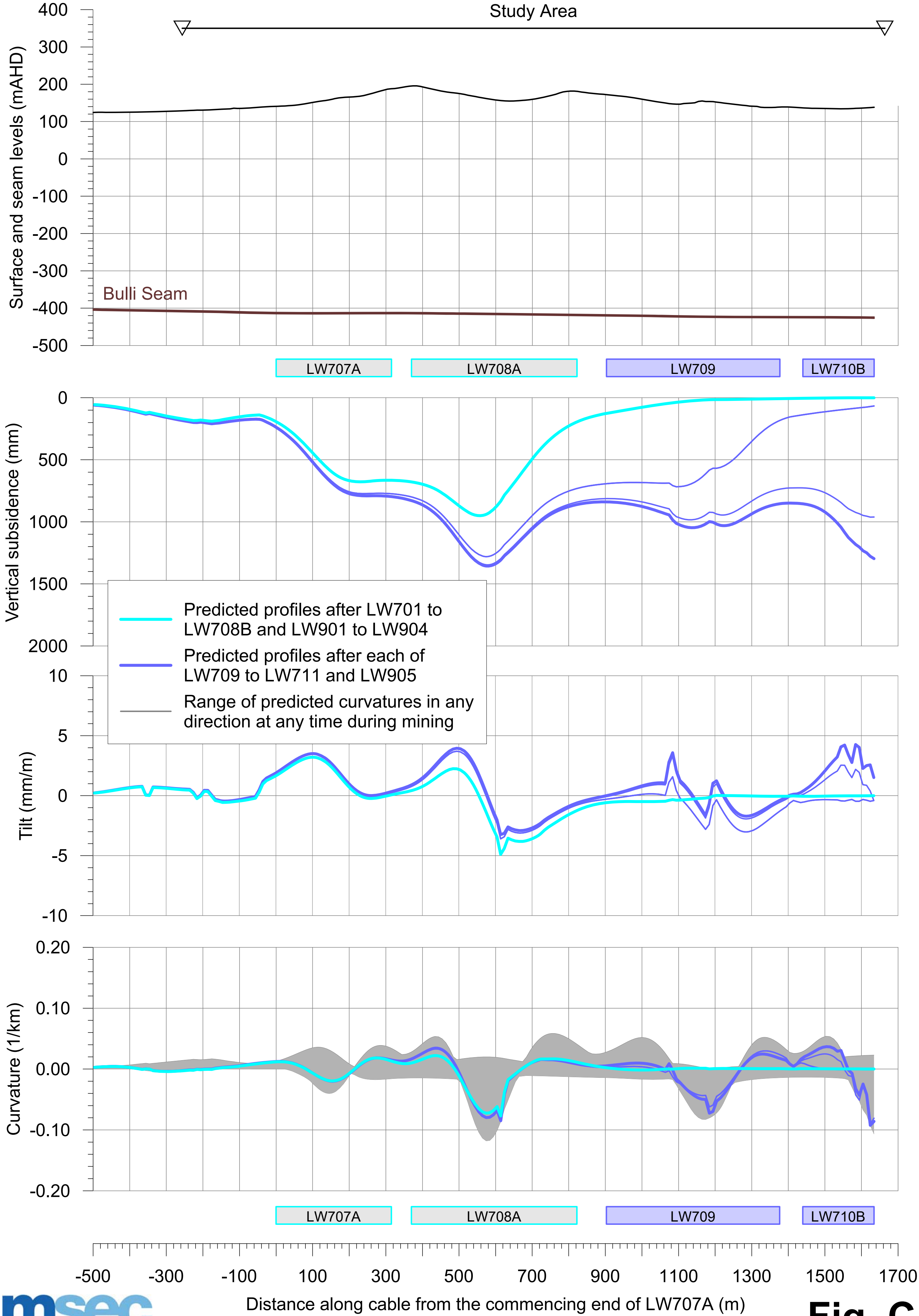

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Fig. C.15

APPENDIX D. TABLES

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Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
A06a	291236	6218373	House	-	27	316		1	1				1			1		1						
A06b	291202	6218403	Rural	Shed	14	117															1			
A06c	291290	6218369	House	-	17	207		1	1				1				1	1						
A06f	291348	6218340	Rural	Shed	7	32															1			
A06g	291290	6218270	Rural	Shed	8	42															1			
A06h	291264	6218303	Rural	Shed	5	14															1			
A06i	291177	6218298	Rural	Shed	6	24															1			
A06j	291172	6218302	Rural	Shed	4	9															1			
A06l	291339	6218319	Rural	Shed	4	10															1			
A06n	291343	6218396	Rural	Shed	5	9															1			
A06p	291220	6218375	Rural	Shed	15	81															1			
A06t03	291258	6218391	Tank	-	8	48																		
A06t04	291270	6218390	Tank	-	2	2																		
A06t05	291270	6218388	Tank	-	2	2																		
A06t07	291320	6218306	Tank	-	7	43																		
A24h01	289802	6217107	House	-	26	357	On	1	1				1			1		1						
A24p01	289803	6217120	Pool	-	9	43																		
A24r01	289793	6217128	Rural	Garage	11	83															1			
A24r02	289804	6217082	Rural	Shed	11	61															1			
A24r03	289485	6217061	Rural	Shed	10	47															1			
A24r04	289496	6217040	Rural	Shed	5	23															1			
A24r06	289487	6217045	Rural	Shed	9	65															1			
A24t01	289484	6217033	Tank	-	5	22																		
A24t03	289805	6217087	Tank	-	2	2																		
C01a	289550	6217189	House	-	21	236	On	1	1					1		1				1				
C01b	289565	6217189	Rural	Shed	10	84															1			
C01p01	289562	6217171	Pool	-	10	42																		
C01t01	289540	6217188	Tank	-	4	13																		
C02a	289842	6217216	House	-	18	248	On	1	1				1			1		1						
C02b	289858	6217206	Rural	Shed	12	81															1			
C02c	289862	6217198	Rural	Shed	9	27															1			
C02d	289913	6217186	Rural	Shed	3	7															1			
C02p01	289869	6217198	Pool	-	10	35																		
C02t01	289866	6217216	Tank	-	4	11																		
C02t03	289850	6217205	Tank	-	2	3																		
C03a	290043	6217100	House	-	30	314	On	1		1			1				1	1						
C03b	290032	6217077	Rural	Shed	12	57															1			
C03c	290050	6217166	Rural	Shed	6	12															1			
C03d	290047	6217251	Rural	Shed	5	11															1			
C03e	289955	6217254	Rural	Shed	4	10															1			
C03f	289972	6217299	Rural	Shed	15	101															1			
C03g	289980	6217310	Rural	Shed	4	12															1			
C03h	289978	6217307	Rural	Shed	4	12															1			
C03r01	290036	6217083	Rural	Carport	7	38															1			
C03t02	290045	6217083	Tank	-	3	8																		
C03t03	289971	6217289	Tank	-	2	4																		

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses				House Wall Type			House Roof Type		House Footing Type			Other Structures			
									Single Storey with Length less than 30 metres H1	Single Storey with Length greater than 30 metres H2	Double Storey with Length less than 30 metres H3	Double Storey with Length greater than 30 metres H4	Brick or Brick Veneer	Weatherboard	Fibro	Tiled	Metal Sheet	Slab on Ground	Suspended on Piered Footings	Suspended on Strip Footings	Rural R	Public Amenities PA	Public Utilities PU	Commerical C
C04a	289817	6217521	House	-	29	424	Bottom	1	1				1				1	1						
C04b	289894	6217500	Rural	Shed	7	24															1			
C04c	289947	6217464	Rural	Shed	8	55															1			
C04p01	289834	6217521	Pool	-	9	29																		
C04r01	289947	6217469	Rural	Shed	8	29															1			
C04t01	289812	6217498	Tank	-	5	20																		
C06a	290056	6217828	House	-	21	263		1	1				1				1	1						
C06b	290060	6217808	Rural	Garage	9	60															1			
C06c	290068	6217809	Rural	Shed	2	5															1			
C06d	290142	6217803	Rural	Shed	13	124															1			
C06r01	290044	6217813	Rural	Shed	4	14															1			
C06t01	290071	6217797	Tank	-	8	45																		
C06t02	290151	6217798	Tank	-	2	4																		
C09a	290052	6218266	House	-	37	412		2				1	1	1			1	1						
C09p01	290075	6218278	Pool	-	15	76																		
C09t01	290060	6218291	Tank	-	8	49																		
C10a	290060	6218377	House	-	19	239		1	1				1			1		1						
C10b	290068	6218351	Rural	Shed	7	50															1			
C10c	290045	6218333	Rural	Shed	11	97															1			
C10e	290062	6218394	Rural	Garage	6	38															1			
C10f	290067	6218387	Rural	Shed	2	24															1			
C10g	290068	6218391	Rural	Shed	2	40															1			
C10h	290075	6218413	Rural	Shed	7	17															1			
C10r01	290056	6218383	Rural	Pergola	10	53															1			
C10t01	290068	6218404	Tank	-	8	55																		
C10t04	290081	6218336	Tank	-	2	3																		
C10t05	290043	6218326	Tank	-	2	2																		
C11a	290552	6218422	Rural	Shed	16	80															1			
C11b	290577	6218424	Rural	Shed	9	15															1			
C11c	290592	6218428	Rural	Shed	3	9															1			
C11d	290529	6218431	Rural	Shed	10	106															1			
C11f	290517	6218439	Rural	Shed	5	10															1			
C11g	290513	6218393	Rural	Shed	2	3															1			
C11r01	290572	6218423	Rural	Shed	5	13															1			
C11r02	290556	6218428	Rural	Shed	5	13															1			
C11t01	290547	6218418	Tank	-	2	4																		
C11t02	290559	6218427	Tank	-	2	4																		
C12f	290454	6219257	Rural	Shed	3	9															1			
C12g	290446	6219155	Rural	Shed	14	111															1			
C12t02	290454	6219151	Tank	-	3	7																		
C20h01	289906	6219226	House	-	47	710	Bottom	2				1		1			1		1					
C20p01	289919	6219225	Pool	-	12	67																		
C20r01	289919	6219268	Rural	Shed	5	18															1			
C20r02	289921	6219244	Rural	Gazebo	9	62															1			
D03r01	289310	6219226	Rural	Shed	19	189															1			
D05a	289261	6219040	House	-	25	609		1	1				1			1								

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
D05b	289275	6219063	Rural	Awning	21	69															1			
D05c	289275	6219078	Rural	Garage	13	103															1			
D05d	289267	6219024	Rural	Shed	6	29															1			
D05e	289300	6219087	Rural	Shed	9	31															1			
D05f	289296	6219102	Rural	Shed	15	163															1			
D05g	289405	6218986	Rural	Shed	4	19															1			
D05h	289084	6219112	Rural	Shed	8	37															1			
D05p01	289271	6219034	Pool	-	10	47																		
D05r01	289297	6219085	Rural	Shed	3	10															1			
D05t01	289304	6219063	Tank	-	7	40																		
D05t02	289307	6219100	Tank	-	3	7																		
D06a	289014	6219008	House	-	30	372		1		1			1				1	1						
D06b	289014	6218968	Rural	Shed	21	386															1			
D06d	289045	6218952	Rural	Shed	3	8															1			
D06e	289097	6218939	Rural	Shed	6	15															1			
D06f	289029	6219052	Rural	Shed	4	8															1			
D06r01	289017	6218954	Rural	Shed	4	15															1			
D06r02	289017	6218947	Rural	Shed	5	16															1			
D06t01	289017	6219032	Tank	-	8	47																		
D06t02	289026	6218953	Tank	-	4	10																		
D07a	289447	6219130	House	-	27	479		1	1							1								
D07b	289441	6219110	Rural	Awning	11	31															1			
D07c	289418	6219132	Rural	Garage	11	78															1			
D07d	289404	6219125	Rural	Shed	4	17															1			
D07f	289488	6219165	Rural	Shed	4	15															1			
D07g	289642	6219280	Rural	Shed	4	16															1			
D07p01	289445	6219114	Pool	-	9	55																		
D07r01	289424	6219100	Tennis court	-	33	563																		
D07t01	289449	6219157	Tank	-	7	39																		
D07t02	289464	6219136	Tank	-	4	10																		
D08a	289787	6219120	House	-	25	510		1	1				1				1							
D08b	289794	6219086	Rural	Shed	7	49															1			
D08c	289714	6219055	Rural	Shed	8	39															1			
D08p01	289771	6219105	Pool	-	8	26																		
D08r01	289809	6219097	Rural	Shed	6	26															1			
D08r02	289773	6219143	Rural	Shed	7	24															1			
D08r03	289738	6219130	Rural	Shed	3	11															1			
D08t01	289785	6219095	Tank	-	8	46																		
D08t02	289777	6219091	Tank	-	7	35																		
D09a	289551	6218926	House	-	23	367		1	1					1		1			1					
D09b	289511	6218886	Rural	Shed	5	19															1			
D09c	289507	6218880	Rural	Shed	6	20															1			
D09e	289786	6218874	Rural	Shed	3	11															1			
D09p01	289577	6218944	Pool	-	7	25																		
D10a	289853	6218961	House	-	41	517	Bottom	1		1			1				1	1						
D10c	289897	6218918	Rural	Garage	10	67															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
D10d	289896	6218962	Rural	Shed	4	14															1			
D10f	289884	6218985	Rural	Shed	4	12															1			
D10p01	289833	6218952	Pool	-	11	52																		
D10r01	289925	6218916	Rural	Shed	19	125															1			
D10r02	289862	6218980	Rural	Carport	5	16															1			
D10r03	289845	6218959	Rural	Pergola	8	44															1			
D10r04	289829	6218955	Rural	Pergola	5	17															1			
D10t01	289901	6218913	Tank	-	3	8																		
D10t02	289898	6218913	Tank	-	2	2																		
D10t03	289931	6218912	Tank	-	3	8																		
D10t04	289935	6218914	Tank	-	3	8																		
D11a	289948	6218814	House	-	29	366	Bottom	1	1				1			1		1						
D11b	289960	6218831	Rural	Shed	13	91															1			
D11c	289909	6218808	Rural	Shed	6	20															1			
D11d	289819	6218821	Rural	Shed	6	27															1			
D11p01	289942	6218831	Pool	-	9	36																		
D11r01	289935	6218803	Rural	Shed	3	8															1			
D11t01	289922	6218811	Tank	-	6	26																		
D11t02	289957	6218841	Tank	-	2	5																		
D12a	289941	6218792	House	-	28	325	Bottom	1	1					1			1			1				
D12b	289891	6218788	House	-	31	260	Bottom	1		1							1	1						
D12c	289950	6218763	Rural	Shed	4	13															1			
D12d	289812	6218732	Rural	Shed	4	13															1			
D12e	289950	6218711	Rural	Shed	10	46															1			
D12f	289857	6218809	Rural	Shed	5	24															1			
D12r01	289804	6218722	Rural	Shed	6	18															1			
D12t01	289924	6218775	Tank	-	7	39																		
D12t02	289916	6218780	Tank	-	2	2																		
D12t03	289918	6218779	Tank	-	2	2																		
D12t04	289870	6218798	Tank	-	3	8																		
D13a	289947	6218673	House	-	26	271	Bottom	1	1				1				1			1				
D13b	289892	6218664	Rural	Shed	16	142															1			
D13c	289867	6218667	Rural	Shed	9	40															1			
D13d	289859	6218680	Rural	Shed	7	19															1			
D13p01	289939	6218690	Pool	-	7	18																		
D13t01	289948	6218661	Tank	-	4	10																		
D14a	289556	6218708	House	-	23	371		2			1		1			1				1				
D14b	289577	6218755	Rural	Shed	9	58															1			
D14r01	289538	6218698	Rural	Shed	3	5															1			
D14t01	289546	6218738	Tank	-	7	43																		
D15a	289350	6218750	House	-	51	794		1		1			1			1		1						
D15b	289405	6218706	Rural	Shed	17	230															1			
D15c	289384	6218770	Rural	Gazebo	7	42															1			
D15d	289427	6218699	Rural	Shed	10	70															1			
D15p01	289370	6218774	Pool	-	13	60																		
D15t01	289411	6218699	Tank	-	2	5																		

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
D17a	289525	6218591	House	-	16	163		1	1				1			1				1				
D17b	289520	6218584	Rural	Carport	5	21															1			
D17c	289489	6218594	Rural	Shed	9	60															1			
D17p01	289515	6218609	Pool	-	9	32																		
D17t01	289514	6218582	Tank	-	5	17																		
D17t02	289490	6218587	Tank	-	3	7																		
D18a	289904	6218449	House	-	31	558		1		1			1	1		1		1						
D18b	289918	6218423	Rural	Shed	10	101															1			
D18d	289839	6218448	Rural	Shed	3	9															1			
D18e	289781	6218488	Rural	Shed	3	7															1			
D18f	289887	6218473	Rural	Shed	4	14															1			
D18p01	289878	6218462	Pool	-	12	53																		
D18r01	289920	6218416	Rural	Shed	6	20															1			
D18r02	289929	6218390	Rural	Shed	8	29															1			
D19a	289796	6218257	House	-	38	828	On	2				1	1			1		1						
D19d	289843	6218283	Rural	Shed	4	13															1			
D19p01	289775	6218259	Pool	-	7	20																		
D19r01	289766	6218249	Rural	Carport	6	34															1			
D19r02	289758	6218282	Rural	Shed	6	31															1			
D19t01	289775	6218284	Tank	-	8	56																		
D19t03	289765	6218254	Tank	-	2	4																		
D19t04	289768	6218253	Tank	-	2	4																		
D20b	289663	6218259	Rural	Shed	9	65															1			
D20h01	289684	6218351	House	-	21	110	On	1	1				1				1	1						
D20t01	289656	6218259	Tank	-	3	8																		
D20t02	289657	6218255	Tank	-	3	8																		
D21a	289481	6218314	House	-	17	229		1	1								1	1						
D21b	289513	6218282	Rural	Shed	5	26															1			
D21c	289465	6218409	House	-	48	704	Top	1		1			1				1	1						
D21d	289451	6218391	Rural	Garage	2	116															1			
D21t01	289474	6218312	Tank	-	2	5																		
D22a	288944	6218555	House	-	34	387		2				1	1				1	1						
D22c	288980	6218569	Rural	Shed	12	75															1			
D22p01	288958	6218547	Pool	-	11	41																		
D22r01	288920	6218528	Rural	Garage	14	113															1			
D22r02	288946	6218572	Rural	Carport	7	21															1			
D22r03	289079	6218471	Rural	Shed	4	10															1			
D22r04	289118	6218553	Rural	Shed	3	10															1			
D22t01	288994	6218567	Tank	-	8	48																		
D22t02	288965	6218573	Tank	-	2	2																		
D22t03	288965	6218571	Tank	-	2	2																		
D23a	288932	6218432	House	-	24	492	Bottom	1	1				1				1	1						
D23b	288914	6218444	Rural	Garage	13	110															1			
D23d	288952	6218407	House	-	18	209	Bottom	1	1				1				1							
D23e	288958	6218429	Rural	Pergola	6	29															1			
D23f	288979	6218455	Rural	Shed	8	56															1			

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									H1	H2	H3	H4									R	PA	PU	C
D23g	288983	6218401	Rural	Garage	11	65															1			
D23h	289121	6218369	Rural	Shed	21	252															1			
D23p01	288957	6218419	Pool	-	12	39																		
D23r01	288972	6218413	Tennis court	-	33	510																		
D23r02	289071	6218426	Rural	Shed	6	21															1			
D23r03	288950	6218483	Rural	Shed	4	11															1			
D23t01	288949	6218436	Tank	-	5	16																		
D23t02	288961	6218436	Tank	-	2	4																		
D23t03	288979	6218433	Tank	-	8	48																		
D24a	288917	6218344	House	-	21	343		1	1				1				1	1						
D24b	288915	6218327	Rural	Garage	10	54															1			
D24c	288954	6218332	Rural	Shed	3	7															1			
D24d	288969	6218323	Rural	Shed	23	272															1			
D24p01	288951	6218344	Pool	-	12	61																		
D24r01	288949	6218327	Rural	Gazebo	9	60															1			
D24r02	288925	6218349	Rural	Pergola	11	83															1			
D24t01	288998	6218316	Tank	-	8	43																		
D24t02	288982	6218313	Tank	-	2	3																		
D25a	288911	6218235	House	-	23	207	Bottom	1	1				1			1		1						
D25b	288929	6218289	Rural	Shed	11	55															1			
D25r01	288926	6218224	Rural	Gazebo	9	60															1			
D26a	289591	6218235	House	-	29	515	Top	1	1				1				1			1				
D26b	289632	6218182	Rural	Shed	12	89															1			
D26p01	289594	6218248	Pool	-	9	54																		
D26t01	289639	6218177	Tank	-	3	9																		
D26t02	289567	6218218	Tank	-	2	3																		
D26t03	289566	6218220	Tank	-	2	3																		
D26t04	289567	6218231	Tank	-	8	56																		
D26t08	289537	6218258	Tank	-	3	8																		
D27a	289696	6218142	House	-	37	528		1		1			1				1	1						
D27b	289699	6218176	Rural	Shed	10	89															1			
D27p01	289678	6218141	Pool	-	11	34																		
D27r01	289676	6218127	Rural	Gazebo	9	38															1			
D27t02	289716	6218168	Tank	-	6	27																		
D27t03	289697	6218183	Tank	-	2	4																		
D28a	289796	6218030	House	-	21	169		1	1				1			1				1				
D28b	289784	6218011	Rural	Shed	8	44															1			
D28c	289835	6217998	Rural	Shed	6	50															1			
D28e	289639	6217908	Rural	Shed	8	29															1			
D28r01	289789	6218036	Rural	Carport	7	24															1			
D28r02	289784	6218006	Rural	Shed	6	24															1			
D28r03	289778	6218009	Rural	Shed	11	61															1			
D28t01	289791	6218021	Tank	-	2	5																		
D29a	289813	6217975	House	-	32	535	Bottom	2				1	1				1	1						
D29b	289723	6217933	Rural	Shed	8	32															1			
D29t01	289781	6217957	Tank	-	8	51																		

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D29t02	289781	6217947	Tank	-	8	51																		
D29t03	289783	6217936	Tank	-	8	51																		
D30a	289591	6218070	House	-	39	674		1		1			1				1			1				
D30b	289585	6218034	Rural	Shed	3	7															1			
D30c	289599	6218035	House	-	18	188		1	1				1				1			1				
D30e	289399	6218069	Rural	Shed	13	142															1			
D30t01	289567	6218043	Tank	-	8	54																		
D30t02	289574	6218019	Tank	-	2	2																		
D30t03	289576	6218018	Tank	-	2	2																		
D31a	288938	6218127	House	-	14	140	Bottom	1	1								1	1						
D31b	288897	6218143	Rural	Shed	11	78															1			
D31d	288885	6218123	House	-	25	296	Bottom	1	1				1				1	1						
D31t01	288896	6218105	Tank	-	8	51																		
D31t02	288941	6218134	Tank	-	2	3																		
D31t03	288942	6218136	Tank	-	2	3																		
D32a	288858	6217974	House	-	28	326		1	1				1				1	1						
D32c	288868	6217929	Rural	Shed	10	67															1			
D32r01	288871	6217968	Rural	Shed	9	50															1			
D32r02	288864	6217959	Rural	Carport	7	21															1			
D32t01	288866	6217993	Tank	-	8	48																		
D32t02	288875	6217992	Tank	-	2	3																		
D33a	288993	6217825	House	-	23	332	Bottom	1	1								1	1						
D33b	288958	6217810	Rural	Shed	12	108															1			
D33c	289016	6217854	Rural	Shed	6	21															1			
D33d	288962	6217851	Rural	Shed	5	15															1			
D33e	288951	6217810	Rural	Shed	9	33															1			
D33f	288966	6217809	Rural	Shed	9	32															1			
D33p01	289004	6217861	Pool	-	8	32																		
D33t01	288983	6217803	Tank	-	8	46																		
D34a	289179	6217863	House	-	36	567		1		1			1				1	1						
D34b	289175	6217825	Rural	Shed	11	75															1			
D34c	289179	6217795	Rural	Shed	18	244															1			
D34t01	289200	6217852	Tank	-	7	38																		
D34t02	289185	6217784	Tank	-	2	4																		
D34t03	289182	6217784	Tank	-	2	4																		
D35a	289771	6217775	House	-	21	272		1	1				1			1		1		1				
D35b	289709	6217629	Rural	Shed	12	52															1			
D35t01	289742	6217773	Tank	-	8	45																		
D37a	289404	6217552	House	-	20	247	On	1	1				1			1				1				
D37b	289396	6217543	Rural	Shed	7	41															1			
D37c	289314	6217528	Rural	Shed	14	135															1			
D37t01	289385	6217555	Tank	-	8	53																		
D37t02	289307	6217522	Tank	-	3	7																		
D38a	289105	6217641	House	-	35	414	Bottom	1		1						1				1				
D38b	289103	6217603	Rural	Shed	22	153															1			
D38c	289086	6217594	Rural	Shed	6	36															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
D38d	289116	6217601	Rural	Shed	7	21															1			
D38e	289114	6217590	Rural	Shed	3	8															1			
D38f	289121	6217589	Rural	Shed	4	9															1			
D38h	289157	6217735	Tennis court	-	32	501																		
D38i	289155	6217754	Rural	Shed	4	14															1			
D38k	289164	6217581	Rural	Shed	2	25															1			
D39a	289040	6217776	Rural	Shed	5	23															1			
D39r01	289020	6217776	Rural	Shed	17	185															1			
D39t01	289023	6217783	Tank	-	2	3																		
D39t02	289029	6217782	Tank	-	2	3																		
D39t03	288998	6217768	Tank	-	2	3																		
D39t04	289040	6217770	Tank	-	2	2																		
D40a	288843	6217698	House	-	32	338	Bottom	1		1			1				1	1						
D40b	288865	6217717	Rural	Garage	9	60															1			
D40r01	288835	6217677	Rural	Garage	11	93															1			
D40t02	288871	6217718	Tank	-	2	3																		
D40t03	288870	6217716	Tank	-	2	3																		
D41a	288907	6217557	House	-	26	451	Bottom	1	1								1	1						
D41b	288931	6217530	Rural	Shed	14	214															1			
D41c	288936	6217516	Rural	Shed	8	223															1			
D41d	288911	6217442	Rural	Shed	4	13															1			
D41p01	288911	6217577	Pool	-	9	30																		
D41t01	288941	6217555	Tank	-	9	60																		
D42r01	289032	6217302	Rural	Shed	11	53															1			
D43a	289264	6217171	House	-	31	417	On	1		1							1			1				
D43r01	289311	6217243	Rural	Shed	12	84															1			
D43t01	289247	6217192	Tank	-	8	46																		
D44a	289399	6217403	House	-	22	356	On	1	1				1			1		1						
D44c	289425	6217390	Rural	Shed	12	77															1			
D44d	289407	6217440	Rural	Shed	6	23															1			
D44e	289393	6217392	Rural	Shed	5	26															1			
D44f	289412	6217424	Rural	Shed	8	22															1			
D44h	289415	6217426	Rural	Shed	2	3															1			
D44k	289453	6217416	Rural	Shed	3	5															1			
D44p01	289403	6217427	Pool	-	12	53																		
D44t01	289418	6217416	Tank	-	7	36																		
D44t02	289422	6217433	Tank	-	2	2																		
D45a	289707	6217307	House	-	25	279	On	2			1		1				1	1						
D45p01	289696	6217303	Pool	-	8	26																		
D45t01	289704	6217292	Tank	-	5	16																		
D45t02	289699	6217291	Tank	-	3	6																		
D46a	289610	6217242	House	-	30	386	On	1		1			1			1		1						
D46r01	289634	6217215	Rural	Shed	8	54															1			
D46r02	289627	6217218	Rural	Shed	7	39															1			
D46t01	289635	6217244	Tank	-	5	17																		
D46t02	289588	6217242	Tank	-	2	3																		

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres	Houses: Single Storey with Length greater than 30 metres	Houses: Double Storey with Length less than 30 metres	Houses: Double Storey with Length greater than 30 metres	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural	Other Structures: Public Amenities	Other Structures: Public Utilities	Other Structures: Commerical
									H1	H2	H3	H4									R	PA	PU	C
D46t03	289587	6217240	Tank	-	2	3																		
D47a	289396	6217278	House	-	33	364	On	1		1			1			1		1						
D47b	289379	6217275	Rural	Shed	11	39															1			
D47c	289346	6217270	Rural	Shed	7	40															1			
D47d	289366	6217266	Tennis court	-	33	487																		
D47t01	289375	6217283	Tank	-	4	12																		
D47t02	289402	6217291	Tank	-	5	23																		
D48a	289406	6217180	House	-	20	253	On	1	1					1			1			1				
D48b	289432	6217196	Rural	Shed	15	127															1			
D48c	289397	6217190	Rural	Shed	4	14															1			
D48d	289391	6217188	Rural	Shed	3	4															1			
D48e	289397	6217167	Rural	Shed	10	57															1			
D48f	289400	6217157	Rural	Shed	3	5															1			
D48g	289391	6217184	Rural	Shed	2	3															1			
D48t01	289393	6217173	Tank	-	5	18																		
D48t02	289392	6217180	Tank	-	4	15																		
D49h01	289412	6217023	House	-	21	255	On	1	1					1			1	1						
D49r01	289419	6217047	Rural	Shed	17	111															1			
D49t02	289418	6217011	Tank	-	4	10																		
D50h01	289302	6216937	House	-	15	201	On	1	1					1			1			1				
D50r01	289266	6216952	Rural	Shed	8	46															1			
D50r02	289265	6216943	Rural	Shed	6	11															1			
D50t01	289319	6216939	Tank	-	5	18																		
D51h01	289098	6217104	House	-	48	726	On	1		1			1			1		1						
D51r01	289166	6217097	Rural	Shed	17	230															1			
D51r02	289152	6217101	Rural	Shed	7	22															1			
D51r03	288833	6217119	Rural	Shed	47	123															1			
D52h01	288854	6217005	House	-	23	208	Top	1	1				1			1		1						
D52r01	288879	6217014	Rural	Shed	7	42															1			
D52r02	288872	6217009	Rural	Shed	10	72															1			
D52r03	288883	6217017	Rural	Shed	6	28															1			
D52r04	288880	6217030	Rural	Shed	6	18															1			
D52r05	288858	6216998	Rural	Pergola	10	40															1			
D52t01	288839	6216990	Tank	-	7	36																		
D53f	288754	6216968	Rural	Shed	3	7															1			
D53h01	288768	6216972	House	-	27	339	Top	1	1				1			1		1						
D53r01	288792	6216978	Rural	Shed	9	63															1			
D53r02	288790	6216961	Rural	Shed	4	13															1			
D53r03	288722	6216951	Rural	Shed	5	23															1			
D53r04	288783	6216920	Rural	Shed	7	19															1			
D53t01	288747	6216967	Tank	-	8	57																		
D53t02	288755	6216961	Tank	-	2	5																		
D53t03	288794	6216973	Tank	-	2	3																		
D54h01	289042	6216626	House	-	21	290	Bottom	1	1					1			1		1					
D54p01	289035	6216611	Pool	-	7	21																		
D54r01	289014	6216648	Rural	Garage	14	181															1			

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Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
D54r02	289009	6216660	Rural	Shed	11	43															1			
D54r03	288932	6216664	Rural	Shed	11	109															1			
D54t01	289035	6216646	Tank	-	8	56																		
D54t04	288929	6216653	Tank	-	5	23																		
D55h01	289212	6216872	House	-	20	400	On	1	1								1			1				
D55r01	289197	6216892	Rural	Shed	7	33															1			
D55t01	289189	6216866	Tank	-	8	49																		
D56h01	289297	6218272	House	-	26	420	Bottom	1	1								1			1				
D56t01	289277	6218265	Tank	-	8	46																		
D57h01	288872	6217759	House	-	15	125	On	1	1															
E15c	289510	6216693	Rural	Shed	5	17															1			
E15r01	289493	6216654	Rural	Shed	11	99															1			
E16c	289411	6216679	Rural	Shed	6	36															1			
E16e	289452	6216661	Rural	Shed	3	8															1			
E16f	289418	6216671	Rural	Shed	4	11															1			
E16h01	289432	6216656	House	-	37	388		1		1			1				1	1						
E16p01	289444	6216665	Pool	-	10	34																		
E16t02	289409	6216638	Tank	-	2	5																		
E16t03	289410	6216641	Tank	-	2	5																		
E16t04	289406	6216679	Tank	-	3	9																		
E20h01	289247	6216553	House	-	34	403		1		1			1				1			1				
F02h01	288696	6216577	House	-	22	274	Bottom	1	1				1				1	1						
F02r01	288684	6216522	Rural	Shed	3	6															1			
F02r02	288693	6216542	Rural	Shed	17	156															1			
F02t02	288692	6216536	Tank	-	4	10																		
F03h01	288411	6216489	House	-	22	411	Bottom	1	1				1			1								
F03r01	288422	6216506	Rural	Shed	9	62															1			
F03r02	288448	6216513	Rural	Shed	14	138															1			
F03r03	288411	6216515	Rural	Shed	18	69															1			
F03r04	288388	6216468	Rural	Shed	6	10															1			
F03r05	288326	6216478	Rural	Shed	5	28															1			
F03r06	288477	6216428	Rural	Shed	3	5															1			
F03r07	288459	6216504	Rural	Shed	6	22															1			
F03r08	288488	6216512	Rural	Greenhouse	8	20															1			
F03r09	288382	6216495	Rural	Shed	3	6															1			
F03r10	288384	6216467	Rural	Shed	3	5															1			
F03r11	288484	6216526	Rural	Shed	10	60															1			
F03t01	288382	6216472	Tank	-	7	42																		
F03t04	288458	6216511	Tank	-	4	10																		
F03t05	288423	6216520	Tank	-	3	8																		
F04h01	288674	6216766	House	-	25	294	Top	1	1				1				1	1						
F04r01	288686	6216777	Rural	Shed	12	77															1			
F04r02	288671	6216823	Rural	Shed	3	8															1			
F04t01	288667	6216739	Tank	-	8	50																		
F04t02	288660	6216747	Tank	-	2	5																		
F05h01	288583	6216817	House	-	37	562		1		1			1			1		1						

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Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
F05r02	288544	6216801	Rural	Shed	13	86															1			
F05r03	288463	6216771	Rural	Shed	18	130															1			
F05r05	288529	6216799	Rural	Shed	4	13															1			
F05r06	288527	6216805	Rural	Shed	3	7															1			
F05t03	288545	6216792	Tank	-	3	8																		
F05t04	288560	6216817	Tank	-	2	2																		
F05t05	288565	6216785	Tank	-	3	8																		
F05t06	288574	6216788	Tank	-	7	41																		
F06h01	288722	6217100	House	-	22	275	Top	1	1				1			1		1						
F06p01	288711	6217096	Pool	-	5	13																		
F06r01	288660	6217197	Rural	Shed	11	81															1			
F06r04	288719	6217090	Rural	Pergola	16	132															1			
F06r05	288731	6217104	Rural	Carport	5	18															1			
F06r06	288696	6217214	Rural	Shed	4	10															1			
F07h01	288577	6217201	House	-	17	202		1	1					1			1		1					
F07r01	288600	6217184	Rural	Shed	11	78															1			
F07r02	288575	6217190	Rural	Shed	3	32															1			
F07r03	288561	6217249	Rural	Shed	14	43															1			
F07r04	288574	6217217	Rural	Shed	2	5															1			
F07t01	288573	6217173	Tank	-	3	7																		
F08h01	288585	6217288	House	-	27	232		2			1		1			1		1		1				
F08m	288560	6217312	Rural	Shed	5	28															1			
F08q	288568	6217255	Rural	Shed	6	23															1			
F08r01	288577	6217255	Rural	Shed	13	84															1			
F08r02	288595	6217253	Rural	Shed	5	15															1			
F08r03	288560	6217258	Rural	Shed	9	34															1			
F08r04	288552	6217278	Rural	Shed	15	103															1			
F08r05	288534	6217294	Rural	Shed	6	19															1			
F08r06	288525	6217303	Rural	Shed	4	9															1			
F08r07	288542	6217311	Rural	Shed	6	22															1			
F08r08	288557	6217310	Rural	Shed	10	25															1			
F08r09	288544	6217318	Rural	Shed	3	8															1			
F08r10	288603	6217288	Rural	Shed	5	12															1			
F08r11	288634	6217274	Rural	Shed	6	19															1			
F08r12	288592	6217287	Rural	Pergola	9	36															1			
F08t01	288538	6217290	Tank	-	4	11																		
F08t02	288560	6217253	Tank	-	3	6																		
F08t03	288564	6217254	Tank	-	3	7																		
F09c	288649	6217386	Rural	Shed	6	120															1			
F09f	288656	6217390	Rural	Shed	6	33															1			
F09g	288594	6217432	Rural	Shed	11	84															1			
F09h	288616	6217433	Rural	Shed	4	10															1			
F09h01	288650	6217410	House	-	30	267	Bottom	1	1				1			1		1						
F09r03	288631	6217413	Rural	Gazebo	8	38															1			
F09t01	288590	6217427	Tank	-	2	3																		
F09tc	288633	6217378	Tennis court	-	31	483																		

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Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses				House Wall Type			House Roof Type		House Footing Type			Other Structures			
									Single Storey with Length less than 30 metres	Single Storey with Length greater than 30 metres	Double Storey with Length less than 30 metres	Double Storey with Length greater than 30 metres	Brick or Brick Veneer	Weatherboard	Fibro	Tiled	Metal Sheet	Slab on Ground	Suspended on Piered Footings	Suspended on Strip Footings	Rural	Public Amenities	Public Utilities	Commerical
									H1	H2	H3	H4									R	PA	PU	C
F10a	288631	6217758	House	-	19	277	Bottom	1	1				1			1		1						
F10b	288646	6217716	Rural	Shed	13	70															1			
F10r01	288640	6217720	Rural	Carport	9	18															1			
F10r02	288612	6217748	Rural	Shed	3	10															1			
F10t01	288640	6217733	Tank	-	8	46																		
F10t02	288636	6217716	Tank	-	2	2																		
F11a	288602	6217525	House	-	29	482		1	1					1			1		1					
F11b	288581	6217533	Rural	Shed	11	75															1			
F11c	288626	6217558	Rural	Shed	5	20															1			
F11d	288597	6217501	Rural	Shed	13	87															1			
F11e	288575	6217539	Rural	Shed	4	15															1			
F11f	288551	6217594	Rural	Shed	25	344															1			
F11g	288546	6217643	Rural	Shed	7	29															1			
F11p01	288618	6217553	Pool	-	11	48																		
F12h01	288465	6217584	House	-	22	315		1	1				1				1	1						
F12p01	288473	6217566	Pool	-	13	48																		
F12r01	288459	6217564	Rural	Garage	12	78															1			
F12r02	288462	6217572	Rural	Awning	5	16															1			
F12r03	288505	6217597	Rural	Shed	18	130															1			
F12r04	288531	6217590	Rural	Shed	9	28															1			
F12r05	288479	6217554	Rural	Shed	2	4															1			
F12t01	288490	6217579	Tank	-	8	56																		
F12t02	288467	6217551	Tank	-	2	4																		
F12t03	288512	6217605	Tank	-	2	5																		
F13h01	288360	6217380	House	-	19	180	Bottom	2			1		1			1		1						
F13r01	288338	6217410	Rural	Garage	20	158															1			
F13r02	288330	6217351	Rural	Shed	4	11															1			
F13t01	288386	6217352	Tank	-	3	8																		
F13t02	288385	6217356	Tank	-	3	8																		
F13t03	288382	6217353	Tank	-	2	3																		
F13tc	288335	6217298	Tennis court	-	38	731																		
F14h01	288320	6217034	House	-	27	334	On	1	1				1				1	1						
F14p01	288326	6217011	Pool	-	8	29																		
F14p02	288321	6217010	Pool	-	2	3																		
F14r01	288301	6217049	Rural	Garage	9	76															1			
F14r02	288300	6217097	Rural	Shed	20	170															1			
F14t01	288308	6217107	Tank	-	2	5																		
F14t02	288310	6217104	Tank	-	2	5																		
F14t03	288289	6217084	Tank	-	2	5																		
F14t04	288285	6217075	Tank	-	8	48																		
F14t05	288317	6217020	Tank	-	5	18																		
F17C01	287779	6216833	Commercial	-	3	6																		1
F17C02	287786	6216820	Commercial	-	7	18																		1
F17h01	288119	6217170	House	-	25	355	Bottom	1	1				1				1							
F17p01	288123	6217160	Pool	-	7	19																		
F17r01	288109	6217154	Rural	Garage	10	95															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres	Houses: Single Storey with Length greater than 30 metres	Houses: Double Storey with Length less than 30 metres	Houses: Double Storey with Length greater than 30 metres	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural	Other Structures: Public Amenities	Other Structures: Public Utilities	Other Structures: Commerical
									H1	H2	H3	H4									R	PA	PU	C
F17r02	288140	6217173	Rural	Shed	10	80															1			
F17r05	287987	6217027	Rural	Shed	6	14															1			
F17t01	288126	6217149	Tank	-	7	42																		
F17t02	288138	6217154	Tank	-	2	4																		
F17t03	288105	6217147	Tank	-	3	7																		
F18h01	287952	6217263	House	-	34	409	Bottom	1		1							1	1						
F18p01	287976	6217266	Pool	-	9	38																		
F18r01	287852	6217278	Rural	Shed	16	171															1			
F18t02	287953	6217295	Tank	-	7	43																		
F18t03	287945	6217293	Tank	-	2	4																		
F18t04	287842	6217282	Tank	-	2	3																		
F18t05	287843	6217279	Tank	-	2	3																		
F18t06	287843	6217277	Tank	-	2	3																		
F19h01	287895	6217471	House	-	39	629	Bottom	1		1			1			1		1						
F19r01	287896	6217484	Rural	Carport	13	98															1			
F19r02	287926	6217468	Rural	Shed	15	127															1			
F19t01	287916	6217454	Tank	-	7	44																		
F19t02	287922	6217452	Tank	-	4	12																		
F19t03	287928	6217458	Tank	-	4	12																		
F20h01	287762	6217695	House	-	19	318	On	1	1				1				1			1				
F20r01	287773	6217667	Rural	Shed	14	108															1			
F20r04	287673	6217777	Rural	Shed	10	71															1			
F20t01	287780	6217706	Tank	-	8	51																		
F20t02	287769	6217659	Tank	-	3	9																		
F20t03	287767	6217662	Tank	-	3	9																		
F21a	288153	6217720	House	-	34	471	Top	1		1			1				1	1						
F21b	288131	6217711	Rural	Shed	11	58															1			
F21f	287979	6217610	House	-	18	143	Bottom	1	1					1			1	1						
F21p01	288178	6217726	Pool	-	9	41																		
F21r02	288217	6217722	Tennis court	-	31	507																		
F21r03	287953	6217611	Rural	Shed	4	14															1			
F22a	288132	6217800	House	-	30	238	Top	1		1			1			1			1					
F22b	288160	6217796	House	-	15	140	Top	1	1								1							
F22c	288149	6217790	Rural	Shed	7	48															1			
F22d	288096	6217797	Rural	Shed	12	71															1			
F22e	288093	6217880	Rural	Shed	7	50															1			
F22p01	288134	6217815	Pool	-	9	34																		
F22r01	288146	6217799	Rural	Pergola	11	76															1			
F22r02	288101	6217791	Rural	Shed	3	7															1			
F22r03	288079	6217879	Rural	Shed	6	27															1			
F22t01	288090	6217793	Tank	-	2	2																		
F23a	288362	6217772	House	-	28	272	Top	1	1				1				1	1						
F23b	288365	6217798	Rural	Garage	11	62															1			
F23c	288408	6217852	Rural	Shed	17	182															1			
F23d	288417	6217852	Rural	Carport	8	37															1			
F23e	288403	6217859	Rural	Carport	8	37															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
F23f	288341	6217767	Rural	Shed	28	220															1			
F23p01	288349	6217793	Pool	-	9	47																		
F23t01	288361	6217802	Tank	-	2	5																		
F23t02	288410	6217863	Tank	-	4	10																		
F24a	288570	6217828	House	-	26	328	Bottom	2			1		1				1	1						
F24b	288561	6217802	Rural	Shed	7	41															1			
F24c	288552	6217834	Rural	Shed	8	57															1			
F24d	288538	6217841	Rural	Shed	10	41															1			
F24e	288542	6217848	Rural	Shed	7	30															1			
F24f	288546	6217854	Rural	Shed	7	28															1			
F24r03	288533	6217832	Rural	Shed	3	11															1			
F25a	288394	6218014	House	-	28	348	On	1	1				1				1	1						
F25b	288416	6218036	Rural	Garage	11	83															1			
F25c	288416	6218076	Rural	Shed	8	52															1			
F25d	288404	6218075	Rural	Shed	8	37															1			
F25e	288389	6218095	Rural	Shed	15	128															1			
F25p01	288405	6218086	Pool	-	8	36																		
F25t01	288384	6218087	Tank	-	2	4																		
F26a	288568	6218109	House	-	23	301	On	1	1				1			1		1						
F26b	288496	6218080	Rural	Shed	10	69															1			
F26c	288504	6218069	Rural	Shed	4	13															1			
F26d	288508	6218066	Rural	Shed	5	15															1			
F26e	288503	6218061	Rural	Shed	8	23															1			
F26f	288585	6218092	Rural	Shed	4	16															1			
F26h	288561	6218140	Rural	Garage	5	25															1			
F26r01	288586	6218110	Rural	Shed	3	6															1			
F27a	288670	6218007	House	-	34	380	Bottom	1		1			1			1		1						
F27r01	288661	6218005	Rural	Pergola	6	29	Bottom														1			
F27t01	288699	6218022	Tank	-	7	41																		
F28a	288716	6218153	House	-	32	457		1		1			1				1	1						
F28b	288754	6218173	Rural	Garage	12	81															1			
F28c	288748	6218183	Rural	Shed	9	63															1			
F28f	288760	6218186	Rural	Shed	14	131															1			
F28p01	288695	6218155	Pool	-	10	41																		
F28r01	288751	6218166	Rural	Carport	12	95															1			
F28r02	288761	6218170	Rural	Shed	7	22															1			
F28r03	288757	6218177	Rural	Shed	11	40															1			
F28t01	288694	6218143	Tank	-	7	39																		
F28t02	288745	6218174	Tank	-	2	3																		
F28t03	288746	6218177	Tank	-	2	3																		
F28t04	288756	6218194	Tank	-	2	5																		
F29a	288770	6218220	House	-	15	164		1	1				1			1				1				
F29b	288760	6218248	Rural	Shed	9	48															1			
F29t01	288760	6218236	Tank	-	7	39																		
F29t02	288749	6218251	Tank	-	4	11																		
F30a	288780	6218324	House	-	20	304	Bottom	1	1				1				1	1						

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres	Houses: Single Storey with Length greater than 30 metres	Houses: Double Storey with Length less than 30 metres	Houses: Double Storey with Length greater than 30 metres	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural	Other Structures: Public Amenities	Other Structures: Public Utilities	Other Structures: Commerical
									H1	H2	H3	H4									R	PA	PU	C
F30b	288782	6218308	Rural	Shed	6	17															1			
F30t01	288758	6218329	Tank	-	8	49																		
F31a	287790	6217789	House	-	23	202		2			1			1	1		1	1						
F31b	287778	6217800	Rural	Pergola	11	87															1			
F31c	287756	6217796	Rural	Shed	12	68															1			
F31r01	287770	6217752	Rural	Shed	10	46															1			
F31t01	287778	6217791	Tank	-	3	6																		
F32a	288649	6217973	House	-	15	154	Bottom	2			1		1				1	1						
F32b	288610	6217967	Rural	Shed	17	102															1			
F32c	288579	6217947	Rural	Shed	11	116															1			
F32p01	288635	6217981	Pool	-	11	39																		
F32r01	288637	6217978	Rural	Pergola	4	15															1			
F32t01	288604	6217939	Tank	-	7	41																		
F33a	288413	6217647	House	-	18	270	Bottom	2			1		1			1		1						
F33b	288388	6217629	Rural	Cabana	6	30															1			
F33c	288395	6217647	Rural	Shed	5	24															1			
F33d	288453	6217676	Rural	Shed	14	81															1			
F33p01	288392	6217636	Pool	-	7	28																		
F33r01	288383	6217633	Rural	Shed	2	3															1			
F33t01	288438	6217661	Tank	-	7	36																		
F33t02	288399	6217621	Tank	-	2	4																		
F34a	288407	6218254	House	-	39	494	Bottom	2				1	1				1			1				
F34b	288370	6218191	Rural	Shed	20	273															1			
F34r01	288408	6218228	Rural	Garage	10	77															1			
F34r02	288362	6218241	Tennis court	-	34	572																		
F34t01	288370	6218264	Tank	-	9	58																		
F34t02	288362	6218199	Tank	-	4	10																		
F35a	288149	6218446	House	-	24	287	On	1	1				1			1								
F35b	288138	6218450	Rural	Pergola	10	65															1			
F35c	288140	6218460	Rural	Carport	6	41															1			
F35p01	288144	6218429	Pool	-	10	42																		
F36b	288272	6218537	Rural	Garage	10	56															1			
F36c	288228	6218551	Rural	Shed	13	97															1			
F36d	288309	6218593	Rural	Gazebo	10	251															1			
F36h01	288266	6218572	House	-	37	472	On	1		1			1				1							
F36p01	288296	6218567	Pool	-	10	37																		
F37a	288622	6218515	House	-	21	780		1	1				1				1			1				
F37b	288588	6218507	Rural	Shed	11	114															1			
F37c	288592	6218519	Rural	Shed	11	77															1			
F37r01	288606	6218555	Rural	Shed	11	114															1			
F37r02	288580	6218546	Rural	Shed	5	17															1			
F37t01	288638	6218518	Tank	-	8	52																		
F37t02	288648	6218540	Tank	-	2	3																		
F37t03	288587	6218516	Tank	-	3	7																		
F37t04	288591	6218515	Tank	-	3	7																		
F37t05	288594	6218513	Tank	-	3	7																		

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses				House Wall Type			House Roof Type		House Footing Type			Other Structures			
									Single Storey with Length less than 30 metres	Single Storey with Length greater than 30 metres	Double Storey with Length less than 30 metres	Double Storey with Length greater than 30 metres	Brick or Brick Veneer	Weatherboard	Fibro	Tiled	Metal Sheet	Slab on Ground	Suspended on Piered Footings	Suspended on Strip Footings	Rural	Public Amenities	Public Utilities	Commerical
									H1	H2	H3	H4									R	PA	PU	C
F37t06	288608	6218562	Tank	-	3	7																		
F37t07	288581	6218550	Tank	-	2	3																		
F39a	288826	6218516	House	-	15	188		1	1					1			1		1					
F39b	288795	6218506	Rural	Shed	18	155															1			
F39c	288799	6218497	Rural	Shed	7	45															1			
F39d	288797	6218488	Rural	Shed	6	15															1			
F39e	288775	6218521	Rural	Shed	14	33															1			
F39r01	288782	6218522	Rural	Shed	4	13															1			
F39t01	288777	6218517	Tank	-	3	7																		
F3tp01	288307	6218578	Tank	-	7	40																		
F40a	288808	6218615	House	-	17	302	Bottom	2			1					1								
F40b	288784	6218601	Rural	Shed	7	46															1			
F40c	288829	6218601	Rural	Shed	12	109															1			
F40d	288843	6218597	Rural	Shed	15	108															1			
F40e	288856	6218590	Rural	Shed	3	7															1			
F40p01	288791	6218614	Pool	-	12	39																		
F40r01	288799	6218624	Rural	Pergola	11	67															1			
F40t01	288770	6218606	Tank	-	8	47																		
F40t02	288779	6218619	Tank	-	2	3																		
F40t03	288851	6218593	Tank	-	2	3																		
F41a	288532	6218866	House	-	25	337	On	1	1							1								
F41b	288493	6218852	Rural	Shed	14	121															1			
F41c	288474	6218844	Rural	Shed	4	10															1			
F41t01	288489	6218843	Tank	-	2	5																		
F42a	288238	6217208	House	-	25	378	Bottom	1	1								1			1				
F42p01	288234	6217224	Pool	-	10	31																		
F42r01	288228	6217243	Rural	Garage	20	171															1			
F42t01	288246	6217182	Tank	-	8	49																		
F42t02	288223	6217249	Tank	-	2	5																		
F42t03	288224	6217253	Tank	-	2	5																		
F42t04	288229	6217261	Tank	-	2	5																		
F43a	288020	6217831	House	-	34	470	On	1		1			1				1	1						
F43b	287965	6217768	Rural	Garage	17	246															1			
F43t01	288041	6217847	Tank	-	8	56																		
F43t02	288032	6217853	Tank	-	2	2																		
F43t03	288030	6217855	Tank	-	2	2																		
F43t04	287956	6217773	Tank	-	2	2																		
F45h01	288871	6218872	House	-	27	347		1	1				1				1	1						
F45p01	288850	6218871	Pool	-	1	40																		
F45r01	288837	6218863	Rural	Shed	15	212															1			
F45r02	288860	6218881	Rural	Carport	13	121															1			
F45r03	288807	6218857	Rural	Shed	10	35															1			
F45t01	288830	6218854	Tank	-	3	9																		
F50h01	288190	6218575	House	-	16	185	On	1	1							1								
F50p01	288186	6218560	Pool	-	6	18																		
F50r01	288178	6218575	Rural	Carport	7	45															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres	Houses: Single Storey with Length greater than 30 metres	Houses: Double Storey with Length less than 30 metres	Houses: Double Storey with Length greater than 30 metres	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural	Other Structures: Public Amenities	Other Structures: Public Utilities	Other Structures: Commerical
									H1	H2	H3	H4									R	PA	PU	C
F50r02	288186	6218569	Rural	Pergola	6	27															1			
F50r03	288140	6218599	Rural	Shed	6	41															1			
F50r04	288203	6218563	Rural	Shed	8	22															1			
F50r05	288205	6218555	Rural	Shed	9	26															1			
F50r06	288180	6218550	Rural	Shed	3	9															1			
F50t01	288171	6218573	Tank	-	3	9																		
F50t02	288200	6218575	Tank	-	3	6																		
F50t03	288200	6218578	Tank	-	3	6																		
F51h01	288030	6218520	House	-	35	441	On	1		1							1							
F51p01	288012	6218510	Pool	-	8	24																		
F51r01	287947	6218466	Rural	Shed	12	87															1			
F51r02	287951	6218476	Rural	Shed	9	55															1			
F51r03	287992	6218515	Rural	Shed	3	7															1			
F51r04	287980	6218472	Rural	Shed	2	3															1			
F51t01	287973	6218538	Tank	-	10	72																		
F51t02	287980	6218515	Tank	-	7	43																		
F51t03	287938	6218464	Tank	-	3	6																		
F52h01	287830	6218390	House	-	25	305		1	1								1							
F52h02	287890	6218372	House	-	10	74	On	1	1								1							
F52r01	287807	6218401	Rural	Shed	8	69															1			
F52r02	287803	6218381	Rural	Shed	14	118															1			
F52r03	287795	6218380	Rural	Pergola	6	29															1			
F52r04	287883	6218372	Rural	Carport	7	29															1			
F52r05	287786	6218468	Rural	Shed	6	33															1			
F52r06	287748	6218463	Rural	Shed	5	20															1			
F52r07	287742	6218462	Rural	Shed	5	29															1			
F52r08	287782	6218525	Rural	Shed	4	11															1			
F52t01	287896	6218365	Tank	-	3	9																		
J01a	289704	6217547	House	-	40	407	Bottom	1		1				1			1			1				
J01b	289639	6217515	Rural	Shed	11	69															1			
J01t01	289690	6217551	Tank	-	8	50																		
J01t02	289680	6217533	Tank	-	2	2																		
J01t03	289679	6217531	Tank	-	2	2																		
J02a	289938	6217736	House	-	27	442	Top	1	1				1				1							
J02b	289918	6217752	Rural	Garage	11	96															1			
J02c	289876	6217615	Rural	Shed	18	194															1			
J02t01	289957	6217750	Tank	-	9	61																		
J02t02	289969	6217753	Tank	-	2	3																		
J02t03	289972	6217753	Tank	-	2	3																		
K01a	288143	6218213	House	-	41	630	Bottom	1		1			1			1		1						
K01r01	288115	6218235	Rural	Garage	13	156															1			
K01r02	288194	6218254	Rural	Shed	5	13															1			
K01t01	288206	6218250	Tank	-	8	48																		
K01t02	288198	6218255	Tank	-	2	4																		
K01t03	288175	6218216	Tank	-	2	4																		
K02a	288026	6218181	House	-	31	416		1		1			1			1		1						

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
K02p01	288033	6218194	Pool	-	11	31																		
K02r01	288019	6218188	Rural	Pergola	10	53															1			
K02r02	287960	6218219	Rural	Shed	3	7															1			
K02r0r3	287994	6218188	Rural	Shed	2	5															1			
K02t01	288062	6218191	Tank	-	8	44																		
K02t02	288053	6218183	Tank	-	2	3																		
K02t03	288052	6218185	Tank	-	2	3																		
K03a	287915	6218126	House	-	29	470		1	1				1				1	1						
K03r01	287888	6218105	Rural	Shed	12	119															1			
K03r02	287886	6218113	Rural	Shed	10	38															1			
K03r03	287880	6218129	Rural	Shed	2	4															1			
K03r04	287880	6218274	Rural	Shed	3	10															1			
K04a	288020	6218050	House	-	19	323		1	1				1				1	1						
K04h01	288065	6218075	House	-	33	482		1		1			1				1	1						
K04p01	288065	6218062	Pool	-	10	25																		
K04r01	288043	6218071	Rural	Garage	16	134															1			
K04r02	288036	6218021	Rural	Shed	16	186															1			
K04r03	288043	6218000	Rural	Shed	12	93															1			
K04r04	288044	6218055	Rural	Shed	7	23															1			
K04r05	287994	6218078	Rural	Shed	3	10															1			
K04t01	288087	6218068	Tank	-	8	48																		
K04t02	288025	6218032	Tank	-	8	48																		
K04t03	288039	6218014	Tank	-	3	9																		
K04t04	288031	6218042	Tank	-	2	4																		
K05a	287878	6217973	House	-	29	375		1	1				1			1		1						
K05r01	287913	6217951	Rural	Shed	10	99															1			
K05t01	287851	6217952	Tank	-	8	53																		
K05t02	287914	6217944	Tank	-	2	3																		
K05t03	287875	6217940	Tank	-	2	3																		
L01a	288859	6218057	House	-	30	451	Bottom	1		1			1				1	1						
L01r01	288960	6218009	Rural	Shed	6	21															1			
L01t01	288874	6218035	Tank	-	9	57																		
L01t02	288862	6218032	Tank	-	2	3																		
L01t03	288862	6218030	Tank	-	2	3																		
L01t04	288828	6218067	Tank	-	2	3																		
N05r01	287580	6215764	Rural	Shed	30	247															1			
N05t01	287562	6215763	Tank	-	3	6																		
N05t02	287568	6215772	Tank	-	3	9																		
N05t03	287562	6215768	Tank	-	3	9																		
N11h01	288429	6216160	House	-	25	425	Bottom	1	1				1				1							
N11r01	288485	6216139	Rural	Shed	17	131															1			
N11r03	288464	6216121	Rural	Shed	5	22															1			
N11t01	288463	6216138	Tank	-	8	46																		
N11t02	288478	6216146	Tank	-	3	8																		
N11t03	288416	6216208	Tank	-	3	6																		
N12h01	288322	6216677	House	-	23	373	Top	1	1				1				1	1						

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses				House Wall Type			House Roof Type		House Footing Type			Other Structures			
									Single Storey with Length less than 30 metres H1	Single Storey with Length greater than 30 metres H2	Double Storey with Length less than 30 metres H3	Double Storey with Length greater than 30 metres H4	Brick or Brick Veneer	Weatherboard	Fibro	Tiled	Metal Sheet	Slab on Ground	Suspended on Piered Footings	Suspended on Strip Footings	Rural R	Public Amenities PA	Public Utilities PU	Commerical C
N12r01	288297	6216683	Rural	Shed	10	61															1			
N12r02	288306	6216708	Rural	Shed	13	66															1			
N12r03	288331	6216690	Rural	Shed	6	34															1			
N12r04	288320	6216707	Rural	Shed	3	7															1			
N12r05	288322	6216713	Rural	Shed	13	54															1			
N12t01	288293	6216661	Tank	-	8	52																		
N12t02	288291	6216679	Tank	-	5	23																		
N12t03	288351	6216693	Tank	-	2	2																		
N12t04	288353	6216693	Tank	-	2	2																		
N13h01	288232	6216685	House	-	29	430	Top	1	1				1			1	1	1						
N13p01	288234	6216669	Pool	-	10	31																		
N13r01	288263	6216704	Rural	Shed	9	59															1			
N13r02	288274	6216663	Rural	Shed	4	13															1			
N13r03	288255	6216756	Rural	Shed	3	8															1			
N13t01	288206	6216675	Tank	-	8	53																		
N13t02	288262	6216694	Tank	-	2	4																		
N14h01	288195	6216442	House	-	16	230	Bottom	1	1				1			1			1					
N14p01	288187	6216449	Pool	-	11	48																		
N14r01	288187	6216430	Rural	Carport	13	96															1			
N14r02	288219	6216469	Rural	Shed	7	36															1			
N14r03	288228	6216458	Rural	Shed	9	59															1			
N14t01	288212	6216427	Tank	-	5	18																		
N14t03	288225	6216466	Tank	-	3	8																		
N15h01	287963	6216293	House	-	17	194	Bottom	1	1				1			1		1						
N15p01	287954	6216298	Pool	-	9	28																		
N15r01	287999	6216258	Rural	Shed	14	141															1			
N15r02	287956	6216307	Rural	Shed	8	38															1			
N15r03	287959	6216313	Rural	Garage	7	46															1			
N15r04	287991	6216234	Rural	Shed	3	5															1			
N15t01	287960	6216274	Tank	-	5	21																		
N15t02	287994	6216250	Tank	-	3	8																		
N15t03	287955	6216318	Tank	-	2	4																		
N16h01	287899	6216323	House	-	30	409	Bottom	1	1				1			1		1						
N16r01	287934	6216326	Rural	Shed	12	113															1			
N16r02	287931	6216347	Rural	Shed	5	12															1			
N16r03	287926	6216327	Rural	Carport	12	70															1			
N16r04	287921	6216342	Rural	Shed	6	20															1			
N16r05	287905	6216331	Rural	Pergola	6	30															1			
N16r06	287905	6216350	Rural	Shed	3	5															1			
N16t01	287871	6216338	Tank	-	3	7																		
N16t02	287940	6216333	Tank	-	2	5																		
N17h01	287659	6216283	House	-	23	247	Bottom	1	1				1			1		1						
N17r01	287684	6216295	Rural	Garage	9	76															1			
N17r03	287640	6216305	Rural	Shed	3	6															1			
N17r04	287620	6216309	Rural	Shed	5	14															1			
N17r05	287672	6216281	Rural	Carport	11	57															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
N17t01	287692	6216296	Tank	-	2	5																		
N18h01	287461	6216178	House	-	19	177	Bottom	1	1				1			1		1						
N18r01	287428	6216159	Rural	Shed	7	39															1			
N18r02	287430	6216176	Rural	Shed	4	14															1			
N18r03	287437	6216181	Rural	Shed	13	97															1			
N18r04	287447	6216184	Rural	Shed	9	73															1			
N18r05	287454	6216193	Rural	Shed	5	16															1			
N18r06	287446	6216206	Rural	Shed	5	11															1			
N18r07	287419	6216178	Rural	Shed	11	29															1			
N18r08	287480	6216175	Rural	Shed	5	14															1			
N18r09	287487	6216182	Rural	Shed	5	16															1			
N18r10	287497	6216178	Rural	Greenhouse	6	14															1			
N18r11	287480	6216191	Rural	Shed	2	3															1			
N18r12	287426	6216164	Rural	Shed	6	26															1			
N18r13	287427	6216155	Rural	Shed	3	9															1			
N18r14	287458	6216128	Rural	Shed	5	7															1			
N18t01	287474	6216186	Tank	-	4	15																		
N18t02	287461	6216156	Tank	-	3	9																		
N18t03	287428	6216181	Tank	-	2	3																		
N18t04	287429	6216179	Tank	-	2	3																		
O01h01	286052	6216701	House	-	31	334		2				1	1			1		1						
O01p01	286033	6216688	Pool	-	14	59																		
O01r01	286060	6216704	Rural	Carport	6	32															1			
O01r02	286079	6216709	Rural	Shed	6	38															1			
O01r05	286031	6216705	Rural	Gazebo	8	48															1			
O01t01	286082	6216705	Tank	-	3	6																		
O02h01	286812	6216841	House	-	30	309	Top	1	1								1							
O02r01	286819	6216848	Rural	Awning	20	83															1			
O02r02	286802	6216814	Rural	Shed	11	105															1			
O02r04	286815	6216802	Rural	Shed	5	23															1			
O02r06	286814	6216786	Rural	Shed	9	58															1			
O02t01	286821	6216875	Tank	-	9	58																		
O02t02	286810	6216809	Tank	-	2	3																		
O03h01	286686	6216961	House	-	34	574	Top	1		1			1				1			1				
O03r01	286697	6216933	Rural	Garage	12	131															1			
O03r02	286692	6216969	Rural	Pergola	10	75															1			
O03r03	286687	6217003	Rural	Garage	15	168															1			
O03t01	286695	6216986	Tank	-	7	43																		
O03t02	286706	6216927	Tank	-	5	18																		
O03t03	286697	6217005	Tank	-	3	9																		
O04h01	286694	6217047	House	-	27	450	Top	2			1		1				1		1	1				
O04r01	286685	6217025	Rural	Garage	14	80															1			
O04r02	286700	6217026	Rural	Shed	10	39															1			
O04r03	286714	6217040	Rural	Shed	5	13															1			
O04t01	286689	6217066	Tank	-	8	55																		
O04t02	286696	6217067	Tank	-	2	2																		

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses				House Wall Type			House Roof Type		House Footing Type			Other Structures			
									Single Storey with Length less than 30 metres	Single Storey with Length greater than 30 metres	Double Storey with Length less than 30 metres	Double Storey with Length greater than 30 metres	Brick or Brick Veneer	Weatherboard	Fibro	Tiled	Metal Sheet	Slab on Ground	Suspended on Piered Footings	Suspended on Strip Footings	Rural	Public Amenities	Public Utilities	Commerical
									H1	H2	H3	H4									R	PA	PU	C
O04t03	286696	6217069	Tank	-	2	2																		
O05h01	286768	6217191	House	-	26	377	Top	2			1		1				1	1						
O05r01	286857	6217233	Rural	Shed	15	213															1			
O05t01	286786	6217173	Tank	-	9	60																		
O05t02	286846	6217175	Tank	-	2	3																		
O05t03	286849	6217174	Tank	-	2	3																		
O06h01	286878	6217362	House	-	22	367	Top	1	1								1							
O06r01	286898	6217390	Rural	Shed	12	134															1			
O06t01	286899	6217341	Tank	-	8	55																		
O06t02	286895	6217380	Tank	-	2	2																		
O07r01	286848	6217461	Rural	Shed	17	233															1			
O07r02	286839	6217436	Rural	Shed	6	73															1			
O07r03	286830	6217384	Rural	Shed	4	10															1			
O07r04	286836	6217430	Rural	Shed	7	33															1			
O07t01	286840	6217499	Tank	-	9	60																		
O07t02	286829	6217379	Tank	-	3	8																		
O07t03	286827	6217381	Tank	-	3	8																		
O08h01	286786	6217319	House	-	28	277	Top	1	1				1				1	1						
O08r01	286751	6217282	Rural	Shed	6	38															1			
O08r02	286751	6217307	Rural	Shed	3	7															1			
O08t01	286810	6217292	Tank	-	7	43																		
O08t02	286816	6217296	Tank	-	4	11																		
O08t03	286763	6217301	Tank	-	5	20																		
O08t04	286746	6217285	Tank	-	2	3																		
O09h01	286389	6216912	House	-	18	292		2			1		1	1			1	1						
O09p01	286390	6216929	Pool	-	9	23																		
O09r01	286344	6216910	Rural	Garage	11	106															1			
O09r02	286321	6216921	Tennis court	-	31	444																		
O09t01	286368	6216926	Tank	-	8	45																		
O10h01	286264	6217003	House	-	13	123		1	1					1			1		1					
O10h02	286241	6216919	House	-	31	488		1		1			1				1	1						
O10r02	286300	6217043	Rural	Shed	7	25															1			
O10r03	286299	6217034	Rural	Shed	11	40															1			
O10r04	286209	6217062	Rural	Shed	5	30															1			
O10r05	286250	6217030	Rural	Shed	10	36															1			
O10t01	286302	6217024	Tank	-	8	45																		
O10t02	286204	6217064	Tank	-	2	3																		
O11h01	286035	6216905	House	-	34	379		1		1			1				1	1						
O11h02	286013	6216924	House	-	14	178		1	1				1				1	1						
O11r01	286066	6216920	Rural	Shed	3	7															1			
O11r02	286062	6216920	Rural	Shed	2	4															1			
O11r03	286076	6216934	Rural	Shed	6	29															1			
O11r04	286035	6216915	Rural	Awning	12	71															1			
O11r05	285994	6216928	Rural	Shed	11	113															1			
O11r06	286058	6216937	Rural	Shed	5	16															1			
O11t01	286008	6216904	Tank	-	8	53																		

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Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
O12h01	285979	6217014	House	-	36	435		1		1			1				1			1				
O12p01	285994	6217023	Pool	-	11	46																		
O12r01	285963	6217049	Rural	Shed	13	90															1			
O12t01	285986	6216992	Tank	-	7	42																		
O13h01	286022	6217092	House	-	37	477		1		1			1				1			1				
O13p01	286036	6217100	Pool	-	7	22																		
O13r01	286087	6217101	Rural	Shed	9	59															1			
O13r02	286089	6217070	Rural	Shed	7	19															1			
O13t01	286024	6217119	Tank	-	7	34																		
O14h01	286143	6217176	House	-	21	215		1	1				1				1	1						
O14r01	286148	6217139	Rural	Shed	15	102															1			
O14r02	286185	6217134	Rural	Shed	7	22															1			
O14r03	286151	6217147	Rural	Shed	9	50															1			
O14r04	286157	6217145	Rural	Shed	70	33															1			
O14r05	286146	6217071	Rural	Shed	4	16															1			
O15h01	286230	6217449	House	-	19	189	Top	1	1							1								
O15r01	286242	6217444	Rural	Shed	5	26															1			
O15r02	286236	6217437	Rural	Shed	7	30															1			
O15r03	286184	6217453	Rural	Shed	30	249															1			
O15r08	286166	6217424	Rural	Shed	13	117															1			
O15r09	285989	6217457	Rural	Shed	3	10															1			
O15r10	286030	6217452	Rural	Shed	3	10															1			
O15r11	286083	6217444	Rural	Shed	3	10															1			
O15r12	286143	6217445	Rural	Shed	3	10															1			
O15t01	286231	6217468	Tank	-	8	45																		
O15t02	286192	6217471	Tank	-	8	57																		
O15t04	286157	6217423	Tank	-	3	7																		
O16h01	285965	6217415	House	-	21	232		1	1				1			1		1						
O16p01	285989	6217412	Pool	-	8	28																		
O16r01	285989	6217423	Rural	Garage	7	54															1			
O16r02	285988	6217405	Rural	Shed	7	23															1			
O16r03	285996	6217422	Rural	Shed	6	7															1			
O16r04	286009	6217398	Rural	Shed	3	7															1			
O16r05	285999	6217421	Rural	Shed	3	5															1			
O16r06	285972	6217420	Rural	Pergola	7	35															1			
O16t01	285971	6217433	Tank	-	8	48																		
O16t02	285993	6217404	Tank	-	2	4																		
O17h01	286363	6216687	House	-	34	526	Top	1		1							1							
O17r01	286403	6216672	Rural	Garage	13	120															1			
O17r02	286374	6216610	Rural	Shed	6	30															1			
O17r03	286381	6216613	Rural	Shed	5	13															1			
O17t01	286369	6216607	Tank	-	2	2																		
O17t02	286337	6216672	Tank	-	8	50																		
O18h01	286253	6216669	House	-	26	257	Top	1	1								1			1				
O18h02	286227	6216662	House	-	13	138	Top	1	1								1			1				
O18r01	286233	6216653	Rural	Garage	11	77															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
O18r02	286237	6216646	Rural	Carport	8	36															1			
O18r03	286238	6216667	Rural	Shed	5	15															1			
O18t01	286278	6216666	Tank	-	8	50																		
O18t02	286283	6216645	Tank	-	5	16																		
O18t03	286242	6216633	Tank	-	2	3																		
O18t04	286244	6216633	Tank	-	2	3																		
P01h01	285754	6216650	House	-	29	332	Top	1	1				1				1	1						
P01p01	285752	6216660	Pool	-	8	25																		
P01r01	285816	6216598	Rural	Shed	5	19															1			
P01t01	285785	6216638	Tank	-	8	51																		
P39h01	285637	6216817	House	-	36	350	0	1		1														
P39r04	285632	6216901	Rural	Shed	6	27															1			
P39t03	285665	6216851	Tank	-	2	2																		
P39t04	285666	6216853	Tank	-	2	2																		
P40h01	285772	6216806	House	-	42	617	Top	1		1			1				1	1						
P40p01	285758	6216824	Pool	-	9	31																		
P40r01	285697	6216806	Rural	Shed	6	32															1			
P40r02	285759	6216787	Rural	Shed	2	3															1			
P40r03	285706	6216875	Rural	Shed	7	47															1			
P40r04	285769	6216863	Rural	Shed	2	5															1			
P40r05	285762	6216809	Rural	Pergola	16	99															1			
P40t01	285778	6216846	Tank	-	8	51																		
P40t02	285769	6216845	Tank	-	2	2																		
P40t03	285766	6216846	Tank	-	2	2																		
P41h01	285830	6216992	House	-	18	169		1	1				1			1		1						
P41r01	285800	6216974	Rural	Shed	9	44															1			
P41r02	285827	6217032	Rural	Shed	7	35															1			
P41r04	285790	6217035	Rural	Shed	5	21															1			
P41r05	285821	6217000	Rural	Shed	6	16															1			
P41t01	285819	6216984	Tank	-	7	40																		
P41t02	285798	6216979	Tank	-	2	2																		
P41t03	285827	6217038	Tank	-	2	3																		
P42h01	285614	6217061	House	-	22	228	Top	1	1				1				1	1						
P42r01	285626	6217053	Rural	Carport	6	39															1			
P42r02	285594	6217073	Rural	Shed	8	58															1			
P42r03	285548	6217102	Rural	Shed	8	34															1			
P44h01	285834	6217231	House	-	24	337		1	1				1				1			1				
P44p01	285815	6217236	Pool	-	8	29																		
P44r02	285802	6217254	Rural	Garage	14	143															1			
P44t01	285811	6217209	Tank	-	8	52																		
P45h01	285877	6217372	House	-	17	207		1	1				1			1								
P45r01	285900	6217354	Rural	Shed	7	35															1			
P45t01	285875	6217354	Tank	-	8	44																		
P46h01	285785	6217437	House	-	31	450		1		1			1				1	1						
P46p01	285792	6217453	Pool	-	9	32																		
P46r01	285761	6217452	Rural	Garage	10	71															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres	Houses: Single Storey with Length greater than 30 metres	Houses: Double Storey with Length less than 30 metres	Houses: Double Storey with Length greater than 30 metres	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural	Other Structures: Public Amenities	Other Structures: Public Utilities	Other Structures: Commerical
									H1	H2	H3	H4									R	PA	PU	C
P46r02	285766	6217417	Rural	Shed	6	29															1			
P46r03	285745	6217343	Rural	Shed	6	33															1			
P46r05	285806	6217451	Rural	Gazebo	6	13															1			
P46r06	285774	6217418	Rural	Shed	5	20															1			
P46r07	285765	6217424	Rural	Shed	5	19															1			
P46t01	285811	6217468	Tank	-	8	53																		
P46t02	285766	6217412	Tank	-	2	4																		
P46t03	285775	6217415	Tank	-	2	2																		
P46t04	285805	6217415	Tank	-	5	16																		
P47h01	285628	6217477	House	-	30	429		2				1	1				1	1						
P47r02	285658	6217475	Rural	Garage	13	117															1			
R01h01	286371	6217572	House	-	27	472	Top	1	1								1							
R01r01	286369	6217590	Rural	Shed	13	130															1			
R01r02	286381	6217596	Rural	Shed	10	86															1			
R01r03	286365	6217613	Rural	Shed	12	84															1			
R01r04	286403	6217544	Rural	Shed	6	26															1			
R01t01	286364	6217597	Tank	-	6	32																		
R02h01	286256	6217549	House	-	22	264	Top	1	1								1							
R02p01	286267	6217561	Pool	-	7	30																		
R02r01	286265	6217552	Rural	Pergola	5	24															1			
R02r02	286246	6217581	Rural	Shed	11	114															1			
R02r03	286254	6217578	Rural	Shed	8	49															1			
R02r04	286251	6217598	Rural	Shed	3	10															1			
R02t01	286238	6217581	Tank	-	4	12																		
R02t02	286238	6217586	Tank	-	4	12																		
R03h01	286247	6217744	House	-	25	264		1	1								1							
R03h02	286229	6217764	House	-	15	123		1	1								1	1						
R03r01	286233	6217737	Rural	Carport	6	40															1			
R03r02	286207	6217745	Rural	Shed	13	154															1			
R03r03	286258	6217738	Rural	Shed	6	14															1			
R03t01	286263	6217711	Tank	-	7	42																		
R03t02	286267	6217760	Tank	-	5	23																		
R03t03	286261	6217729	Tank	-	2	2																		
R03t04	286261	6217727	Tank	-	2	2																		
R04h01	286107	6217580	House	-	28	372		2			1		1				1	1						
R04p01	286119	6217575	Pool	-	7	23																		
R04r01	286137	6217583	Rural	Carport	8	49															1			
R04r02	286145	6217578	Rural	Shed	21	187															1			
R04r03	286147	6217568	Rural	Shed	11	87															1			
R04r04	286154	6217573	Rural	Shed	8	46															1			
R04r05	286154	6217567	Rural	Shed	6	32															1			
R04r06	286141	6217562	Rural	Shed	5	24															1			
R04r07	286139	6217566	Rural	Shed	3	10															1			
R04r08	286133	6217560	Rural	Shed	4	15															1			
R04t01	286134	6217589	Tank	-	5	19																		
R05h01	286152	6217715	House	-	22	256		1	1				1				1	1						

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres (H1)	Houses: Single Storey with Length greater than 30 metres (H2)	Houses: Double Storey with Length less than 30 metres (H3)	Houses: Double Storey with Length greater than 30 metres (H4)	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural (R)	Other Structures: Public Amenities (PA)	Other Structures: Public Utilities (PU)	Other Structures: Commerical (C)
R05r01	286144	6217717	Rural	Pergola	6	16															1			
R05r02	286164	6217701	Rural	Shed	9	58															1			
R05r03	286166	6217693	Rural	Shed	9	52															1			
R05t01	286136	6217722	Tank	-	5	20																		
R05t02	286169	6217701	Tank	-	2	3																		
R05t03	286169	6217699	Tank	-	2	3																		
R06h01	286136	6217765	House	-	22	267		1	1							1								
R06r01	286153	6217760	Rural	Garage	9	55															1			
R06r02	286121	6217753	Rural	Shed	3	10															1			
R06r03	286162	6217771	Rural	Shed	9	25															1			
R06r04	286168	6217767	Rural	Shed	9	56															1			
R06r05	286174	6217765	Rural	Shed	4	6															1			
R06t01	286159	6217757	Tank	-	2	3																		
R06t02	286162	6217766	Tank	-	2	3																		
R09h01	286322	6217888	House	-	34	559	Top	1		1						1								
R09r01	286317	6217847	Rural	Shed	18	104															1			
R09r02	286319	6217839	Rural	Shed	9	47															1			
R09t01	286339	6217854	Tank	-	7	42																		
R0pt01	286259	6217745	Pool	-	9	27																		
R10h01	285890	6217581	House	-	28	271		1	1					1			1		1					
R10p01	285892	6217558	Pool	-	9	36																		
R10r01	285906	6217603	Rural	Shed	7	46															1			
R10r02	285908	6217560	Rural	Shed	11	99															1			
R10r03	285871	6217564	Rural	Shed	7	47															1			
R10t01	285877	6217594	Tank	-	6	27																		
R11r03	285788	6217621	Rural	Garage	8	56															1			
R11r04	285791	6217590	Rural	Shed	9	47															1			
S01h01	287845	6218089	House	-	41	667		1		1			1				1	1						
S01r01	287793	6218082	Rural	Shed	16	214															1			
S01r02	287794	6218126	Rural	Shed	4	11															1			
S01r03	287799	6218128	Rural	Shed	2	4															1			
S01t01	287793	6218058	Tank	-	2	4																		
S01t02	287871	6218064	Tank	-	2	4																		
S02h01	287736	6218069	House	-	31	543		2				1		1		1		1						
S02r01	287765	6218074	Rural	Garage	12	104															1			
S02t01	287760	6218093	Tank	-	10	72																		
S02t02	287778	6218052	Tank	-	2	2																		
S02t03	287779	6218049	Tank	-	2	2																		
S03h01	287609	6218033	House	-	37	518		1		1			1				1	1						
S03p01	287590	6218043	Pool	-	9	29																		
S03r01	287654	6218056	Rural	Shed	18	248															1			
S03r02	287621	6218079	Rural	Shed	3	5															1			
S03t01	287676	6218032	Tank	-	8	46																		
S04h01	287688	6218265	House	-	43	649	Top	1		1							1	1						
S04p01	287691	6218280	Pool	-	10	36																		
S04r01	287654	6218267	Rural	Garage	14	127															1			

Table D.01 - Details of the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Type	Description	Maximum Structure Plan Length (m)	Planar Area (m2)	Houses Steep Slopes	Houses Number of Storeys	Houses: Single Storey with Length less than 30 metres	Houses: Single Storey with Length greater than 30 metres	Houses: Double Storey with Length less than 30 metres	Houses: Double Storey with Length greater than 30 metres	House Wall Type: Brick or Brick Veneer	House Wall Type: Weatherboard	House Wall Type: Fibro	House Roof Type: Tiled	House Roof Type: Metal Sheet	House Footing Type: Slab on Ground	House Footing Type: Suspended on Piered Footings	House Footing Type: Suspended on Strip Footings	Other Structures: Rural	Other Structures: Public Amenities	Other Structures: Public Utilities	Other Structures: Commerical
									H1	H2	H3	H4									R	PA	PU	C
S04r02	287615	6218232	Rural	Shed	17	146															1			
S04r03	287702	6218279	Rural	Cabana	7	47															1			
S04t01	287633	6218269	Tank	-	9	58																		
S04t02	287643	6218277	Tank	-	2	5																		
S04t03	287646	6218279	Tank	-	2	5																		
S04t04	287609	6218236	Tank	-	2	5																		
S04t05	287611	6218238	Tank	-	2	5																		
S05h01	287549	6218231	House	-	42	520	Top	1		1							1	1						
S05h02	287523	6218236	House	-	15	156	Top	1	1								1	1						
S05p01	287547	6218249	Pool	-	10	41																		
S05r01	287587	6218235	Rural	Shed	13	150															1			
S05t01	287516	6218257	Tank	-	9	58																		
S05t02	287528	6218261	Tank	-	2	5																		
S05t03	287531	6218261	Tank	-	2	5																		
S05t04	287596	6218238	Tank	-	4	11																		
S09a	287313	6218064	House	-	9	57	Bottom	1	1															
S10r01	287187	6218038	Rural	Shed	6	32															1			
S10r02	287187	6218042	Rural	Shed	6	17															1			
S11h01	286986	6217780	House	-	17	197	On	1	1								1							
S11r01	286963	6217781	Rural	Shed	12	64															1			
S11r02	286955	6217782	Rural	Shed	4	13															1			
S11t01	286971	6217776	Tank	-	3	6																		
S11t02	286966	6217775	Tank	-	3	6																		
S11t03	286963	6217776	Tank	-	3	6																		
S13r01	287645	6217878	Rural	Shed	4	10															1			
S14h01	287638	6217927	House	-	15	168	Bottom	1	1								1	1						
S14r01	287649	6217897	Rural	Shed	6	15															1			
S14t01	287619	6217949	Tank	-	9	60																		
								Count	108	47	13	9	121	20	1	59	116	106	11	32	581	0	0	2

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
A06a	291236	6218372	House	775	775	775	775	775	6.5	6.5	6.5	6.5	6.5	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.3	0.8	-0.3	-1.3	51.3	29.8	14.7	4.2
A06b	291202	6218403	Rural	500	500	500	500	500	6.0	6.0	6.0	6.0	6.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	-0.1	-0.3	-	-	-	-
A06c	291289	6218368	House	900	900	900	900	900	6.5	6.5	6.5	6.5	6.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.4	1.2	-0.6	-2.5	44.7	33.7	15.3	6.3
A06f	291347	6218340	Rural	950	950	950	950	950	4.0	4.0	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.6	1.7	-1.1	-3.4	-	-	-	-
A06g	291289	6218270	Rural	975	975	975	975	975	2.5	2.5	2.5	2.5	2.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.5	1.2	-0.8	-2.5	-	-	-	-
A06h	291263	6218303	Rural	975	975	975	975	975	4.0	4.0	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.6	1.7	-1.1	-3.5	-	-	-	-
A06i	291177	6218298	Rural	950	950	950	950	950	6.5	6.5	6.5	6.5	6.5	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.5	1.5	-0.8	-3.1	-	-	-	-
A06j	291172	6218301	Rural	950	950	950	950	950	6.5	6.5	6.5	6.5	6.5	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.5	1.4	-0.8	-2.9	-	-	-	-
A06l	291339	6218319	Rural	950	950	950	950	950	2.0	2.0	2.0	2.0	2.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.6	1.5	-1.0	-3.1	-	-	-	-
A06n	291343	6218396	Rural	850	850	850	850	850	6.5	6.5	6.5	6.5	6.5	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.4	1.2	-0.6	-2.4	-	-	-	-
A06p	291219	6218375	Rural	700	700	700	700	700	6.5	6.5	6.5	6.5	6.5	0.06	0.06	0.06	0.06	0.06	0.03	0.03	0.03	0.03	0.03	0.3	0.9	-0.2	-0.9	-	-	-	-
A06t03	291258	6218391	Tank	700	700	700	700	700	6.5	6.5	6.5	6.5	6.5	0.06	0.06	0.06	0.06	0.06	0.03	0.03	0.03	0.03	0.03	0.3	0.9	-0.3	-1.0	-	-	-	-
A06t04	291270	6218390	Tank	725	725	725	725	725	6.5	6.5	6.5	6.5	6.5	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.3	0.8	-0.3	-1.2	-	-	-	-
A06t05	291270	6218388	Tank	725	725	725	725	725	6.5	6.5	6.5	6.5	6.5	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.3	0.8	-0.3	-1.3	-	-	-	-
A06t07	291320	6218306	Tank	950	950	950	950	950	2.5	2.5	2.5	2.5	2.5	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.6	1.5	-1.0	-3.0	-	-	-	-
A24h01	289800	6217107	House	1300	1300	1300	1300	1300	5.0	5.0	5.0	5.0	5.0	0.05	0.05	0.05	0.05	0.05	0.07	0.07	0.07	0.07	0.07	0.4	1.0	-0.6	-1.9	48.8	31.2	15.1	5.0
A24p01	289802	6217119	Pool	1300	1300	1300	1300	1300	4.5	4.5	5.0	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.08	0.08	0.08	0.08	0.08	0.4	1.1	-0.7	-2.2	-	-	-	-
A24r01	289792	6217128	Rural	1325	1325	1350	1350	1350	4.5	4.5	5.0	5.0	5.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.5	1.3	-0.8	-2.5	-	-	-	-
A24r02	289803	6217082	Rural	1150	1150	1175	1175	1175	4.5	4.5	4.5	5.0	5.0	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.3	0.8	-0.4	-1.5	-	-	-	-
A24r03	289484	6217061	Rural	1400	1400	1425	1425	1425	5.0	5.0	5.0	5.0	5.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.5	1.4	-0.8	-2.9	-	-	-	-
A24r04	289495	6217040	Rural	1400	1400	1425	1425	1425	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.7	-1.0	-3.5	-	-	-	-
A24r06	289486	6217045	Rural	1400	1400	1425	1425	1425	4.0	4.0	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.7	-0.9	-3.3	-	-	-	-
A24t01	289484	6217033	Tank	1400	1400	1425	1425	1425	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.7	-1.0	-3.5	-	-	-	-
A24t03	289805	6217087	Tank	1150	1150	1150	1150	1150	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.3	0.8	-0.4	-1.5	-	-	-	-
C01a	289550	6217187	House	1100	1100	1100	1100	1100	5.0	5.0	5.0	4.5	4.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.1	-0.1	-0.3	49.7	30.7	15.0	4.7
C01b	289566	6217190	Rural	1100	1100	1125	1125	1125	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.1	-0.1	-0.3	-	-	-	-
C01p01	289561	6217170	Pool	1175	1175	1175	1200	1200	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.5	-	-	-	-
C01t01	289540	6217188	Tank	1050	1050	1050	1050	1050	4.5	4.5	4.5	4.0	4.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.1	-0.1	-0.2	-	-	-	-
C02a	289840	6217216	House	1275	1275	1275	1275	1275	4.0	4.0	4.0	4.0	4.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.6	-0.8	-2.8	44.6	33.7	15.4	6.4
C02b	289857	6217205	Rural	1250	1250	1250	1250	1250	4.0	4.0	4.0	4.0	4.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.7	-0.8	-2.7	-	-	-	-
C02c	289862	6217199	Rural	1225	1225	1250	1250	1250	4.0	4.0	4.0	4.5	4.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.10	0.10	0.10	0.6	1.7	-0.8	-2.7	-	-	-	-
C02d	289913	6217186	Rural	1050	1050	1050	1050	1050	5.0	5.0	5.0	5.0	5.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.07	0.07	0.07	0.07	0.07	0.5	1.2	-0.5	-1.7	-	-	-	-
C02p01	289869	6217198	Pool	1225	1225	1225	1225	1225	4.5	4.5	4.5	4.5	4.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.10	0.10	0.10	0.6	1.6	-0.8	-2.6	-	-	-	-
C02t01	289866	6217216	Tank	1200	1200	1225	1225	1225	4.0	4.0	4.0	4.0	4.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.10	0.10	0.10	0.6	1.7	-0.8	-2.7	-	-	-	-
C02t03	289850	6217205	Tank	1250	1250	1250	1275	1275	3.5	3.5	3.5	3.5	3.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.7	-0.8	-2.8	-	-	-	-
C03a	290046	6217105	House	575	575	575	575	575	3.0	3.0	3.0	3.0	3.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	-0.3	58.6	26.2	12.2	3.0
C03b	290031	6217077	Rural	600	600	600	600	600	3.5	3.5	3.5	3.5	3.5	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.1	0.2	0.0	-0.2	-	-	-	-
C03c	290050	6217166	Rural	450	450	450	450	450	3.0	3.0	3.0	3.0	3.0	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
C03d	290047	6217251	Rural	425	425	450	450	450	3.0	3.0	3.0	3.0	3.0	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.4	1.2	-0.4	-1.6	-	-	-	-
C03e	289955	6217255	Rural	800	800	825	825	825	5.5	5.5	5.5	5.5	5.5	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.6	1.7	-0.6	-2.3	-	-	-	-
C03f	289972	6217298	Rural	650	650	650	650	650	5.0	5.0	5.0	5.0	5.0	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.5	1.5	-0.4	-2.0	-	-	-	-
C03g	289980	6217310	Rural	550	550	575	575	575	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.4	1.3	-0.4	-1.8	-	-	-	-
C03h	289978	6217307	Rural	575	575	575	575	575	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.4	1.3	-0.4	-1.9	-	-	-	-
C03r01	290035	6217083	Rural	575	575	600	600	600	3.0	3.0	3.0	3.0	3.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	-0.2	-	-	-	-
C03t02	290045	6217083	Tank	550	550	575	575	575	3.0	3.0	3.0	3.0	3.0	0.05	0.05	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	-0.2	-	-	-	-
C03t03	289971	6217289	Tank	650	650	650	650	650	5.0	5.0	5.0	5.0	5.0	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.5	1.6	-0.5	-2.2	-	-	-	-
C04a	289815	6217519	House	850	850	900	925	925	5.0	5.0	5.0	5.0	5.0	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.3	0.9	-0.3	-1.2	57.9	26.6	12.4	3.1
C04b	289893	6217500	Rural	475	475	500	500	500	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
C04c	289946	6217465	Rural	350	350	375	375	375	2.0	2.0	2.0	2.0	2.0	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
C04p01	289834	6217520	Pool	725	725	775	775	775	5.0	5.0	5.0	5.0	5.0	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.3	0.8	-0.3	-1.1	-	-	-	-
C04r01	289947	6217471	Rural	350	350	350	375	375	2.0	2.0	2.0	2.0	2.0	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
C04t01	289812	6217498	Tank	800	800	825	850	850	5.0	5.0	5.0	5.0	5.0	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.2	0.7	-0.3	-0.9	-	-	-	-
C06a	290054	6217828	House	675	675	775	775	775	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	59.2	25.9	12.0	2.9
C06b	290059	6217807	Rural	675	675	750	775	775	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
C06c	290068	6217809	Rural	675	675	775	775	775	2.5	2.5	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.1	0.5	-0.1	-0.7	-	-	-	-
C06d	290141	6217802	Rural	950	950	1025	1025	1025	4.5	4.5	4.5	4.5	4.5	0.04	0.04	0.04	0.04	0.04	0.07	0.07	0.07	0.07	0.07	0.4	1.3	-0.4	-1.8	-	-	-	-
C06r01	290044	6217813	Rural	650	650	725	750	750	1.5	1.5	1.5	1.5	1.5	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
C06t01	290071	6217797	Tank	675	675	775	775	775	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.2	0.7	-0.2	-1.0	-	-	-	-
C06t02	290151	6217799	Tank	950	950	1025	1050	1050	4.5	4.5	4.5	4.5	4.5	0.03	0.03	0.03	0.03	0.03	0.08	0.08	0.08	0.08	0.08	0.5	1.5	-0.4	-2.1	-	-	-	-
C09a	290054	6218265	House	525	525	1000	1100	1100	6.5	6.5	5.0	4.5	4.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.1	0.0	-0.2	50.0	30.5	15.0	4.5
C09p01	290074	6218278	Pool	450	450	925	1025	1025	5.5	5.5	4.5	4.0	4.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.1	0.0	-0.2	-	-	-	-
C09t01	290060	6218291	Tank	350	350	850	950	950	4.5	4.5	3.5	3.0	3.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
C10a	290057	6218380	House	170	170	750	900	900	1.0	1.0	1.0	2.0	2.0	0.03	0.03	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	53.2	28.9	14.0	4.0
C10b	290067	6218351	Rural	200	200	750	875	875	2.0	2.0	1.0	0.5	0.5	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
C10c	290044	6218332	Rural	225	225	750	875	875	2.0	2.0	1.0	1.0	1.0	0.05	0.05	0.05	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
C10e	290061	6218393	Rural	150	150	775	925	925	1.0	1.0	1.5	2.5	2.5	0.01	0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
C10f	290065	6218386	Rural	160	160	750	900	900	1.0	1.0	1.0	2.0	2.0	0.02	0.02	0.03	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	-	-	-	-
C10g	290068	6218390	Rural	150	150	750	900	900	1.0	1.0	1.5	2.0	2.0	0.02	0.02	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	-	-	-	-
C10h	290075	6218413	Rural	140	140	775	950	950	0.5	0.5	2.0	3.0	3.0	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.5	-0.2	-0.9	-	-	-	-
C10r01	290055	6218385	Rural	150	150	750	900	900	1.0	1.0	1.0	2.0	2.0	0.02	0.02	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	-	-	-	-
C10t01	290068	6218404	Tank	140	140	775	925	925	0.5	0.5	1.5	2.5	2.5	0.01	0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.9	-	-	-	-
C10t04	290081	6218336	Tank	225	225	775	875	875	2.5	2.5	1.5	1.5	1.5	0.05	0.05	0.05	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.4	-	-	-	-
C10t05	290043	6218326	Tank	200	200	750	875	875	2.0	2.0	1.0	1.0	1.0	0.05	0.05	0.05	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
C11a	290552	6218423	Rural	950	975	1200	1200	1200	6.5	6.5	6.5	6.5	6.5	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.3	1.0	-0.6	-2.1	-	-	-	-
C11b	290576	6218424	Rural	950	975	1150	1175	1175	6.0	6.0	6.0	6.0	6.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.4	1.3	-0.7	-2.6	-	-	-	-
C11c	290592	6218428	Rural	950	975	1125	1150	1150	6.0	6.0	6.0	6.0	6.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.5	1.4	-0.8	-2.7	-	-	-	-
C11d	290528	6218430	Rural	875	900	1150	1150	1150	6.5	7.0	6.5	6.5	6.5	0.03	0.03	0.03	0.03	0.03	0.09	0.09	0.10	0.10	0.10	0.2	0.7	-0.4	-1.3	-	-	-	-
C11f	290517	6218438	Rural	800	800	1075	1100	1100	6.5	7.0	6.5	6.5	6.5	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.3	0.8	-0.2	-0.8	-	-	-	-
C11g	290513	6218392	Rural	975	975	1250	1275	1275	6.5	6.5	5.5	5.5	5.5	0.03	0.03	0.03	0.03	0.03	0.11	0.11	0.12	0.12	0.12	0.4	1.3	-0.7	-2.7	-	-	-	-
C11r01	290571	6218423	Rural	950	950	1150	1175	1175	6.5	6.5	6.0	6.0	6.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.4	1.2	-0.7	-2.5	-	-	-	-
C11r02	290556	6218428	Rural	925	925	1150	1175	1175	6.5	6.5	6.5	6.5	6.5	0.02	0.02	0.02	0.02	0.02	0.10	0.11	0.11	0.11	0.11	0.3	1.0	-0.5	-2.0	-	-	-	-
C11t01	290547	6218418	Tank	950	950	1175	1200	1200	6.5	6.5	6.0	6.0	6.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.4	1.1	-0.6	-2.2	-	-	-	-
C11t02	290559	6218427	Tank	925	925	1150	1175	1175	6.5	6.5	6.5	6.5	6.5	0.02	0.02	0.02	0.02	0.02	0.10	0.11	0.11	0.11	0.11	0.3	1.0	-0.6	-2.0	-	-	-	-
C12f	290454	6219257	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
C12g	290445	6219155	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.6	-0.5	-2.3	-	-	-	-
C12t02	290454	6219151	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.7	-0.5	-2.3	-	-	-	-
C20h01	289908	6219228	House	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	91.5	6.8	1.5	0.2
C20p01	289919	6219226	Pool	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
C20r01	289919	6219268	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
C20r02	289920	6219244	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
D03r01	289308	6219226	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05a	289258	6219040	House	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.8	5.9	1.1	0.2
D05b	289274	6219063	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05c	289275	6219077	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05d	289266	6219024	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
D05e	289299	6219088	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05f	289294	6219102	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05g	289404	6218986	Rural	< 20	< 20	< 20	110	110	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	0.0	-	-	-	-
D05h	289083	6219112	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05p01	289271	6219035	Pool	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05r01	289297	6219085	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
D05t01	289304	6219063	Tank	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D05t02	289307	6219100	Tank	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06a	289015	6219008	House	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.8	5.9	1.1	0.2
D06b	289012	6218967	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06d	289045	6218952	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06e	289097	6218939	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06f	289029	6219051	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06r01	289017	6218954	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06r02	289016	6218947	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06t01	289017	6219032	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D06t02	289026	6218953	Tank	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07a	289442	6219127	House	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.9	5.8	1.1	0.2
D07b	289442	6219108	Rural	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07c	289418	6219131	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07d	289404	6219125	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07f	289488	6219166	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07g	289642	6219280	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07p01	289444	6219115	Pool	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07r01	289422	6219102	Tennis court	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07t01	289449	6219157	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D07t02	289464	6219136	Tank	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
D08a	289786	6219115	House	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	88.8	8.6	2.3	0.2
D08b	289794	6219085	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	-	-	-	-
D08c	289713	6219055	Rural	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	0.0	0.0	-	-	-	-
D08p01	289769	6219108	Pool	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
D08r01	289810	6219098	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	0.0	0.0	-	-	-	-
D08r02	289772	6219143	Rural	< 20	< 20	< 20	110	110	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	0.0	-	-	-	-
D08r03	289737	6219131	Rural	< 20	< 20	< 20	110	110	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	0.0	-	-	-	-
D08t01	289785	6219095	Tank	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
D08t02	289777	6219091	Tank	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
D09a	289550	6218929	House	< 20	< 20	< 20	225	225	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	52.8	29.1	14.1	4.0
D09b	289511	6218886	Rural	< 20	< 20	< 20	250	250	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
D09c	289506	6218880	Rural	< 20	< 20	< 20	250	250	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	0.0	0.0	-	-	-	-
D09e	289785	6218874	Rural	< 20	< 20	50	950	950	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.11	0.11	0.3	1.0	-0.5	-2.0	-	-	-	-
D09p01	289577	6218943	Pool	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	-	-	-	-
D10a	289853	6218962	House	< 20	< 20	40	725	725	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	0.05	0.05	0.3	0.9	-0.1	-0.5	50.4	30.2	15.0	4.4
D10c	289896	6218917	Rural	< 20	< 20	60	875	875	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.4	1.2	-0.5	-2.2	-	-	-	-
D10d	289895	6218962	Rural	< 20	< 20	40	675	675	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.04	0.04	0.3	0.8	-0.2	-0.8	-	-	-	-
D10f	289883	6218985	Rural	< 20	< 20	30	525	525	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	0.9	-0.1	-0.3	-	-	-	-
D10p01	289833	6218953	Pool	< 20	< 20	40	650	650	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.5	-	-	-	-
D10r01	289924	6218915	Rural	< 20	< 20	70	875	875	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.5	1.5	-0.7	-2.6	-	-	-	-
D10r02	289863	6218981	Rural	< 20	< 20	30	500	500	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	0.9	-0.1	-0.3	-	-	-	-
D10r03	289843	6218960	Rural	< 20	< 20	30	600	600	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	0.9	-0.1	-0.4	-	-	-	-
D10r04	289829	6218955	Rural	< 20	< 20	30	600	600	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.4	-	-	-	-
D10t01	289901	6218913	Tank	< 20	< 20	60	875	875	< 0.5	< 0.5	< 0.5	5.5	5.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.4	1.3	-0.6	-2.4	-	-	-	-
D10t02	289898	6218913	Tank	< 20	< 20	60	875	875	< 0.5	< 0.5	< 0.5	5.5	5.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.4	1.3	-0.6	-2.4	-	-	-	-
D10t03	289931	6218912	Tank	< 20	< 20	70	850	850	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.5	1.6	-0.7	-2.6	-	-	-	-
D10t04	289935	6218914	Tank	< 20	< 20	70	850	850	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.5	1.6	-0.7	-2.6	-	-	-	-
D11a	289947	6218816	House	< 20	< 20	120	850	850	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.9	-0.5	-1.7	63.1	23.9	10.7	2.2
D11b	289959	6218831	Rural	< 20	< 20	110	825	825	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.03	0.03	0.4	1.0	-0.6	-1.8	-	-	-	-
D11c	289909	6218809	Rural	< 20	< 20	110	900	900	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.03	0.03	0.4	1.1	-0.6	-2.0	-	-	-	-
D11d	289819	6218821	Rural	< 20	< 20	80	1000	1000	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.11	0.11	0.6	1.7	-1.0	-3.3	-	-	-	-
D11p01	289942	6218831	Pool	< 20	< 20	110	875	875	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.04	0.04	0.4	1.1	-0.6	-2.0	-	-	-	-
D11r01	289935	6218803	Rural	< 20	< 20	110	825	825	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.9	-0.5	-1.6	-	-	-	-
D11t01	289922	6218811	Tank	< 20	< 20	110	875	875	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.02	0.02	0.4	1.0	-0.6	-1.9	-	-	-	-
D11t02	289957	6218841	Tank	< 20	< 20	100	850	850	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.04	0.04	0.4	1.2	-0.6	-2.0	-	-	-	-
D12a	289936	6218792	House	< 20	< 20	130	850	850	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.8	-0.4	-1.4	61.9	24.5	11.1	2.4
D12b	289889	6218788	House	< 20	< 20	120	925	925	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.04	0.04	0.3	0.9	-0.5	-1.8	59.5	25.8	11.9	2.8
D12c	289950	6218763	Rural	< 20	< 20	140	750	750	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.1	0.5	-0.2	-0.9	-	-	-	-
D12d	289812	6218732	Rural	< 20	< 20	120	900	900	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.7	-0.4	-1.4	-	-	-	-
D12e	289949	6218711	Rural	< 20	< 20	180	750	750	< 0.5	< 0.5	1.5	1.0	1.0	< 0.01	< 0.01	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
D12f	289856	6218809	Rural	< 20	< 20	100	975	975	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.08	0.08	0.5	1.4	-0.8	-2.6	-	-	-	-
D12r01	289804	6218722	Rural	< 20	< 20	120	875	875	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.7	-0.4	-1.3	-	-	-	-
D12t01	289924	6218775	Tank	< 20	< 20	130	800	800	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.6	-0.3	-1.2	-	-	-	-
D12t02	289916	6218780	Tank	< 20	< 20	120	825	825	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.7	-0.4	-1.4	-	-	-	-
D12t03	289918	6218779	Tank	< 20	< 20	120	825	825	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.7	-0.4	-1.3	-	-	-	-
D12t04	289870	6218798	Tank	< 20	< 20	100	950	950	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.05	0.05	0.4	1.1	-0.7	-2.2	-	-	-	-
D13a	289946	6218672	House	20	20	275	800	800	< 0.5	< 0.5	3.5	2.5	2.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.1	0.4	-0.1	-0.3	50.7	30.0	14.9	4.3
D13b	289890	6218664	Rural	< 20	< 20	225	800	800	< 0.5	< 0.5	2.5	1.5	1.5	< 0.01	< 0.01	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D13c	289866	6218667	Rural	< 20	< 20	190	775	775	< 0.5	< 0.5	2.0	1.0	1.0	< 0.01	< 0.01	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
D13d	289859	6218680	Rural	< 20	< 20	170	775	775	< 0.5	< 0.5	1.0	0.5	0.5	< 0.01	< 0.01	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.1	-0.6	-	-	-	-
D13p01	289938	6218690	Pool	< 20	< 20	200	775	775	< 0.5	< 0.5	2.0	1.0	1.0	< 0.01	< 0.01	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D13t01	289948	6218661	Tank	20	20	300	825	825	< 0.5	< 0.5	3.5	2.5	2.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D14a	289557	6218711	House	< 20	< 20	80	1025	1025	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.4	44.3	33.8	15.4	6.4
D14b	289576	6218755	Rural	< 20	< 20	60	1025	1025	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.4	1.3	-0.7	-2.7	-	-	-	-
D14r01	289538	6218698	Rural	< 20	< 20	80	1025	1025	< 0.5	< 0.5	0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.4	-	-	-	-
D14t01	289546	6218738	Tank	< 20	< 20	60	1025	1025	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.4	1.4	-0.7	-2.8	-	-	-	-
D15a	289349	6218751	House	< 20	< 20	30	600	600	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.1	0.0	-0.2	49.3	30.9	15.0	4.8
D15b	289406	6218706	Rural	< 20	< 20	50	900	900	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.09	0.09	0.3	0.8	-0.3	-1.4	-	-	-	-
D15c	289384	6218771	Rural	< 20	< 20	30	450	450	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.2	-	-	-	-
D15d	289427	6218697	Rural	< 20	< 20	60	975	975	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.11	0.11	0.3	1.0	-0.5	-2.1	-	-	-	-
D15p01	289370	6218774	Pool	< 20	< 20	20	400	400	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D15t01	289411	6218699	Tank	< 20	< 20	50	925	925	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.09	0.09	0.2	0.9	-0.4	-1.8	-	-	-	-
D17a	289526	6218592	House	< 20	< 20	140	925	925	< 0.5	< 0.5	0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	0.8	-0.4	-1.5	59.7	25.6	11.8	2.8
D17b	289519	6218584	Rural	< 20	< 20	130	900	900	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.7	-0.4	-1.5	-	-	-	-
D17c	289490	6218594	Rural	< 20	< 20	120	975	975	< 0.5	< 0.5	0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.03	0.03	0.3	1.0	-0.6	-1.9	-	-	-	-
D17p01	289515	6218609	Pool	< 20	< 20	120	975	975	< 0.5	< 0.5	0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.03	0.03	0.4	1.0	-0.6	-2.0	-	-	-	-
D17t01	289514	6218582	Tank	< 20	< 20	130	900	900	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.7	-0.4	-1.5	-	-	-	-
D17t02	289490	6218587	Tank	< 20	< 20	120	950	950	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	0.9	-0.5	-1.8	-	-	-	-
D18a	289902	6218446	House	90	90	975	1325	1325	< 0.5	< 0.5	3.0	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.6	-1.0	-3.2	44.2	33.9	15.4	6.5
D18b	289920	6218422	Rural	100	100	975	1300	1300	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.02	0.03	0.03	< 0.01	< 0.01	0.09	0.09	0.09	0.4	1.2	-0.8	-2.4	-	-	-	-
D18d	289839	6218447	Rural	70	70	975	1325	1325	< 0.5	< 0.5	5.0	3.0	3.0	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.6	-0.9	-3.3	-	-	-	-
D18e	289780	6218487	Rural	40	40	775	1225	1225	< 0.5	< 0.5	6.5	5.0	5.0	< 0.01	< 0.01	0.04	0.04	0.04	< 0.01	< 0.01	0.05	0.06	0.06	0.3	0.8	-0.2	-1.0	-	-	-	-
D18f	289886	6218473	Rural	70	70	975	1325	1325	< 0.5	< 0.5	5.0	3.5	3.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.5	1.6	-0.9	-3.3	-	-	-	-
D18p01	289877	6218461	Pool	70	70	975	1325	1325	< 0.5	< 0.5	4.5	3.0	3.0	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.6	-1.0	-3.3	-	-	-	-
D18r01	289920	6218415	Rural	100	100	950	1250	1250	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.02	0.03	0.03	< 0.01	< 0.01	0.06	0.06	0.06	0.4	1.1	-0.7	-2.2	-	-	-	-
D18r02	289928	6218390	Rural	120	120	900	1150	1150	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.04	0.06	0.06	< 0.01	< 0.01	0.02	0.02	0.02	0.3	0.8	-0.5	-1.6	-	-	-	-
D19a	289798	6218258	House	150	150	800	975	975	1.0	1.0	2.0	3.0	3.0	0.02	0.02	0.04	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	52.0	29.5	14.4	4.1
D19d	289843	6218283	Rural	140	140	775	925	925	0.5	0.5	1.5	2.5	2.5	0.01	0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	-	-	-	-
D19p01	289775	6218259	Pool	130	130	775	950	950	< 0.5	< 0.5	2.0	3.0	3.0	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
D19r01	289764	6218249	Rural	140	140	775	925	925	< 0.5	< 0.5	1.5	2.5	2.5	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
D19r02	289758	6218282	Rural	120	120	850	1050	1050	< 0.5	< 0.5	2.5	4.0	4.0	< 0.01	< 0.01	0.04	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
D19t01	289775	6218284	Tank	130	130	850	1025	1025	< 0.5	< 0.5	2.5	4.0	4.0	< 0.01	< 0.01	0.04	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
D19t03	289765	6218254	Tank	130	130	775	950	950	< 0.5	< 0.5	1.5	2.5	2.5	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
D19t04	289768	6218253	Tank	130	130	775	950	950	< 0.5	< 0.5	1.5	2.5	2.5	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
D20b	289662	6218259	Rural	110	110	900	1150	1150	< 0.5	< 0.5	3.0	5.0	5.0	< 0.01	< 0.01	0.04	0.06	0.06	< 0.01	< 0.01	0.02	0.02	0.02	0.3	0.8	-0.5	-1.7	-	-	-	-
D20h01	289684	6218352	House	80	80	975	1325	1325	< 0.5	< 0.5	4.0	4.5	4.5	< 0.01	< 0.01	0.03	0.03	0.03	< 0.01	< 0.01	0.12	0.13	0.13	0.6	1.6	-1.0	-3.3	44.0	34.0	15.5	6.6
D20t01	289656	6218259	Tank	110	110	900	1150	1150	< 0.5	< 0.5	3.0	4.5	4.5	< 0.01	< 0.01	0.04	0.06	0.06	< 0.01	< 0.01	0.02	0.02	0.02	0.3	0.9	-0.5	-1.7	-	-	-	-
D20t02	289657	6218255	Tank	110	110	900	1125	1125	< 0.5	< 0.5	3.0	4.5	4.5	< 0.01	< 0.01	0.04	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.3	0.8	-0.5	-1.6	-	-	-	-
D21a	289478	6218314	House	60	60	925	1325	1325	< 0.5	< 0.5	6.5	5.0	5.0	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.10	0.12	0.12	0.3	1.0	-0.5	-2.0	44.4	33.8	15.4	6.4
D21b	289513	6218282	Rural	70	70	975	1325	1325	< 0.5	< 0.5	4.5	3.0	3.0	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.6	-1.0	-3.3	-	-	-	-
D21c	289468	6218409	House	30	30	450	975	975	< 0.5	< 0.5	5.5	4.5	4.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50.0	30.5	15.0	4.5
D21d	289450	6218390	Rural	30	30	425	950	950	< 0.5	< 0.5	5.5	4.0	4.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D21t01	289474	6218312	Tank	50	50	875	1300	1300	< 0.5	< 0.5	6.5	5.0	5.0	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.09	0.10	0.10	0.3	0.9	-0.5	-1.9	-	-	-	-
D22a	288945	6218558	House	< 20	< 20	30	500	500	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.1	48.9	31.1	15.1	4.9
D22c	288979	6218569	Rural	< 20	< 20	30	475	475	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.1	-	-	-	-
D22p01	288957	6218547	Pool	< 20	< 20	30	525	525	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.2	-	-	-	-
D22r01	288919	6218527	Rural	< 20	< 20	30	550	550	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.1	-0.1	-0.2	-	-	-	-
D22r02	288946	6218573	Rural	< 20	< 20	< 20	350	350	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D22r03	289079	6218471	Rural	< 20	< 20	80	1075	1075	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.5	-	-	-	-
D22r04	289118	6218553	Rural	< 20	< 20	50	950	950	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.10	0.10	0.3	0.8	-0.4	-1.7	-	-	-	-
D22t01	288994	6218567	Tank	< 20	< 20	30	525	525	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.2	-	-	-	-
D22t02	288965	6218573	Tank	< 20	< 20	20	400	400	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D22t03	288965	6218571	Tank	< 20	< 20	20	400	400	< 0.5	< 0.5	< 0.5	5.5	5.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.1	-	-	-	-
D23a	288930	6218432	House	< 20	< 20	70	1050	1050	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.5	1.4	-0.8	-2.9	44.2	33.9	15.4	6.5
D23b	288914	6218445	Rural	< 20	< 20	60	1000	1000	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.11	0.11	0.3	1.0	-0.5	-2.1	-	-	-	-
D23d	288951	6218406	House	< 20	< 20	80	1050	1050	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.5	44.2	33.9	15.4	6.5
D23e	288958	6218429	Rural	< 20	< 20	70	1050	1050	< 0.5	< 0.5	< 0.5	5.5	5.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.4	-	-	-	-
D23f	288978	6218454	Rural	< 20	< 20	60	1050	1050	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.5	1.5	-0.8	-3.0	-	-	-	-
D23g	288983	6218402	Rural	< 20	< 20	90	1050	1050	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.6	-1.0	-3.1	-	-	-	-
D23h	289119	6218368	Rural	< 20	< 20	130	900	900	< 0.5	< 0.5	0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.1	0.5	-0.2	-1.0	-	-	-	-
D23p01	288956	6218419	Pool	< 20	< 20	70	1050	1050	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.5	-	-	-	-
D23r01	288973	6218410	Tennis court	< 20	< 20	90	1050	1050	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.4	-	-	-	-
D23r02	289071	6218426	Rural	< 20	< 20	90	1075	1075	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.11	0.11	0.5	1.3	-0.8	-2.6	-	-	-	-
D23r03	288949	6218483	Rural	< 20	< 20	50	875	875	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.07	0.07	0.3	0.8	-0.3	-1.3	-	-	-	-
D23t01	288949	6218437	Tank	< 20	< 20	60	1050	1050	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.5	1.5	-0.8	-3.1	-	-	-	-
D23t02	288961	6218436	Tank	< 20	< 20	70	1050	1050	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.5	1.6	-0.9	-3.2	-	-	-	-
D23t03	288979	6218433	Tank	< 20	< 20	70	1050	1050	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.4	-	-	-	-
D24a	288920	6218346	House	< 20	< 20	100	1050	1050	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.11	0.11	0.5	1.3	-0.8	-2.6	44.5	33.8	15.4	6.4
D24b	288915	6218328	Rural	< 20	< 20	100	1025	1025	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.07	0.07	0.4	1.1	-0.7	-2.2	-	-	-	-
D24c	288954	6218332	Rural	< 20	< 20	110	975	975	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.03	0.03	0.3	0.9	-0.5	-1.8	-	-	-	-
D24d	288967	6218323	Rural	< 20	< 20	120	975	975	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.7	-0.4	-1.5	-	-	-	-
D24p01	288948	6218344	Pool	< 20	< 20	100	1025	1025	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.07	0.07	0.4	1.1	-0.7	-2.2	-	-	-	-
D24r01	288948	6218327	Rural	< 20	< 20	110	975	975	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.03	0.03	0.3	0.9	-0.5	-1.8	-	-	-	-
D24r02	288927	6218351	Rural	< 20	< 20	90	1050	1050	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.09	0.09	0.5	1.3	-0.8	-2.6	-	-	-	-
D24t01	288998	6218316	Tank	< 20	< 20	120	900	900	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.5	-0.3	-1.1	-	-	-	-
D24t02	288982	6218313	Tank	< 20	< 20	120	900	900	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.6	-0.3	-1.2	-	-	-	-
D25a	288913	6218236	House	< 20	< 20	150	825	825	< 0.5	< 0.5	1.0	2.0	2.0	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	58.3	26.4	12.3	3.0
D25b	288929	6218288	Rural	< 20	< 20	120	900	900	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.6	-0.3	-1.3	-	-	-	-
D25r01	288926	6218224	Rural	< 20	< 20	160	800	800	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.1	-0.6	-	-	-	-
D26a	289592	6218236	House	110	110	950	1250	1250	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.04	0.06	0.06	< 0.01	< 0.01	0.07	0.07	0.07	0.3	0.9	-0.6	-1.9	48.3	31.5	15.1	5.1
D26b	289632	6218181	Rural	140	140	775	950	950	0.5	0.5	1.5	2.5	2.5	0.01	0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
D26p01	289594	6218248	Pool	100	100	950	1250	1250	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	0.06	0.06	0.06	0.4	1.1	-0.7	-2.2	-	-	-	-
D26t01	289639	6218177	Tank	140	140	750	900	900	0.5	0.5	1.0	2.0	2.0	0.01	0.01	0.03	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	-	-	-	-
D26t02	289567	6218218	Tank	110	110	900	1150	1150	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.03	0.05	0.05	< 0.01	< 0.01	0.02	0.02	0.02	0.3	0.9	-0.5	-1.8	-	-	-	-
D26t03	289566	6218220	Tank	110	110	925	1175	1175	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.03	0.05	0.05	< 0.01	< 0.01	0.03	0.03	0.03	0.3	0.9	-0.6	-1.8	-	-	-	-
D26t04	289567	6218231	Tank	100	100	950	1225	1225	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.03	0.05	0.05	< 0.01	< 0.01	0.05	0.05	0.05	0.4	1.0	-0.6	-2.1	-	-	-	-
D26t08	289537	6218258	Tank	90	90	975	1325	1325	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.5	-1.0	-3.0	-	-	-	-
D27a	289697	6218139	House	250	250	775	875	875	3.0	3.0	2.0	2.0	2.0	0.07	0.07	0.07	0.07	0.07	< 0.01	< 0.01	0.01	0.01	0.01	0.4	0.9	0.0	0.0	49.6	30.7	15.0	4.7
D27b	289698	6218175	Rural	160	160	750	875	875	1.0	1.0	0.5	1.0	1.0	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
D27p01	289679	6218142	Pool	200	200	750	875	875	2.0	2.0	1.0	1.0	1.0	0.05	0.05	0.05	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.4	-	-	-	-
D27r01	289676	6218127	Rural	225	225	775	875	875	2.5	2.5	1.5	1.5	1.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.3	-	-	-	-
D27t02	289716	6218168	Tank	180	180	725	850	850	1.5	1.5	1.0	0.5	0.5	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D27t03	289697	6218183	Tank	150	150	750	875	875	1.0	1.0	0.5	1.0	1.0	0.02	0.02	0.02	0.03	0.03	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
D28a	289796	6218029	House	875	875	1225	1300	1300	6.0	6.0	4.5	4.5	4.5	0.04	0.04	0.05	0.05	0.05	0.13	0.13	0.14	0.14	0.14	0.5	1.5	-0.8	-3.1	43.7	34.2	15.5	6.6
D28b	289782	6218011	Rural	875	875	1225	1300	1300	5.5	5.5	4.0	3.5	3.5	0.04	0.04	0.05	0.05	0.05	0.13	0.13	0.14	0.14	0.14	0.5	1.6	-0.9	-3.3	-	-	-	-
D28c	289834	6217997	Rural	875	875	1200	1275	1275	3.5	3.5	5.5	6.0	6.0	0.04	0.04	0.05	0.05	0.05	0.13	0.13	0.14	0.14	0.14	0.6	1.6	-1.0	-3.1	-	-	-	-
D28e	289638	6217907	Rural	925	925	1250	1325	1325	2.5	2.5	4.0	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.6	1.6	-1.0	-3.2	-	-	-	-
D28r01	289789	6218037	Rural	850	850	1200	1275	1275	6.0	6.0	5.0	4.5	4.5	0.04	0.04	0.05	0.05	0.05	0.12	0.12	0.14	0.14	0.14	0.4	1.3	-0.7	-2.7	-	-	-	-
D28r02	289783	6218004	Rural	875	875	1225	1300	1300	4.5	4.5	3.0	3.0	3.0	0.04	0.04	0.04	0.04	0.04	0.13	0.13	0.14	0.14	0.14	0.6	1.7	-1.0	-3.4	-	-	-	-
D28r03	289776	6218009	Rural	875	875	1225	1300	1300	5.5	5.5	4.0	4.0	4.0	0.04	0.04	0.04	0.04	0.04	0.13	0.13	0.14	0.14	0.14	0.5	1.6	-0.9	-3.3	-	-	-	-
D28t01	289791	6218021	Tank	875	875	1225	1300	1300	5.5	5.5	4.0	3.5	3.5	0.04	0.04	0.05	0.05	0.05	0.13	0.13	0.14	0.14	0.14	0.5	1.6	-0.9	-3.2	-	-	-	-
D29a	289811	6217977	House	875	875	1225	1300	1300	4.0	4.0	6.0	6.0	6.0	0.04	0.04	0.05	0.05	0.05	0.13	0.13	0.14	0.14	0.14	0.6	1.5	-0.9	-3.0	43.7	34.2	15.5	6.6
D29b	289722	6217933	Rural	900	900	1225	1300	1300	2.5	2.5	4.5	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.10	0.10	0.11	0.11	0.11	0.5	1.5	-0.9	-2.9	-	-	-	-
D29t01	289781	6217957	Tank	875	875	1200	1275	1275	3.5	3.5	5.5	6.0	6.0	0.03	0.03	0.03	0.03	0.03	0.12	0.12	0.13	0.13	0.13	0.5	1.4	-0.9	-2.8	-	-	-	-
D29t02	289781	6217947	Tank	875	875	1175	1250	1250	3.5	3.5	5.5	6.0	6.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.5	1.3	-0.8	-2.6	-	-	-	-
D29t03	289783	6217936	Tank	875	875	1150	1200	1200	3.5	3.5	5.5	6.0	6.0	0.03	0.03	0.04	0.04	0.04	0.08	0.08	0.08	0.08	0.08	0.4	1.1	-0.7	-2.3	-	-	-	-
D30a	289595	6218070	House	350	350	850	975	975	4.5	4.5	3.5	3.0	3.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50.8	30.0	14.9	4.3
D30b	289586	6218034	Rural	425	425	900	1000	1000	5.5	5.5	4.0	4.0	4.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.1	-0.1	-0.2	-	-	-	-
D30c	289600	6218036	House	500	500	975	1075	1075	6.0	6.0	4.5	4.0	4.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.1	-0.1	-0.2	50.8	30.0	14.9	4.3
D30e	289397	6218069	Rural	140	140	800	975	975	1.0	1.0	2.0	3.0	3.0	0.02	0.02	0.04	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.7	-	-	-	-
D30t01	289567	6218043	Tank	350	350	850	975	975	4.5	4.5	3.5	3.0	3.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D30t02	289574	6218019	Tank	475	475	950	1050	1050	5.5	5.5	4.5	4.0	4.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
D30t03	289576	6218018	Tank	475	475	950	1050	1050	5.5	5.5	4.5	4.0	4.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.3	-	-	-	-
D31a	288936	6218127	House	20	20	475	975	975	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50.5	30.2	15.0	4.4
D31b	288897	6218144	Rural	< 20	< 20	300	850	850	< 0.5	< 0.5	4.0	2.5	2.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	0.0	-	-	-	-
D31d	288884	6218122	House	20	20	400	925	925	< 0.5	< 0.5	5.0	3.5	3.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50.6	30.1	15.0	4.3
D31t01	288896	6218105	Tank	20	20	475	975	975	< 0.5	< 0.5	5.5	4.5	4.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.2	-	-	-	-
D31t02	288941	6218134	Tank	20	20	400	925	925	< 0.5	< 0.5	5.5	4.0	4.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D31t03	288942	6218136	Tank	20	20	400	925	925	< 0.5	< 0.5	5.0	4.0	4.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D32a	288862	6217970	House	70	70	950	1300	1300	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.6	-0.9	-3.3	44.3	33.8	15.4	6.4
D32c	288867	6217928	Rural	80	80	950	1300	1300	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.5	1.4	-0.9	-2.9	-	-	-	-
D32r01	288871	6217968	Rural	70	70	950	1300	1300	< 0.5	< 0.5	5.0	3.0	3.0	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.7	-1.0	-3.3	-	-	-	-
D32r02	288865	6217958	Rural	70	70	950	1300	1300	< 0.5	< 0.5	4.0	2.5	2.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.6	1.7	-1.0	-3.4	-	-	-	-
D32t01	288866	6217993	Tank	60	60	925	1300	1300	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.10	0.12	0.12	0.4	1.3	-0.7	-2.7	-	-	-	-
D32t02	288875	6217992	Tank	60	60	925	1300	1300	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.10	0.12	0.12	0.5	1.4	-0.8	-2.9	-	-	-	-
D33a	288990	6217822	House	190	190	750	875	875	2.0	2.0	1.0	1.0	1.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	58.8	26.1	12.1	3.0
D33b	288963	6217809	Rural	180	180	725	850	850	1.5	1.5	0.5	1.0	1.0	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D33c	289015	6217853	Rural	150	150	725	875	875	1.0	1.0	1.0	1.5	1.5	0.02	0.02	0.03	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
D33d	288962	6217851	Rural	140	140	750	900	900	0.5	0.5	1.5	2.5	2.5	0.01	0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.6	-	-	-	-
D33e	288951	6217811	Rural	170	170	725	875	875	1.5	1.5	0.5	1.0	1.0	0.03	0.03	0.03	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D33f	288967	6217808	Rural	180	180	725	850	850	1.5	1.5	1.0	0.5	0.5	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
D33p01	289004	6217861	Pool	140	140	750	900	900	1.0	1.0	1.5	2.0	2.0	0.02	0.02	0.04	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.6	-	-	-	-
D33t01	288983	6217803	Tank	200	200	750	850	850	2.0	2.0	1.0	1.0	1.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.3	-	-	-	-
D34a	289177	6217862	House	350	350	850	950	950	4.5	4.5	3.5	3.0	3.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50.4	30.2	15.0	4.4
D34b	289176	6217826	Rural	475	475	950	1025	1025	6.0	6.0	4.5	4.5	4.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
D34c	289178	6217794	Rural	675	675	1100	1200	1200	6.0	6.0	5.0	4.5	4.5	0.06	0.06	0.06	0.06	0.06	0.03	0.03	0.03	0.03	0.03	0.3	0.9	-0.2	-0.7	-	-	-	-
D34t01	289200	6217852	Tank	400	400	875	975	975	5.0	5.0	4.0	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.1	0.0	-0.1	-	-	-	-
D34t02	289185	6217784	Tank	700	700	1125	1200	1200	6.0	6.0	5.0	4.5	4.5	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.3	0.8	-0.3	-1.0	-	-	-	-
D34t03	289182	6217784	Tank	700	700	1125	1200	1200	6.0	6.0	5.0	4.5	4.5	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.3	0.8	-0.2	-1.0	-	-	-	-
D35a	289770	6217773	House	625	625	750	775	775	1.0	1.0	1.0	1.0	1.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.1	-0.3	71.0	19.5	8.1	1.4
D35b	289710	6217629	Rural	1000	1000	1075	1100	1100	4.5	4.5	4.0	4.0	4.0	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.2	0.6	-0.2	-0.8	-	-	-	-
D35t01	289742	6217773	Tank	650	650	775	800	800	1.0	1.0	1.0	1.0	1.0	0.02	0.02	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D37a	289406	6217550	House	875	875	975	1000	1000	4.0	4.0	4.0	3.5	3.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	49.9	30.5	15.0	4.6
D37b	289395	6217543	Rural	875	875	975	975	975	4.0	4.0	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D37c	289316	6217526	Rural	800	800	900	925	925	2.5	2.5	2.5	2.5	2.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D37t01	289385	6217555	Tank	800	800	900	925	925	3.0	3.0	3.0	2.5	2.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D37t02	289307	6217522	Tank	800	800	900	900	900	2.5	2.5	2.5	2.0	2.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D38a	289105	6217641	House	925	925	1275	1325	1325	3.0	3.0	4.0	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.12	0.12	0.12	0.6	1.6	-1.0	-3.1	44.3	33.8	15.4	6.4
D38b	289099	6217603	Rural	925	925	1225	1300	1300	2.5	2.5	4.5	4.5	4.5	0.02	0.02	0.03	0.03	0.03	0.09	0.09	0.09	0.09	0.09	0.4	1.2	-0.7	-2.3	-	-	-	-
D38c	289086	6217595	Rural	925	925	1225	1275	1275	2.5	2.5	4.5	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.08	0.08	0.09	0.09	0.09	0.4	1.1	-0.7	-2.3	-	-	-	-
D38d	289116	6217602	Rural	925	925	1200	1250	1250	2.5	2.5	4.5	4.5	4.5	0.02	0.02	0.03	0.03	0.03	0.07	0.07	0.07	0.07	0.07	0.4	1.0	-0.6	-2.1	-	-	-	-
D38e	289113	6217590	Rural	900	900	1175	1225	1225	2.5	2.5	4.5	4.5	4.5	0.02	0.02	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.3	0.9	-0.6	-1.9	-	-	-	-
D38f	289121	6217589	Rural	900	900	1150	1200	1200	2.5	2.5	4.5	4.5	4.5	0.03	0.03	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.3	0.9	-0.5	-1.8	-	-	-	-
D38h	289156	6217738	Tennis court	900	900	1275	1325	1325	6.0	6.0	5.0	4.5	4.5	0.03	0.03	0.03	0.03	0.03	0.10	0.10	0.12	0.12	0.12	0.3	1.1	-0.6	-2.3	-	-	-	-
D38i	289155	6217754	Rural	775	775	1175	1250	1250	6.0	6.0	5.0	4.5	4.5	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.07	0.07	0.07	0.2	0.8	-0.4	-1.6	-	-	-	-
D38k	289164	6217581	Rural	825	825	1050	1075	1075	2.5	2.5	4.0	4.5	4.5	0.04	0.04	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
D39a	289040	6217776	Rural	375	375	850	950	950	5.0	5.0	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.1	0.0	-0.1	-	-	-	-
D39r01	289019	6217775	Rural	350	350	850	950	950	4.5	4.5	3.5	3.0	3.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D39t01	289023	6217783	Tank	300	300	800	900	900	4.0	4.0	2.5	2.5	2.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D39t02	289029	6217782	Tank	300	300	825	925	925	4.0	4.0	3.0	2.5	2.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D39t03	288998	6217768	Tank	300	300	800	925	925	4.0	4.0	3.0	2.5	2.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D39t04	289040	6217770	Tank	375	375	875	975	975	5.0	5.0	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.1	0.0	-0.2	-	-	-	-
D40a	288842	6217698	House	325	325	850	950	950	4.5	4.5	3.0	3.0	3.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50.5	30.2	15.0	4.4
D40b	288865	6217717	Rural	275	275	800	900	900	3.5	3.5	2.5	2.0	2.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D40r01	288834	6217677	Rural	375	375	875	975	975	5.0	5.0	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D40t02	288871	6217718	Tank	275	275	800	900	900	3.5	3.5	2.0	2.0	2.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D40t03	288870	6217716	Tank	275	275	800	900	900	3.5	3.5	2.5	2.0	2.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D41a	288907	6217558	House	925	925	1275	1325	1325	4.5	4.5	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.12	0.12	0.12	0.6	1.7	-1.0	-3.3	44.4	33.8	15.4	6.4
D41b	288930	6217535	Rural	925	925	1250	1325	1325	2.5	2.5	4.5	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.11	0.11	0.11	0.5	1.3	-0.9	-2.7	-	-	-	-
D41c	288933	6217519	Rural	925	925	1225	1275	1275	2.5	2.5	4.5	4.5	4.5	0.02	0.02	0.03	0.04	0.04	0.08	0.08	0.08	0.08	0.08	0.4	1.1	-0.7	-2.2	-	-	-	-
D41d	288911	6217442	Rural	750	750	950	1000	1000	2.5	2.5	4.0	4.0	4.0	0.03	0.03	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.2	0.5	-0.3	-1.0	-	-	-	-
D41p01	288910	6217577	Pool	925	925	1275	1325	1325	5.0	5.0	3.5	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.12	0.12	0.12	0.6	1.7	-1.0	-3.4	-	-	-	-
D41t01	288941	6217555	Tank	925	925	1275	1325	1325	2.0	2.0	4.0	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.12	0.12	0.12	0.6	1.5	-1.0	-3.0	-	-	-	-
D42r01	289031	6217301	Rural	1000	1000	1075	1100	1100	4.5	4.5	4.0	4.0	4.0	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.3	0.7	-0.2	-1.0	-	-	-	-
D43a	289264	6217173	House	925	925	975	975	975	3.0	3.0	3.0	3.5	3.5	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	52.1	29.4	14.4	4.1
D43r01	289310	6217243	Rural	1075	1075	1100	1125	1125	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.6	-0.4	-1.3	-	-	-	-
D43t01	289247	6217192	Tank	975	975	1000	1025	1025	3.5	3.5	4.0	4.0	4.0	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.2	0.5	-0.3	-1.1	-	-	-	-
D44a	289396	6217404	House	1300	1300	1375	1375	1375	4.0	4.0	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-0.9	-3.3	44.2	33.9	15.4	6.5
D44c	289424	6217391	Rural	1300	1300	1375	1375	1375	4.0	4.0	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-1.0	-3.1	-	-	-	-
D44d	289406	6217439	Rural	1275	1275	1350	1375	1375	5.0	5.0	5.0	5.0	5.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.4	1.3	-0.6	-2.6	-	-	-	-
D44e	289393	6217393	Rural	1300	1300	1375	1375	1375	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-1.0	-3.3	-	-	-	-
D44f	289411	6217425	Rural	1300	1300	1375	1375	1375	4.5	4.5	4.5	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.5	1.5	-0.8	-3.1	-	-	-	-
D44h	289415	6217426	Rural	1300	1300	1375	1375	1375	4.5	4.5	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.5	1.5	-0.8	-3.1	-	-	-	-
D44k	289452	6217416	Rural	1300	1300	1375	1375	1375	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-1.0	-3.3	-	-	-	-
D44p01	289407	6217426	Pool	1300	1300	1375	1375	1375	5.0	5.0	4.5	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.5	1.5	-0.8	-3.0	-	-	-	-
D44t01	289418	6217416	Tank	1300	1300	1375	1375	1375	4.0	4.0	3.5	3.5	3.5	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-0.9	-3.3	-	-	-	-
D44t02	289422	6217433	Tank	1300	1300	1375	1375	1375	4.5	4.5	4.5	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.5	1.5	-0.8	-3.0	-	-	-	-
D45a	289705	6217307	House	925	925	950	950	950	3.0	3.0	3.0	3.0	3.0	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.4	0.9	0.0	-0.1	50.1	30.4	15.0	4.5
D45p01	289696	6217303	Pool	900	900	925	925	925	2.5	2.5	2.5	2.0	2.0	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.4	1.0	0.0	-0.1	-	-	-	-
D45t01	289704	6217292	Tank	925	925	950	950	950	3.0	3.0	3.0	3.0	3.0	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.4	1.0	0.0	-0.1	-	-	-	-
D45t02	289699	6217291	Tank	925	925	950	950	950	3.0	3.0	3.0	3.0	3.0	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.4	1.0	0.0	-0.1	-	-	-	-
D46a	289607	6217243	House	1025	1025	1025	1025	1025	4.0	4.0	4.0	4.0	4.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	49.6	30.7	15.0	4.7
D46r01	289632	6217215	Rural	1125	1125	1150	1150	1150	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.4	-	-	-	-
D46r02	289625	6217218	Rural	1075	1075	1100	1100	1100	4.5	4.5	4.5	4.5	4.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.3	-	-	-	-
D46t01	289635	6217244	Tank	1000	1000	1025	1025	1025	4.0	4.0	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.1	0.0	-0.2	-	-	-	-
D46t02	289588	6217242	Tank	925	925	950	950	950	2.5	2.5	2.5	2.5	2.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D46t03	289587	6217240	Tank	950	950	950	950	950	3.0	3.0	2.5	2.5	2.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
D47a	289394	6217280	House	1075	1075	1125	1125	1125	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.6	-0.3	-1.2	51.8	29.6	14.5	4.2
D47b	289377	6217275	Rural	1075	1075	1125	1125	1125	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.6	-0.3	-1.3	-	-	-	-
D47c	289345	6217269	Rural	1100	1100	1150	1150	1150	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.7	-0.4	-1.4	-	-	-	-
D47d	289365	6217263	Tennis court	1100	1100	1150	1175	1175	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.6	-0.3	-1.2	-	-	-	-
D47t01	289375	6217283	Tank	1100	1100	1125	1150	1150	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.7	-0.4	-1.4	-	-	-	-
D47t02	289402	6217291	Tank	1075	1075	1125	1125	1125	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.4	-1.3	-	-	-	-
D48a	289404	6217181	House	900	900	925	925	925	2.0	2.0	1.5	1.5	1.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.4	51.2	29.8	14.7	4.3
D48b	289430	6217196	Rural	900	900	925	925	925	1.5	1.5	1.5	1.5	1.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.4	-	-	-	-
D48c	289396	6217190	Rural	875	875	900	900	900	1.0	1.0	1.0	1.0	1.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D48d	289391	6217188	Rural	875	875	900	900	900	1.0	1.0	1.0	1.0	1.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D48e	289396	6217166	Rural	900	900	925	925	925	2.0	2.0	2.0	2.0	2.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.3	-	-	-	-
D48f	289400	6217157	Rural	925	925	950	950	950	2.5	2.5	2.5	2.5	2.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	0.0	-	-	-	-
D48g	289391	6217184	Rural	875	875	900	900	900	1.0	1.0	1.0	1.0	1.0	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
D48t01	289393	6217173	Tank	900	900	900	900	900	1.5	1.5	1.5	1.5	1.5	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.3	-	-	-	-
D48t02	289392	6217180	Tank	875	875	900	900	900	1.5	1.5	1.0	1.0	1.0	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.4	-	-	-	-
D49h01	289410	6217022	House	1375	1375	1400	1400	1400	5.0	5.0	5.0	5.0	5.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.5	1.5	-0.8	-2.9	44.2	33.9	15.4	6.5
D49r01	289418	6217046	Rural	1375	1375	1375	1375	1375	5.0	5.0	5.0	5.0	5.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.11	0.11	0.11	0.3	1.1	-0.5	-2.1	-	-	-	-
D49t02	289418	6217011	Tank	1375	1375	1400	1400	1400	3.5	3.5	3.5	3.5	3.5	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.7	-0.9	-3.3	-	-	-	-
D50h01	289300	6216938	House	1225	1225	1225	1225	1225	4.5	4.5	4.5	4.5	4.5	0.01	0.01	0.01	0.01	0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.7	-0.8	-2.8	44.6	33.7	15.3	6.3
D50r01	289265	6216952	Rural	1125	1125	1150	1150	1150	4.0	4.0	4.0	4.0	4.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.10	0.10	0.10	0.10	0.10	0.5	1.4	-0.6	-2.2	-	-	-	-
D50r02	289265	6216944	Rural	1125	1125	1125	1125	1125	4.0	4.0	4.0	4.0	4.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.09	0.09	0.09	0.09	0.09	0.5	1.6	-0.6	-2.3	-	-	-	-
D50t01	289319	6216939	Tank	1250	1250	1250	1250	1250	4.0	4.0	4.0	4.0	4.0	0.01	0.01	0.01	0.01	0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.7	-0.9	-2.9	-	-	-	-
D51h01	289100	6217104	House	800	800	825	825	825	4.0	4.0	4.0	4.0	4.0	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.1	0.5	-0.2	-0.8	54.2	28.4	13.6	3.8
D51r01	289165	6217099	Rural	775	775	825	825	825	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.1	0.4	-0.1	-0.6	-	-	-	-
D51r02	289151	6217101	Rural	775	775	800	800	800	2.0	2.0	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.1	0.4	-0.1	-0.6	-	-	-	-
D51r03	288836	6217118	Rural	425	425	475	500	500	3.0	3.0	3.5	3.5	3.5	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.6	1.6	-0.5	-2.2	-	-	-	-
D52h01	288851	6217005	House	200	200	225	250	250	2.0	2.0	2.0	2.0	2.0	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.8	81.0	13.6	4.8	0.6
D52r01	288879	6217014	Rural	225	225	250	275	275	2.0	2.0	2.5	2.5	2.5	0.01	0.01	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.8	-	-	-	-
D52r02	288869	6217007	Rural	200	200	225	250	250	2.0	2.0	2.0	2.0	2.0	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.8	-	-	-	-
D52r03	288885	6217018	Rural	225	225	275	275	275	2.0	2.0	2.5	2.5	2.5	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.8	-	-	-	-
D52r04	288880	6217029	Rural	250	250	300	300	300	2.5	2.5	2.5	2.5	2.5	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.7	-0.2	-0.9	-	-	-	-
D52r05	288857	6216998	Rural	180	180	225	225	225	2.0	2.0	2.0	2.0	2.0	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.2	-0.7	-	-	-	-
D52t01	288839	6216990	Tank	160	160	190	190	190	1.5	1.5	1.5	2.0	2.0	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.2	-0.7	-	-	-	-
D53f	288754	6216968	Rural	90	90	120	120	120	1.0	1.0	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.7	-0.2	-0.9	-	-	-	-
D53h01	288767	6216970	House	110	110	130	140	140	1.0	1.0	1.0	1.0	1.0	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.9	84.3	11.6	3.7	0.4

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
D53r01	288791	6216979	Rural	120	120	150	160	160	1.0	1.0	1.5	1.5	1.5	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.9	-	-	-	-
D53r02	288790	6216961	Rural	100	100	130	130	140	1.0	1.0	1.0	1.0	1.0	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.1	-0.7	-	-	-	-
D53r03	288722	6216951	Rural	70	70	90	100	100	0.5	0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.7	-0.2	-0.9	-	-	-	-
D53r04	288783	6216920	Rural	80	80	90	100	100	0.5	0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	-	-	-	-
D53t01	288747	6216967	Tank	90	90	110	120	120	1.0	1.0	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.7	-0.2	-1.0	-	-	-	-
D53t02	288755	6216961	Tank	90	90	110	120	120	1.0	1.0	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.9	-	-	-	-
D53t03	288794	6216973	Tank	110	110	140	150	150	1.0	1.0	1.5	1.5	1.5	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.8	-	-	-	-
D54h01	289042	6216626	House	80	80	80	80	80	0.5	0.5	0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	90.3	7.6	1.9	0.2
D54p01	289035	6216611	Pool	60	60	70	70	70	0.5	0.5	0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
D54r01	289012	6216648	Rural	80	80	80	90	90	0.5	0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.5	-	-	-	-
D54r02	289008	6216659	Rural	80	80	90	90	90	1.0	1.0	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
D54r03	288931	6216663	Rural	60	60	70	70	70	0.5	0.5	0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	-0.2	-1.0	-	-	-	-
D54t01	289035	6216646	Tank	80	80	90	90	90	1.0	1.0	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
D54t04	288929	6216654	Tank	60	60	60	60	60	< 0.5	< 0.5	0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.7	-0.2	-0.9	-	-	-	-
D55h01	289213	6216872	House	850	850	875	875	875	5.5	5.5	5.5	5.5	5.5	0.04	0.04	0.04	0.04	0.04	0.07	0.07	0.07	0.07	0.07	0.6	1.6	-0.5	-2.1	49.6	30.7	15.0	4.7
D55r01	289197	6216891	Rural	800	800	800	800	800	5.0	5.0	5.0	5.0	5.0	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.6	1.7	-0.6	-2.3	-	-	-	-
D55t01	289189	6216866	Tank	700	700	700	700	700	5.0	5.0	5.0	5.0	5.0	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.6	1.6	-0.6	-2.2	-	-	-	-
D56h01	289297	6218270	House	40	40	725	1200	1200	< 0.5	< 0.5	6.5	5.5	5.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	0.03	0.04	0.04	0.3	0.9	-0.1	-0.5	49.7	30.6	15.0	4.6
D56t01	289277	6218265	Tank	30	30	625	1125	1125	< 0.5	< 0.5	6.5	5.5	5.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.4	-	-	-	-
D57h01	288871	6217761	House	190	190	750	850	850	1.5	1.5	1.0	1.0	1.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	59.5	25.7	11.9	2.8
E15c	289510	6216693	Rural	1025	1025	1025	1025	1025	4.5	4.5	4.5	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.3	0.8	-0.3	-1.1	-	-	-	-
E15r01	289492	6216653	Rural	975	975	975	975	975	5.0	5.0	5.0	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.07	0.07	0.07	0.5	1.5	-0.5	-2.0	-	-	-	-
E16c	289412	6216679	Rural	675	675	675	675	675	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
E16e	289452	6216661	Rural	775	775	775	800	800	4.5	4.5	4.5	4.5	4.5	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.3	0.8	-0.3	-1.2	-	-	-	-
E16f	289417	6216671	Rural	675	675	675	675	675	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.5	-	-	-	-
E16h01	289433	6216656	House	775	775	775	775	775	4.5	4.5	4.5	4.5	4.5	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.2	0.7	-0.2	-1.0	58.7	26.2	12.2	3.0
E16p01	289443	6216665	Pool	775	775	775	775	775	4.5	4.5	4.5	4.5	4.5	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.2	0.7	-0.2	-0.9	-	-	-	-
E16t02	289409	6216638	Tank	600	600	600	600	600	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.3	0.9	-0.3	-1.2	-	-	-	-
E16t03	289410	6216641	Tank	600	600	625	625	625	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.3	0.8	-0.3	-1.2	-	-	-	-
E16t04	289406	6216679	Tank	650	650	650	650	650	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
E20h01	289247	6216553	House	180	180	180	180	180	1.5	1.5	1.5	1.5	1.5	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	81.6	13.2	4.6	0.6
F02h01	288693	6216577	House	30	30	30	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	91.7	6.7	1.5	0.2
F02r01	288683	6216522	Rural	40	40	40	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
F02r02	288692	6216541	Rural	30	30	30	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
F02t02	288692	6216536	Tank	30	30	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
F03h01	288408	6216487	House	250	250	250	250	275	3.0	3.0	3.0	3.0	3.0	0.05	0.05	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	52.7	29.1	14.2	4.0
F03r01	288421	6216506	Rural	190	190	190	190	225	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.6	0.0	0.0	-	-	-	-
F03r02	288446	6216512	Rural	170	170	170	170	200	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
F03r03	288410	6216515	Rural	180	180	180	180	200	1.5	1.5	1.5	1.5	1.5	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
F03r04	288387	6216468	Rural	300	300	300	300	325	3.5	3.5	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	-0.1	-	-	-	-
F03r05	288326	6216478	Rural	275	275	275	275	325	3.5	3.5	3.5	3.5	3.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	-	-	-	-
F03r06	288477	6216428	Rural	400	400	400	400	425	5.0	5.0	5.0	5.0	5.0	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.3	0.7	-0.1	-0.2	-	-	-	-
F03r07	288459	6216503	Rural	170	170	170	170	200	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
F03r08	288488	6216511	Rural	150	150	150	150	170	1.5	1.5	1.5	1.5	1.5	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	-	-	-	-
F03r09	288381	6216495	Rural	200	200	200	200	250	2.5	2.5	2.5	2.5	2.5	0.05	0.05	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	-	-	-	-
F03r10	288383	6216467	Rural	300	300	300	300	325	4.0	4.0	4.0	4.0	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	-0.1	-	-	-	-
F03r11	288483	6216526	Rural	130	130	130	130	150	1.5	1.5	1.0	1.0	1.5	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	0.0	0.0	-	-	-	-
F03t01	288382	6216472	Tank	275	275	275	275	325	3.5	3.5	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	-	-	-	-
F03t04	288458	6216511	Tank	160	160	160	160	180	1.5	1.5	1.5	1.5	1.5	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
F03t05	288423	6216520	Tank	160	160	160	160	190	1.5	1.5	1.5	1.5	1.5	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	-	-	-	-
F04h01	288677	6216766	House	30	30	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	92.8	5.9	1.1	0.2
F04r01	288685	6216778	Rural	30	30	30	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	-	-	-	-
F04r02	288671	6216822	Rural	30	30	40	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
F04t01	288667	6216740	Tank	20	20	30	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.1	-	-	-	-
F04t02	288660	6216747	Tank	20	20	30	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.1	-	-	-	-
F05h01	288583	6216816	House	20	20	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	92.0	6.5	1.4	0.2
F05r02	288543	6216802	Rural	20	30	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F05r03	288462	6216771	Rural	40	40	40	40	70	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.1	-0.8	-	-	-	-
F05r05	288529	6216800	Rural	30	30	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F05r06	288526	6216805	Rural	20	30	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
F05t03	288545	6216792	Tank	30	30	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	-	-	-	-
F05t04	288560	6216817	Tank	20	20	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.2	-	-	-	-
F05t05	288565	6216785	Tank	20	20	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F05t06	288574	6216788	Tank	20	20	30	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F06h01	288723	6217097	House	160	160	225	225	225	1.5	1.5	2.0	2.0	2.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.4	-0.4	-1.9	76.9	16.0	6.2	0.9
F06p01	288711	6217096	Pool	140	140	190	200	200	1.0	1.0	1.5	1.5	1.5	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.3	-0.4	-1.8	-	-	-	-
F06r01	288659	6217196	Rural	130	130	200	225	225	1.5	1.5	1.5	1.5	1.5	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	-	-	-	-
F06r04	288720	6217086	Rural	150	150	190	200	200	1.5	1.5	1.5	1.5	1.5	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.5	-0.4	-2.0	-	-	-	-
F06r05	288732	6217104	Rural	170	170	225	225	225	1.5	1.5	2.0	2.0	2.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.3	-0.4	-1.9	-	-	-	-
F06r06	288695	6217214	Rural	180	180	275	300	300	2.0	2.0	2.0	2.0	2.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	-	-	-	-
F07h01	288577	6217201	House	70	70	120	150	150	0.5	0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	86.3	10.3	3.1	0.3
F07r01	288599	6217183	Rural	80	80	130	150	150	0.5	0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	-	-	-	-
F07r02	288575	6217189	Rural	60	60	110	130	140	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
F07r03	288560	6217248	Rural	80	80	140	180	180	0.5	0.5	1.5	1.5	1.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F07r04	288575	6217217	Rural	70	70	120	150	150	0.5	0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.4	-	-	-	-
F07t01	288573	6217173	Tank	60	60	100	120	120	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	-	-	-	-
F08h01	288586	6217287	House	120	120	225	275	275	1.0	1.0	2.0	2.5	2.5	0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.2	-0.8	79.3	14.6	5.4	0.7
F08m	288562	6217313	Rural	110	110	225	275	275	1.0	1.0	2.0	2.5	2.5	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
F08q	288567	6217255	Rural	80	80	150	190	190	0.5	0.5	1.5	1.5	1.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F08r01	288574	6217255	Rural	90	90	160	200	200	1.0	1.0	1.5	1.5	1.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F08r02	288595	6217253	Rural	100	100	170	200	200	1.0	1.0	1.5	1.5	1.5	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	-	-	-	-
F08r03	288559	6217258	Rural	80	80	150	190	190	0.5	0.5	1.5	1.5	1.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F08r04	288552	6217279	Rural	90	90	170	225	225	0.5	0.5	2.0	2.0	2.0	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.8	-	-	-	-
F08r05	288533	6217294	Rural	80	80	180	225	225	0.5	0.5	2.0	2.0	2.0	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	-0.3	-1.1	-	-	-	-
F08r06	288524	6217303	Rural	80	80	180	225	225	0.5	0.5	2.0	2.0	2.0	< 0.01	< 0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	-	-	-	-
F08r07	288542	6217311	Rural	100	100	200	275	275	1.0	1.0	2.0	2.5	2.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	-	-	-	-
F08r08	288557	6217312	Rural	110	110	225	275	275	1.0	1.0	2.0	2.5	2.5	0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
F08r09	288543	6217318	Rural	100	100	225	275	275	1.0	1.0	2.0	2.5	2.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	-0.3	-1.4	-	-	-	-
F08r10	288602	6217288	Rural	120	120	225	275	275	1.0	1.0	2.0	2.0	2.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.1	-0.7	-	-	-	-
F08r11	288634	6217274	Rural	140	140	250	275	275	1.5	1.5	2.0	2.0	2.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	-	-	-	-
F08r12	288594	6217288	Rural	110	110	225	250	250	1.0	1.0	2.0	2.0	2.0	0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.1	-0.7	-	-	-	-
F08t01	288538	6217290	Tank	80	80	170	225	225	0.5	0.5	2.0	2.0	2.0	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	-0.2	-1.0	-	-	-	-
F08t02	288560	6217253	Tank	80	80	140	180	180	0.5	0.5	1.5	1.5	1.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F08t03	288564	6217254	Tank	80	80	140	180	190	0.5	0.5	1.5	1.5	1.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
F09c	288651	6217387	Rural	375	375	600	650	650	3.5	3.5	5.0	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.5	1.2	-0.4	-1.6	-	-	-	-
F09f	288657	6217392	Rural	400	400	625	675	675	3.5	3.5	5.0	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.5	1.2	-0.4	-1.7	-	-	-	-
F09g	288593	6217432	Rural	275	275	575	650	650	3.0	3.0	4.0	4.0	4.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.5	1.6	-0.5	-2.2	-	-	-	-
F09h	288616	6217433	Rural	325	325	625	700	700	3.5	3.5	4.0	4.5	4.5	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.6	1.7	-0.5	-2.3	-	-	-	-
F09h01	288650	6217411	House	450	450	700	775	775	3.5	3.5	5.0	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.6	1.5	-0.5	-2.0	53.1	28.9	14.0	4.0
F09r03	288631	6217414	Rural	350	350	650	700	700	3.5	3.5	4.5	4.5	4.5	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.6	1.6	-0.6	-2.2	-	-	-	-
F09t01	288590	6217427	Tank	250	250	525	625	625	2.5	2.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.5	1.6	-0.5	-2.2	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
F09tc	288630	6217378	Tennis court	325	325	550	600	600	3.5	3.5	4.5	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.5	1.2	-0.4	-1.7	-	-	-	-
F10a	288630	6217758	House	90	90	900	1200	1200	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.03	0.05	0.05	< 0.01	< 0.01	0.05	0.05	0.05	0.3	0.9	-0.5	-1.7	52.4	29.3	14.3	4.1
F10b	288645	6217716	Rural	110	110	775	975	975	0.5	0.5	2.5	4.0	4.0	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.02	0.02	0.02	0.1	0.5	-0.2	-1.0	-	-	-	-
F10r01	288640	6217720	Rural	100	100	800	975	975	< 0.5	< 0.5	2.5	4.0	4.0	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.02	0.02	0.02	0.2	0.5	-0.3	-1.0	-	-	-	-
F10r02	288612	6217748	Rural	90	90	875	1125	1125	< 0.5	< 0.5	3.0	4.5	4.5	< 0.01	< 0.01	0.03	0.05	0.05	< 0.01	< 0.01	0.04	0.04	0.04	0.3	0.9	-0.5	-1.7	-	-	-	-
F10t01	288640	6217733	Tank	100	100	825	1050	1050	< 0.5	< 0.5	2.5	4.5	4.5	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.02	0.02	0.02	0.2	0.6	-0.3	-1.2	-	-	-	-
F10t02	288636	6217716	Tank	100	100	775	975	975	< 0.5	< 0.5	2.5	4.0	4.0	< 0.01	< 0.01	0.04	0.05	0.05	< 0.01	< 0.01	0.02	0.02	0.02	0.2	0.5	-0.3	-1.0	-	-	-	-
F11a	288601	6217525	House	300	300	700	800	800	4.0	4.0	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	< 0.01	< 0.01	0.02	0.02	0.02	0.2	0.4	-0.1	-0.3	68.8	20.8	8.8	1.6
F11b	288582	6217533	Rural	180	180	600	725	725	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	-0.2	-	-	-	-
F11c	288625	6217558	Rural	250	250	700	800	800	3.5	3.5	3.0	3.0	3.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.02	0.02	0.02	0.2	0.6	0.0	-0.2	-	-	-	-
F11d	288597	6217500	Rural	275	275	650	750	750	3.5	3.5	3.5	3.5	3.5	0.02	0.02	0.03	0.03	0.03	0.01	0.01	0.02	0.02	0.02	0.1	0.5	-0.1	-0.7	-	-	-	-
F11e	288574	6217539	Rural	160	160	575	700	700	2.5	2.5	2.5	2.5	2.5	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	-0.1	-	-	-	-
F11f	288551	6217596	Rural	90	90	575	700	700	1.5	1.5	2.0	2.0	2.0	0.02	0.02	0.02	0.03	0.03	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F11g	288545	6217643	Rural	70	70	625	775	775	0.5	0.5	2.0	3.0	3.0	< 0.01	< 0.01	0.03	0.05	0.05	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.4	-0.2	-0.7	-	-	-	-
F11p01	288619	6217553	Pool	250	250	700	800	800	3.5	3.5	3.0	3.0	3.0	0.04	0.04	0.04	0.04	0.04	< 0.01	< 0.01	0.02	0.02	0.02	0.2	0.6	0.0	-0.2	-	-	-	-
F12h01	288465	6217581	House	40	40	450	600	600	< 0.5	< 0.5	2.5	3.0	3.0	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	60.8	25.1	11.5	2.6
F12p01	288473	6217566	Pool	40	40	425	550	550	0.5	0.5	2.5	2.5	2.5	< 0.01	< 0.01	0.01	0.02	0.02	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.2	-0.1	-0.4	-	-	-	-
F12r01	288458	6217565	Rural	30	30	400	525	525	< 0.5	< 0.5	2.5	3.0	3.0	< 0.01	< 0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F12r02	288461	6217572	Rural	30	30	400	550	550	< 0.5	< 0.5	2.5	3.0	3.0	< 0.01	< 0.01	0.01	0.03	0.03	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F12r03	288506	6217598	Rural	50	50	525	675	675	0.5	0.5	2.5	2.5	2.5	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F12r04	288530	6217590	Rural	70	70	550	675	675	1.0	1.0	2.0	2.0	2.0	0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F12r05	288479	6217554	Rural	40	40	425	550	550	0.5	0.5	2.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.1	0.2	0.0	-0.3	-	-	-	-
F12t01	288490	6217579	Tank	40	40	475	600	600	0.5	0.5	2.5	2.5	2.5	< 0.01	< 0.01	0.01	0.03	0.03	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
F12t02	288467	6217551	Tank	40	40	400	525	525	0.5	0.5	2.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.1	0.2	0.0	-0.3	-	-	-	-
F12t03	288512	6217605	Tank	50	50	525	675	675	0.5	0.5	2.0	2.5	2.5	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	0.01	0.01	0.01	0.1	0.3	-0.1	-0.5	-	-	-	-
F13h01	288360	6217378	House	30	30	100	120	120	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	-0.1	86.1	10.4	3.2	0.3
F13r01	288337	6217411	Rural	20	30	90	110	110	< 0.5	< 0.5	0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.1	-	-	-	-
F13r02	288330	6217351	Rural	20	20	70	80	80	< 0.5	< 0.5	0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	-0.1	-	-	-	-
F13t01	288386	6217352	Tank	40	40	100	130	130	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	-0.1	-	-	-	-
F13t02	288385	6217356	Tank	40	40	100	140	140	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	-0.1	-	-	-	-
F13t03	288382	6217353	Tank	40	40	100	130	130	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	-0.1	-	-	-	-
F13tc	288336	6217295	Tennis court	30	30	70	80	80	< 0.5	< 0.5	0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14h01	288317	6217032	House	< 20	< 20	< 20	20	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.8	5.2	0.8	0.1
F14p01	288325	6217012	Pool	< 20	< 20	< 20	< 20	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14p02	288321	6217011	Pool	< 20	< 20	< 20	< 20	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14r01	288300	6217049	Rural	< 20	< 20	< 20	20	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14r02	288299	6217095	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14t01	288308	6217107	Tank	< 20	< 20	< 20	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14t02	288310	6217104	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14t03	288289	6217084	Tank	< 20	< 20	< 20	20	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14t04	288285	6217076	Tank	< 20	< 20	< 20	20	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F14t05	288317	6217020	Tank	< 20	< 20	< 20	< 20	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F17C01	287779	6216833	Commercial	30	60	60	60	275	< 0.5	< 0.5	< 0.5	< 0.5	2.5	< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	-0.2	-	-	-	-
F17C02	287786	6216821	Commercial	30	60	60	60	325	< 0.5	< 0.5	< 0.5	< 0.5	3.0	< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	-0.2	-	-	-	-
F17h01	288118	6217171	House	< 20	< 20	< 20	30	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.7	5.3	0.9	0.1
F17p01	288122	6217160	Pool	< 20	< 20	< 20	30	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F17r01	288110	6217153	Rural	< 20	< 20	< 20	30	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F17r02	288139	6217171	Rural	< 20	< 20	< 20	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F17r05	287986	6217027	Rural	< 20	20	20	30	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
F17t01	288126	6217149	Tank	< 20	< 20	< 20	30	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F17t02	288138	6217154	Tank	< 20	< 20	< 20	30	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F17t03	288105	6217148	Tank	< 20	< 20	< 20	30	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F18h01	287952	6217266	House	< 20	20	30	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	87.5	9.5	2.8	0.3
F18p01	287976	6217267	Pool	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	-0.2	-	-	-	-
F18r01	287854	6217279	Rural	< 20	70	70	120	130	< 0.5	1.0	1.0	1.5	1.5	< 0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
F18t02	287953	6217295	Tank	< 20	20	30	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.2	-	-	-	-
F18t03	287945	6217293	Tank	< 20	20	30	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.2	-	-	-	-
F18t04	287842	6217282	Tank	< 20	70	70	130	130	< 0.5	1.0	1.0	1.5	1.5	< 0.01	0.01	0.01	0.02	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.4	-	-	-	-
F18t05	287843	6217279	Tank	< 20	70	70	120	130	< 0.5	1.0	1.0	1.5	1.5	< 0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
F18t06	287843	6217277	Tank	< 20	70	70	120	120	< 0.5	1.0	1.0	1.5	1.5	< 0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
F19h01	287894	6217467	House	< 20	90	90	225	225	< 0.5	1.0	1.0	1.5	1.5	< 0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.3	-1.3	79.8	14.3	5.2	0.7
F19r01	287895	6217485	Rural	< 20	80	80	190	190	< 0.5	0.5	0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	1.0	-0.3	-1.3	-	-	-	-
F19r02	287927	6217466	Rural	< 20	60	60	150	150	< 0.5	0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	-0.3	-1.2	-	-	-	-
F19t01	287916	6217454	Tank	< 20	70	70	160	160	< 0.5	0.5	0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
F19t02	287922	6217452	Tank	< 20	60	70	150	150	< 0.5	0.5	0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
F19t03	287928	6217458	Tank	< 20	60	60	140	140	< 0.5	0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
F20h01	287761	6217693	House	< 20	< 20	< 20	400	400	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.3	-1.1	62.3	24.3	11.0	2.4
F20r01	287772	6217667	Rural	< 20	20	20	325	325	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
F20r04	287672	6217777	Rural	< 20	< 20	< 20	800	800	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.11	0.11	0.6	1.7	-1.0	-3.4	-	-	-	-
F20t01	287780	6217706	Tank	< 20	< 20	< 20	350	350	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
F20t02	287769	6217659	Tank	< 20	20	20	325	325	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.2	-0.7	-	-	-	-
F20t03	287767	6217662	Tank	< 20	20	20	325	325	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
F21a	288154	6217721	House	< 20	< 20	70	525	525	< 0.5	< 0.5	0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	78.8	14.9	5.5	0.8
F21b	288130	6217712	Rural	< 20	< 20	50	375	375	< 0.5	< 0.5	0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.2	-	-	-	-
F21f	287977	6217609	House	< 20	30	40	130	130	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	91.0	7.1	1.7	0.2
F21p01	288179	6217725	Pool	< 20	< 20	70	525	525	< 0.5	< 0.5	1.0	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
F21r02	288214	6217721	Tennis court	< 20	< 20	120	575	575	< 0.5	< 0.5	1.5	1.5	1.5	< 0.01	< 0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.02	0.02	0.1	0.5	-0.1	-0.8	-	-	-	-
F21r03	287953	6217611	Rural	< 20	30	40	120	120	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	-0.1	-0.3	-	-	-	-
F22a	288135	6217800	House	< 20	< 20	30	575	575	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.1	-0.4	74.9	17.2	6.8	1.1
F22b	288158	6217795	House	< 20	< 20	40	600	600	< 0.5	< 0.5	0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.4	78.2	15.3	5.8	0.8
F22c	288149	6217790	Rural	< 20	< 20	40	575	575	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.4	-	-	-	-
F22d	288096	6217797	Rural	< 20	< 20	20	450	450	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
F22e	288092	6217880	Rural	< 20	< 20	< 20	700	700	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.7	-0.4	-1.4	-	-	-	-
F22p01	288134	6217813	Pool	< 20	< 20	30	600	600	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
F22r01	288147	6217801	Rural	< 20	< 20	30	600	600	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.1	-0.4	-	-	-	-
F22r02	288101	6217792	Rural	< 20	< 20	20	450	450	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
F22r03	288078	6217880	Rural	< 20	< 20	< 20	700	700	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	-0.4	-1.5	-	-	-	-
F22t01	288090	6217793	Tank	< 20	< 20	20	425	425	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
F23a	288358	6217771	House	< 20	< 20	475	925	925	< 0.5	< 0.5	4.5	3.5	3.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.05	0.06	0.06	0.2	0.9	-0.2	-1.2	50.9	29.9	14.8	4.3
F23b	288364	6217797	Rural	< 20	< 20	425	875	875	< 0.5	< 0.5	4.5	3.5	3.5	< 0.01	< 0.01	0.03	0.03	0.03	< 0.01	< 0.01	0.02	0.02	0.02	0.2	0.5	-0.1	-0.7	-	-	-	-
F23c	288406	6217854	Rural	< 20	< 20	425	900	900	< 0.5	< 0.5	5.0	3.5	3.5	< 0.01	< 0.01	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.8	-0.1	-0.3	-	-	-	-
F23d	288417	6217853	Rural	< 20	< 20	425	925	925	< 0.5	< 0.5	5.0	4.0	4.0	< 0.01	< 0.01	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.8	-0.1	-0.4	-	-	-	-
F23e	288401	6217860	Rural	< 20	< 20	325	850	850	< 0.5	< 0.5	4.5	3.0	3.0	< 0.01	< 0.01	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.8	-0.1	-0.2	-	-	-	-
F23f	288342	6217766	Rural	< 20	< 20	450	875	875	< 0.5	< 0.5	4.5	3.5	3.5	< 0.01	< 0.01	0.02	0.03	0.03	< 0.01	< 0.01	0.04	0.05	0.05	0.2	0.8	-0.2	-1.2	-	-	-	-
F23p01	288349	6217792	Pool	< 20	< 20	375	850	850	< 0.5	< 0.5	4.5	3.5	3.5	< 0.01	< 0.01	0.03	0.03	0.03	< 0.01	< 0.01	0.01	0.02	0.02	0.2	0.5	-0.1	-0.7	-	-	-	-
F23t01	288361	6217802	Tank	< 20	< 20	375	875	875	< 0.5	< 0.5	4.5	3.5	3.5	< 0.01	< 0.01	0.03	0.03	0.03	< 0.01	< 0.01	0.01	0.02	0.02	0.2	0.6	-0.1	-0.6	-	-	-	-
F23t02	288410	6217863	Tank	< 20	< 20	350	875	875	< 0.5	< 0.5	4.5	3.0	3.0	< 0.01	< 0.01	0.05	0.05	0.05	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.9	-0.1	-0.2	-	-	-	-
F24a	288569	6217827	House	60	60	925	1275	1275	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.11	0.12	0.12	0.5	1.6	-0.9	-3.2	44.3	33.8	15.4	6.4
F24b	288561	6217801	Rural	60	60	925	1275	1275	< 0.5	< 0.5	4.0	3.0	3.0	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.10	0.12	0.12	0.6	1.6	-1.0	-3.2	-	-	-	-
F24c	288551	6217834	Rural	50	50	900	1275	1275	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.10	0.12	0.12	0.4	1.4	-0.7	-2.8	-	-	-	-
F24d	288539	6217842	Rural	40	40	850	1250	1250	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	0.09	0.11	0.11	0.3	1.2	-0.6	-2.3	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
F24e	288544	6217851	Rural	40	40	825	1225	1225	< 0.5	< 0.5	6.0	5.0	5.0	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	0.08	0.09	0.09	0.3	1.0	-0.5	-2.1	-	-	-	-
F24f	288547	6217856	Rural	40	40	800	1225	1225	< 0.5	< 0.5	6.0	5.0	5.0	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	0.08	0.09	0.09	0.3	1.0	-0.5	-1.9	-	-	-	-
F24r03	288533	6217832	Rural	40	40	850	1250	1250	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.01	0.01	0.01	< 0.01	< 0.01	0.10	0.11	0.11	0.4	1.3	-0.6	-2.5	-	-	-	-
F25a	288391	6218011	House	< 20	< 20	120	875	875	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.5	-0.3	-1.1	60.3	25.4	11.7	2.7
F25b	288414	6218036	Rural	< 20	< 20	120	900	900	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.6	-0.4	-1.3	-	-	-	-
F25c	288415	6218076	Rural	< 20	< 20	100	1000	1000	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.05	0.05	0.4	1.0	-0.6	-2.1	-	-	-	-
F25d	288404	6218076	Rural	< 20	< 20	100	1000	1000	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.06	0.06	0.4	1.1	-0.7	-2.2	-	-	-	-
F25e	288389	6218094	Rural	< 20	< 20	90	1025	1025	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.10	0.10	0.5	1.4	-0.9	-2.8	-	-	-	-
F25p01	288404	6218084	Pool	< 20	< 20	100	1025	1025	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.08	0.08	0.4	1.2	-0.8	-2.4	-	-	-	-
F25t01	288384	6218087	Tank	< 20	< 20	90	1025	1025	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.09	0.09	0.5	1.3	-0.9	-2.7	-	-	-	-
F26a	288566	6218109	House	< 20	< 20	130	925	925	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.6	-0.3	-1.3	59.1	26.0	12.0	2.9
F26b	288496	6218081	Rural	< 20	< 20	120	900	900	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.2	0.7	-0.4	-1.4	-	-	-	-
F26c	288504	6218068	Rural	< 20	< 20	130	875	875	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.6	-0.3	-1.1	-	-	-	-
F26d	288507	6218066	Rural	< 20	< 20	130	850	850	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
F26e	288503	6218062	Rural	< 20	< 20	130	850	850	< 0.5	< 0.5	0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
F26f	288585	6218092	Rural	< 20	< 20	130	825	825	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.2	-0.9	-	-	-	-
F26h	288561	6218140	Rural	< 20	< 20	110	975	975	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.03	0.03	0.3	0.9	-0.6	-1.9	-	-	-	-
F26r01	288585	6218110	Rural	< 20	< 20	130	875	875	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
F27a	288669	6218008	House	20	20	425	950	950	< 0.5	< 0.5	5.5	4.0	4.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50.4	30.2	15.0	4.4
F27r01	288660	6218006	Rural	< 20	< 20	350	900	900	< 0.5	< 0.5	4.5	3.0	3.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
F27t01	288699	6218022	Tank	20	20	375	900	900	< 0.5	< 0.5	5.0	3.5	3.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.1	-	-	-	-
F28a	288713	6218156	House	< 20	< 20	140	850	850	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.2	-1.0	58.7	26.2	12.2	3.0
F28b	288754	6218172	Rural	< 20	< 20	140	825	825	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.2	-0.9	-	-	-	-
F28c	288747	6218183	Rural	< 20	< 20	130	850	850	< 0.5	< 0.5	0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
F28f	288760	6218188	Rural	< 20	< 20	130	850	850	< 0.5	< 0.5	0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
F28p01	288694	6218155	Pool	< 20	< 20	130	850	850	< 0.5	< 0.5	0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
F28r01	288750	6218164	Rural	< 20	< 20	140	825	825	< 0.5	< 0.5	0.5	1.5	1.5	< 0.01	< 0.01	0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
F28r02	288762	6218170	Rural	< 20	< 20	140	825	825	< 0.5	< 0.5	0.5	1.5	1.5	< 0.01	< 0.01	0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.2	-0.9	-	-	-	-
F28r03	288758	6218178	Rural	< 20	< 20	130	825	825	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.2	-1.0	-	-	-	-
F28t01	288694	6218143	Tank	< 20	< 20	140	825	825	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.4	-0.2	-0.9	-	-	-	-
F28t02	288745	6218174	Tank	< 20	< 20	130	825	825	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.2	-1.0	-	-	-	-
F28t03	288746	6218177	Tank	< 20	< 20	130	850	850	< 0.5	< 0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.5	-0.3	-1.0	-	-	-	-
F28t04	288756	6218194	Tank	< 20	< 20	120	875	875	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
F29a	288770	6218222	House	< 20	< 20	120	925	925	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.02	0.02	0.3	0.8	-0.4	-1.5	58.5	26.2	12.2	3.0
F29b	288759	6218247	Rural	< 20	< 20	110	1000	1000	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.06	0.06	0.4	1.1	-0.7	-2.2	-	-	-	-
F29t01	288760	6218237	Tank	< 20	< 20	110	975	975	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.03	0.03	0.3	0.9	-0.6	-1.9	-	-	-	-
F29t02	288749	6218251	Tank	< 20	< 20	100	1000	1000	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.07	0.07	0.4	1.2	-0.7	-2.4	-	-	-	-
F30a	288781	6218324	House	< 20	< 20	80	1025	1025	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-1.0	-3.4	44.2	33.9	15.4	6.5
F30b	288781	6218308	Rural	< 20	< 20	90	1025	1025	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.6	-1.0	-3.3	-	-	-	-
F30t01	288758	6218329	Tank	< 20	< 20	70	1025	1025	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.7	-0.9	-3.4	-	-	-	-
F31a	287787	6217792	House	< 20	< 20	< 20	525	525	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.06	0.06	0.5	1.4	-0.9	-2.7	50.1	30.4	15.0	4.5
F31b	287777	6217800	Rural	< 20	< 20	< 20	525	525	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.07	0.07	0.6	1.5	-1.0	-3.0	-	-	-	-
F31c	287755	6217797	Rural	< 20	< 20	< 20	575	575	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.07	0.07	0.6	1.6	-1.0	-3.2	-	-	-	-
F31r01	287770	6217753	Rural	< 20	< 20	< 20	475	475	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.03	0.03	0.4	1.0	-0.6	-2.1	-	-	-	-
F31t01	287778	6217791	Tank	< 20	< 20	< 20	525	525	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.06	0.06	0.5	1.4	-0.9	-2.8	-	-	-	-
F32a	288647	6217971	House	30	30	500	1000	1000	< 0.5	< 0.5	6.0	4.5	4.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.3	50.4	30.2	15.0	4.4
F32b	288609	6217965	Rural	20	20	425	950	950	< 0.5	< 0.5	5.5	4.0	4.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
F32c	288577	6217948	Rural	20	20	450	975	975	< 0.5	< 0.5	5.5	4.5	4.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
F32p01	288635	6217981	Pool	20	20	400	925	925	< 0.5	< 0.5	5.5	4.0	4.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	0.0	-0.2	-	-	-	-
F32r01	288637	6217977	Rural	20	20	425	950	950	< 0.5	< 0.5	5.5	4.0	4.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
F32t01	288604	6217939	Tank	30	30	550	1050	1050	< 0.5	< 0.5	6.0	5.0	5.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.4	-	-	-	-
F33a	288413	6217643	House	< 20	20	500	775	775	< 0.5	< 0.5	3.5	5.0	5.0	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	0.02	0.02	0.02	0.3	0.8	-0.3	-1.2	59.6	25.7	11.9	2.8
F33b	288388	6217629	Rural	< 20	< 20	375	600	600	< 0.5	< 0.5	3.5	4.5	4.5	< 0.01	< 0.01	0.02	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	-0.3	-1.1	-	-	-	-
F33c	288394	6217646	Rural	< 20	< 20	425	700	700	< 0.5	< 0.5	3.5	5.0	5.0	< 0.01	< 0.01	0.02	0.03	0.03	< 0.01	< 0.01	0.02	0.02	0.02	0.4	1.0	-0.3	-1.3	-	-	-	-
F33d	288453	6217675	Rural	30	30	650	925	925	< 0.5	< 0.5	3.5	5.0	5.0	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	0.03	0.03	0.03	0.4	1.0	-0.4	-1.4	-	-	-	-
F33p01	288393	6217634	Pool	< 20	< 20	400	650	650	< 0.5	< 0.5	3.5	4.5	4.5	< 0.01	< 0.01	0.02	0.03	0.03	< 0.01	< 0.01	0.01	0.01	0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
F33r01	288383	6217632	Rural	< 20	< 20	375	600	600	< 0.5	< 0.5	3.5	4.5	4.5	< 0.01	< 0.01	0.02	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
F33t01	288438	6217661	Tank	20	20	575	825	825	< 0.5	< 0.5	3.5	5.0	5.0	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	0.02	0.02	0.02	0.3	0.9	-0.4	-1.2	-	-	-	-
F33t02	288399	6217621	Tank	< 20	< 20	375	575	575	< 0.5	< 0.5	3.5	4.5	4.5	< 0.01	< 0.01	0.02	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.7	-0.2	-1.0	-	-	-	-
F34a	288410	6218252	House	< 20	< 20	40	775	775	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.04	0.04	0.4	1.0	-0.1	-0.5	49.2	30.9	15.0	4.8
F34b	288369	6218189	Rural	< 20	< 20	50	925	925	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.10	0.10	0.2	0.8	-0.4	-1.7	-	-	-	-
F34r01	288406	6218228	Rural	< 20	< 20	40	825	825	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.06	0.06	0.3	0.9	-0.2	-1.0	-	-	-	-
F34r02	288361	6218244	Tennis court	< 20	< 20	40	700	700	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.1	-0.1	-0.3	-	-	-	-
F34t01	288370	6218265	Tank	< 20	< 20	30	500	500	< 0.5	< 0.5	< 0.5	6.0	6.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.2	-	-	-	-
F34t02	288362	6218199	Tank	< 20	< 20	40	850	850	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.06	0.06	0.3	0.8	-0.3	-1.2	-	-	-	-
F35a	288146	6218447	House	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	93.2	5.6	1.0	0.1
F35b	288138	6218449	Rural	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
F35c	288140	6218459	Rural	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
F35p01	288144	6218429	Pool	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
F36b	288271	6218537	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F36c	288228	6218549	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F36d	288309	6218594	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F36h01	288266	6218571	House	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.8	5.9	1.1	0.2
F36p01	288294	6218567	Pool	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F37a	288623	6218518	House	< 20	< 20	< 20	170	170	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	71.3	19.3	8.0	1.4
F37b	288588	6218506	Rural	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	0.0	0.0	-	-	-	-
F37c	288591	6218519	Rural	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F37r01	288606	6218554	Rural	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
F37r02	288579	6218546	Rural	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
F37t01	288638	6218519	Tank	< 20	< 20	< 20	160	160	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	-	-	-	-
F37t02	288648	6218540	Tank	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F37t03	288587	6218516	Tank	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F37t04	288591	6218515	Tank	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F37t05	288594	6218513	Tank	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F37t06	288608	6218562	Tank	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
F37t07	288581	6218550	Tank	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
F39a	288825	6218515	House	< 20	< 20	20	375	375	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	49.0	31.1	15.1	4.9
F39b	288794	6218507	Rural	< 20	< 20	20	350	350	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	-	-	-	-
F39c	288799	6218497	Rural	< 20	< 20	20	375	375	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	-	-	-	-
F39d	288797	6218488	Rural	< 20	< 20	20	400	400	< 0.5	< 0.5	< 0.5	5.5	5.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	0.0	-0.1	-	-	-	-
F39e	288776	6218522	Rural	< 20	< 20	< 20	250	250	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	0.0	0.0	-	-	-	-
F39r01	288783	6218523	Rural	< 20	< 20	< 20	250	250	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	-	-	-	-
F39t01	288777	6218517	Tank	< 20	< 20	< 20	250	250	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	-	-	-	-
F3tp01	288307	6218578	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F40a	288809	6218615	House	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	81.6	13.2	4.6	0.6
F40b	288784	6218601	Rural	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F40c	288828	6218600	Rural	< 20	< 20	< 20	170	170	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	-	-	-	-
F40d	288841	6218596	Rural	< 20	< 20	< 20	180	180	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
F40e	288856	6218590	Rural	< 20	< 20	< 20	190	190	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	-	-	-	-
F40p01	288790	6218613	Pool	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F40r01	288798	6218623	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
F40t01	288770	6218606	Tank	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
F40t02	288779	6218619	Tank	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
F40t03	288851	6218593	Tank	< 20	< 20	< 20	180	180	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
F41a	288531	6218865	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.7	5.3	0.9	0.1
F41b	288494	6218850	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F41c	288474	6218843	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F41t01	288489	6218843	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F42a	288235	6217209	House	< 20	< 20	30	40	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.4	5.5	1.0	0.1
F42p01	288234	6217224	Pool	< 20	< 20	30	40	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F42r01	288229	6217245	Rural	< 20	< 20	30	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F42t01	288246	6217183	Tank	< 20	< 20	20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F42t02	288223	6217249	Tank	< 20	< 20	30	40	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F42t03	288224	6217253	Tank	< 20	< 20	30	40	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F42t04	288229	6217261	Tank	< 20	< 20	30	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F43a	288017	6217833	House	< 20	< 20	< 20	500	500	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.3	-1.2	59.5	25.8	11.9	2.8
F43b	287964	6217766	Rural	< 20	< 20	< 20	300	300	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.2	-0.8	-	-	-	-
F43t01	288041	6217848	Tank	< 20	< 20	< 20	525	525	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.3	-1.3	-	-	-	-
F43t02	288032	6217853	Tank	< 20	< 20	< 20	525	525	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.7	-0.4	-1.4	-	-	-	-
F43t03	288030	6217855	Tank	< 20	< 20	< 20	550	550	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	-0.4	-1.5	-	-	-	-
F43t04	287956	6217773	Tank	< 20	< 20	< 20	275	275	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	-0.2	-0.9	-	-	-	-
F45h01	288870	6218871	House	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.9	5.9	1.1	0.2
F45p01	288851	6218869	Pool	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F45r01	288835	6218862	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F45r02	288856	6218882	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F45r03	288806	6218857	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F45t01	288830	6218854	Tank	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50h01	288188	6218572	House	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.8	5.9	1.1	0.2
F50p01	288186	6218560	Pool	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50r01	288176	6218575	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50r02	288185	6218567	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50r03	288139	6218598	Rural	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50r04	288202	6218565	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50r05	288204	6218557	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50r06	288180	6218551	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50t01	288171	6218573	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50t02	288200	6218575	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F50t03	288200	6218578	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51h01	288028	6218516	House	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.9	5.9	1.1	0.2
F51p01	288011	6218510	Pool	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51r01	287946	6218468	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51r02	287953	6218478	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51r03	287992	6218515	Rural	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51r04	287980	6218473	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51t01	287973	6218538	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51t02	287980	6218515	Tank	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F51t03	287938	6218464	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52h01	287830	6218391	House	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.0	5.7	1.1	0.2
F52h02	287889	6218372	House	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.0	5.8	1.1	0.2
F52r01	287807	6218400	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52r02	287801	6218382	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52r03	287793	6218380	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52r04	287882	6218372	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52r05	287786	6218467	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52r06	287748	6218462	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52r07	287742	6218461	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52r08	287781	6218525	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
F52t01	287896	6218365	Tank	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
J01a	289702	6217544	House	1225	1225	1300	1300	1300	4.0	4.0	4.0	4.0	4.0	0.01	0.01	0.01	0.01	0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.6	-0.8	-2.8	44.5	33.8	15.4	6.4
J01b	289639	6217514	Rural	1275	1275	1350	1350	1350	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-0.9	-3.2	-	-	-	-
J01t01	289690	6217551	Tank	1225	1225	1300	1300	1300	3.5	3.5	3.0	3.0	3.0	0.01	0.01	0.01	0.01	0.01	0.11	0.11	0.11	0.11	0.11	0.5	1.6	-0.8	-2.8	-	-	-	-
J01t02	289680	6217533	Tank	1250	1250	1300	1325	1325	3.0	3.0	3.0	3.0	3.0	0.01	0.01	0.01	0.01	0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.6	-0.9	-3.0	-	-	-	-
J01t03	289679	6217531	Tank	1250	1250	1300	1325	1325	3.0	3.0	3.0	3.0	3.0	0.01	0.01	0.01	0.01	0.01	0.11	0.11	0.11	0.11	0.11	0.6	1.6	-0.9	-3.0	-	-	-	-
J02a	289935	6217732	House	525	525	600	625	625	1.0	1.0	1.0	1.0	1.0	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.2	0.7	-0.2	-0.9	72.4	18.7	7.6	1.3
J02b	289918	6217751	Rural	525	525	625	650	650	0.5	0.5	1.0	1.0	1.0	0.02	0.02	0.02	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
J02c	289875	6217615	Rural	650	650	700	725	725	3.5	3.5	3.5	4.0	4.0	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.6	1.6	-0.5	-2.1	-	-	-	-
J02t01	289957	6217750	Tank	475	475	550	575	575	0.5	0.5	1.0	1.0	1.0	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.2	-0.8	-	-	-	-
J02t02	289969	6217753	Tank	500	500	575	600	600	1.0	1.0	1.0	1.0	1.0	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.2	-0.8	-	-	-	-
J02t03	289972	6217753	Tank	500	500	600	600	600	1.0	1.0	1.0	1.0	1.0	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.2	-0.9	-	-	-	-
K01a	288148	6218210	House	< 20	< 20	< 20	275	275	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	50.3	30.3	15.0	4.4
K01r01	288114	6218236	Rural	< 20	< 20	< 20	190	190	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
K01r02	288195	6218255	Rural	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
K01t01	288206	6218251	Tank	< 20	< 20	< 20	225	225	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
K01t02	288198	6218255	Tank	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
K01t03	288175	6218216	Tank	< 20	< 20	< 20	275	275	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	-	-	-	-
K02a	288023	6218183	House	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	58.2	26.4	12.3	3.1
K02p01	288032	6218194	Pool	< 20	< 20	< 20	180	180	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
K02r01	288019	6218190	Rural	< 20	< 20	< 20	170	170	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
K02r02	287960	6218219	Rural	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
K02r0r3	287994	6218188	Rural	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
K02t01	288062	6218192	Tank	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
K02t02	288053	6218183	Tank	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
K02t03	288052	6218185	Tank	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
K03a	287915	6218125	House	< 20	< 20	< 20	170	170	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	63.1	24.0	10.7	2.2
K03r01	287886	6218108	Rural	< 20	< 20	< 20	160	160	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	-	-	-	-
K03r02	287886	6218114	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	-	-	-	-
K03r03	287880	6218129	Rural	< 20	< 20	< 20	120	120	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
K03r04	287880	6218274	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
K04a	288018	6218053	House	< 20	< 20	< 20	700	700	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.04	0.04	0.4	1.0	-0.2	-0.7	48.2	31.5	15.1	5.2
K04h01	288063	6218077	House	< 20	< 20	< 20	725	725	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.04	0.04	0.4	1.0	-0.1	-0.6	48.2	31.5	15.1	5.1
K04p01	288064	6218062	Pool	< 20	< 20	< 20	725	725	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.06	0.06	< 0.01	< 0.01	< 0.01	0.05	0.05	0.3	0.9	-0.2	-1.0	-	-	-	-
K04r01	288042	6218073	Rural	< 20	< 20	< 20	650	650	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.5	-	-	-	-
K04r02	288035	6218020	Rural	< 20	< 20	< 20	875	875	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.3	0.9	-0.4	-1.9	-	-	-	-
K04r03	288042	6217999	Rural	< 20	< 20	< 20	925	925	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.14	0.14	0.4	1.4	-0.7	-2.8	-	-	-	-
K04r04	288043	6218055	Rural	< 20	< 20	< 20	700	700	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.04	0.04	0.3	0.9	-0.2	-0.9	-	-	-	-
K04r05	287994	6218078	Rural	< 20	< 20	< 20	425	425	< 0.5	< 0.5	< 0.5	5.5	5.5	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	-0.1	-0.2	-	-	-	-
K04t01	288087	6218068	Tank	< 20	< 20	< 20	775	775	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.06	0.06	0.3	0.9	-0.3	-1.1	-	-	-	-
K04t02	288025	6218032	Tank	< 20	< 20	< 20	775	775	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.08	0.08	0.3	0.8	-0.3	-1.3	-	-	-	-
K04t03	288039	6218014	Tank	< 20	< 20	< 20	875	875	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.12	0.12	0.3	1.1	-0.5	-2.2	-	-	-	-
K04t04	288031	6218042	Tank	< 20	< 20	< 20	725	725	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.05	0.05	0.3	0.9	-0.3	-1.1	-	-	-	-
K05a	287877	6217971	House	< 20	< 20	< 20	500	500	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.04	0.04	0.3	0.9	-0.2	-1.0	57.2	26.9	12.7	3.3
K05r01	287914	6217952	Rural	< 20	< 20	< 20	600	600	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.08	0.08	0.3	1.1	-0.5	-2.3	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
K05t01	287851	6217952	Tank	< 20	< 20	< 20	475	475	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.04	0.04	0.3	0.9	-0.3	-1.2	-	-	-	-
K05t02	287914	6217944	Tank	< 20	< 20	< 20	600	600	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.08	0.08	0.4	1.3	-0.6	-2.6	-	-	-	-
K05t03	287875	6217940	Tank	< 20	< 20	< 20	550	550	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.06	0.06	0.3	1.0	-0.5	-2.0	-	-	-	-
L01a	288863	6218059	House	40	40	700	1150	1150	< 0.5	< 0.5	6.5	5.0	5.0	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	0.03	0.03	0.03	0.3	1.0	-0.1	-0.5	50.6	30.1	15.0	4.4
L01r01	288959	6218009	Rural	70	70	950	1300	1300	< 0.5	< 0.5	4.5	2.5	2.5	< 0.01	< 0.01	0.02	0.02	0.02	< 0.01	< 0.01	0.10	0.12	0.12	0.6	1.7	-1.0	-3.4	-	-	-	-
L01t01	288874	6218035	Tank	40	40	775	1225	1225	< 0.5	< 0.5	6.5	5.0	5.0	< 0.01	< 0.01	0.04	0.04	0.04	< 0.01	< 0.01	0.06	0.07	0.07	0.2	0.8	-0.3	-1.2	-	-	-	-
L01t02	288862	6218032	Tank	40	40	750	1200	1200	< 0.5	< 0.5	6.5	5.0	5.0	< 0.01	< 0.01	0.04	0.04	0.04	< 0.01	< 0.01	0.05	0.05	0.05	0.3	0.8	-0.3	-1.1	-	-	-	-
L01t03	288862	6218030	Tank	40	40	750	1200	1200	< 0.5	< 0.5	6.5	5.0	5.0	< 0.01	< 0.01	0.03	0.03	0.03	< 0.01	< 0.01	0.05	0.06	0.06	0.3	0.8	-0.3	-1.2	-	-	-	-
L01t04	288828	6218067	Tank	20	20	475	975	975	< 0.5	< 0.5	5.5	4.5	4.5	< 0.01	< 0.01	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	0.01	0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
N05r01	287578	6215765	Rural	775	775	775	775	775	1.0	1.0	1.0	1.0	1.0	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.5	-	-	-	-
N05t01	287562	6215763	Tank	775	775	775	775	775	1.0	1.0	1.0	1.0	1.0	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.4	-	-	-	-
N05t02	287568	6215772	Tank	775	775	775	775	800	1.0	1.0	1.0	1.0	1.0	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.5	-	-	-	-
N05t03	287562	6215768	Tank	775	775	775	775	775	1.0	1.0	1.0	1.0	1.0	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.1	-0.5	-	-	-	-
N11h01	288431	6216159	House	725	725	725	725	750	2.0	2.0	2.0	2.0	2.0	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.1	0.3	-0.1	-0.4	63.1	24.0	10.7	2.2
N11r01	288484	6216141	Rural	675	675	675	675	675	2.5	2.5	2.5	2.5	3.0	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.1	0.3	0.0	-0.3	-	-	-	-
N11r03	288464	6216121	Rural	700	725	725	725	725	2.5	2.5	2.5	2.5	2.5	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.1	0.3	0.0	-0.3	-	-	-	-
N11t01	288463	6216138	Tank	700	700	700	700	700	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.1	0.3	0.0	-0.3	-	-	-	-
N11t02	288478	6216146	Tank	650	675	675	675	675	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.1	0.3	-0.1	-0.3	-	-	-	-
N11t03	288416	6216208	Tank	775	775	775	775	800	2.5	2.5	2.5	2.5	2.5	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.1	0.5	-0.2	-0.9	-	-	-	-
N12h01	288322	6216678	House	90	90	90	90	180	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.3	-0.4	-1.7	86.9	9.9	2.9	0.3
N12r01	288296	6216684	Rural	80	90	90	90	190	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.3	-0.4	-1.7	-	-	-	-
N12r02	288306	6216707	Rural	70	70	70	70	170	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.2	-0.4	-1.7	-	-	-	-
N12r03	288330	6216689	Rural	80	80	80	80	160	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.3	-0.4	-1.8	-	-	-	-
N12r04	288320	6216707	Rural	70	70	70	70	160	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.2	-0.4	-1.7	-	-	-	-
N12r05	288321	6216713	Rural	70	70	70	70	160	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.2	-0.3	-1.7	-	-	-	-
N12t01	288293	6216661	Tank	90	100	100	100	200	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.2	-0.4	-1.6	-	-	-	-
N12t02	288291	6216679	Tank	80	90	90	90	190	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.3	-0.4	-1.7	-	-	-	-
N12t03	288351	6216693	Tank	80	80	80	80	150	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.3	-0.4	-1.8	-	-	-	-
N12t04	288353	6216693	Tank	80	80	80	80	140	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.3	-0.4	-1.8	-	-	-	-
N13h01	288231	6216681	House	90	90	90	90	300	< 0.5	< 0.5	< 0.5	< 0.5	2.5	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.5	1.3	-0.4	-1.7	72.8	18.4	7.5	1.2
N13p01	288233	6216668	Pool	90	90	90	90	275	< 0.5	< 0.5	< 0.5	< 0.5	2.0	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.5	1.2	-0.4	-1.7	-	-	-	-
N13r01	288263	6216704	Rural	70	80	80	80	225	< 0.5	< 0.5	< 0.5	< 0.5	1.5	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.4	1.2	-0.4	-1.7	-	-	-	-
N13r02	288274	6216663	Rural	90	90	90	100	225	< 0.5	< 0.5	< 0.5	< 0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.2	-0.4	-1.6	-	-	-	-
N13r03	288255	6216756	Rural	50	50	50	50	170	< 0.5	< 0.5	< 0.5	< 0.5	1.5	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.1	-0.9	-	-	-	-
N13t01	288206	6216675	Tank	90	90	90	90	350	< 0.5	< 0.5	< 0.5	< 0.5	2.5	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.5	1.3	-0.4	-1.7	-	-	-	-
N13t02	288262	6216694	Tank	80	80	80	80	225	< 0.5	< 0.5	< 0.5	< 0.5	1.5	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.4	1.3	-0.4	-1.8	-	-	-	-
N14h01	288194	6216440	House	425	450	450	450	575	5.5	5.5	5.5	5.5	5.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.2	50.4	30.2	15.0	4.4
N14p01	288186	6216449	Pool	375	375	375	375	550	5.0	5.0	5.0	5.0	4.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	-	-	-	-
N14r01	288184	6216428	Rural	475	500	500	500	650	6.0	6.0	6.0	6.0	5.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
N14r02	288219	6216469	Rural	300	300	300	300	425	3.5	3.5	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	-0.1	-	-	-	-
N14r03	288227	6216457	Rural	350	350	350	350	450	4.5	4.5	4.5	4.5	4.0	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	-	-	-	-
N14t01	288212	6216427	Tank	475	475	475	475	600	6.0	6.0	6.0	6.0	5.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	-0.1	-0.2	-	-	-	-
N14t03	288225	6216466	Tank	300	300	300	300	400	3.5	3.5	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	-0.1	-	-	-	-
N15h01	287962	6216292	House	925	950	950	950	1175	3.0	3.0	3.0	3.0	3.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.6	1.6	-1.0	-3.2	44.7	33.7	15.3	6.3
N15p01	287954	6216298	Pool	925	950	950	950	1175	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.6	1.6	-1.0	-3.2	-	-	-	-
N15r01	287997	6216257	Rural	950	950	950	950	1150	2.5	2.5	2.5	2.5	3.5	0.02	0.02	0.02	0.02	0.03	0.08	0.08	0.08	0.08	0.08	0.5	1.2	-0.8	-2.5	-	-	-	-
N15r02	287955	6216307	Rural	925	950	950	950	1175	4.0	4.0	4.0	4.0	2.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.5	1.6	-0.9	-3.2	-	-	-	-
N15r03	287958	6216313	Rural	925	950	950	950	1175	4.5	4.5	4.5	4.5	3.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.5	1.5	-0.9	-3.1	-	-	-	-
N15r04	287991	6216234	Rural	900	900	900	900	1050	2.5	2.5	2.5	2.5	3.5	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.4	1.0	-0.6	-1.9	-	-	-	-
N15t01	287960	6216274	Tank	925	950	950	950	1150	2.0	2.0	2.0	2.0	3.5	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.5	1.4	-0.9	-2.9	-	-	-	-
N15t02	287994	6216250	Tank	925	925	925	925	1100	2.5	2.5	2.5	2.5	3.5	0.02	0.02	0.02	0.02	0.03	0.06	0.06	0.06	0.06	0.06	0.4	1.1	-0.7	-2.3	-	-	-	-
N15t03	287955	6216318	Tank	925	925	925	925	1175	4.5	4.5	4.5	4.5	3.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.5	1.5	-0.8	-3.1	-	-	-	-
N16h01	287900	6216320	House	925	925	925	925	1150	5.5	5.5	5.5	5.5	4.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.5	1.5	-0.8	-3.0	44.7	33.7	15.3	6.3
N16r01	287931	6216325	Rural	925	925	925	925	1175	5.5	5.5	5.5	5.5	4.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.4	1.4	-0.7	-2.9	-	-	-	-
N16r02	287931	6216347	Rural	875	875	875	875	1150	6.0	6.0	6.0	6.0	4.5	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.10	0.3	1.0	-0.5	-2.1	-	-	-	-
N16r03	287924	6216328	Rural	925	925	925	925	1175	5.5	5.5	5.5	5.5	4.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.4	1.4	-0.7	-2.8	-	-	-	-
N16r04	287921	6216342	Rural	875	875	875	875	1150	6.0	6.0	6.0	6.0	4.5	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.10	0.3	1.1	-0.5	-2.3	-	-	-	-
N16r05	287905	6216333	Rural	900	900	900	900	1150	5.5	5.5	5.5	5.5	4.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.4	1.3	-0.6	-2.6	-	-	-	-
N16r06	287905	6216350	Rural	850	850	850	850	1150	6.0	6.0	6.0	6.0	4.5	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.3	0.9	-0.4	-2.0	-	-	-	-
N16t01	287871	6216338	Tank	875	900	900	900	1150	5.5	5.5	5.5	5.5	4.0	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.10	0.3	1.2	-0.6	-2.4	-	-	-	-
N16t02	287940	6216333	Tank	900	900	900	900	1150	5.5	5.5	5.5	5.5	4.0	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.10	0.10	0.10	0.4	1.3	-0.7	-2.6	-	-	-	-
N17h01	287660	6216283	House	925	925	925	925	1100	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.6	1.6	-1.0	-3.2	45.6	33.1	15.2	6.0
N17r01	287683	6216296	Rural	925	925	925	925	1100	3.5	3.5	3.5	3.5	2.5	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.5	1.6	-0.9	-3.2	-	-	-	-
N17r03	287640	6216305	Rural	925	925	925	925	1075	4.0	4.0	4.0	4.0	3.0	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.5	1.5	-0.8	-3.1	-	-	-	-
N17r04	287621	6216308	Rural	925	925	925	925	1075	4.5	4.5	4.5	4.5	3.5	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.5	1.5	-0.8	-3.0	-	-	-	-
N17r05	287672	6216280	Rural	925	925	925	925	1100	2.5	2.5	2.5	2.5	3.0	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.6	1.6	-1.0	-3.2	-	-	-	-
N17t01	287692	6216296	Tank	925	925	925	925	1100	3.0	3.0	3.0	3.0	2.0	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.5	1.6	-0.9	-3.2	-	-	-	-
N18h01	287459	6216176	House	800	800	800	800	825	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.0	60.0	25.5	11.7	2.7
N18r01	287427	6216159	Rural	750	750	750	750	775	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.2	-0.8	-	-	-	-
N18r02	287429	6216176	Rural	775	775	775	775	825	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.0	-	-	-	-
N18r03	287433	6216178	Rural	800	800	800	800	825	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
N18r04	287445	6216184	Rural	800	800	800	800	850	2.5	2.5	2.5	2.5	3.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
N18r05	287453	6216193	Rural	825	825	825	825	850	2.5	2.5	2.5	2.5	3.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.7	-0.4	-1.3	-	-	-	-
N18r06	287445	6216206	Rural	850	850	850	850	900	2.5	2.5	2.5	2.5	3.0	0.03	0.03	0.03	0.03	0.04	0.02	0.02	0.02	0.02	0.02	0.3	0.8	-0.5	-1.6	-	-	-	-
N18r07	287419	6216179	Rural	800	800	800	800	825	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
N18r08	287480	6216175	Rural	775	775	775	775	825	2.0	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.0	-	-	-	-
N18r09	287487	6216182	Rural	800	800	800	800	825	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.3	-1.1	-	-	-	-
N18r10	287498	6216179	Rural	775	800	800	800	825	2.5	2.5	2.5	2.5	2.5	0.03	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
N18r11	287480	6216191	Rural	800	825	825	825	850	2.5	2.5	2.5	2.5	3.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.3	-1.3	-	-	-	-
N18r12	287425	6216165	Rural	750	775	775	775	800	2.0	2.0	2.0	2.0	2.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.2	-0.9	-	-	-	-
N18r13	287427	6216154	Rural	725	750	750	750	775	1.5	1.5	1.5	1.5	2.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.2	-0.8	-	-	-	-
N18r14	287458	6216129	Rural	700	700	700	700	725	1.0	1.0	1.0	1.0	1.0	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.5	-	-	-	-
N18t01	287474	6216186	Tank	800	800	800	800	850	2.5	2.5	2.5	2.5	3.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
N18t02	287461	6216156	Tank	750	750	750	750	775	1.5	1.5	1.5	1.5	2.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.1	0.4	-0.2	-0.8	-	-	-	-
N18t03	287428	6216181	Tank	800	800	800	800	825	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
N18t04	287429	6216179	Tank	775	800	800	800	825	2.5	2.5	2.5	2.5	2.5	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	-	-	-	-
O01h01	286052	6216698	House	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	-0.4	94.1	5.0	0.7	0.1
O01p01	286032	6216688	Pool	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	-0.4	-	-	-	-
O01r01	286062	6216705	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	-0.4	-	-	-	-
O01r02	286078	6216710	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
O01r05	286030	6216705	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
O01t01	286082	6216705	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	-	-	-	-
O02h01	286813	6216843	House	< 20	160	160	275	275	< 0.5	1.5	1.5	3.5	3.5	< 0.01	0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.6	-0.4	-1.3	64.6	23.2	10.2	2.0
O02r01	286820	6216849	Rural	< 20	160	160	300	300	< 0.5	1.5	1.5	3.5	3.5	< 0.01	0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	-0.4	-1.3	-	-	-	-
O02r02	286801	6216814	Rural	20	130	130	200	200	< 0.5	1.0	1.0	2.5	2.5	< 0.01	0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.4	-1.1	-	-	-	-
O02r04	286815	6216802	Rural	20	110	110	170	170	< 0.5	1.0	1.0	2.0	2.0	< 0.01	0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.3	-0.9	-	-	-	-
O02r06	286813	6216785	Rural	30	100	100	140	140	< 0.5	0.5	0.5	1.5	1.5	< 0.01	0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.2	-0.8	-	-	-	-
O02t01	286821	6216875	Tank	< 20	190	190	350	350	< 0.5	1.5	1.5	3.5	3.5	< 0.01	0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	-0.5	-1.5	-	-	-	-
O02t02	286810	6216809	Tank	20	120	120	180	180	< 0.5	1.0	1.0	2.0	2.0	< 0.01	0.01	0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.3	-1.0	-	-	-	-
O03h01	286686	6216963	House	< 20	225	225	600	600	< 0.5	1.5	1.5	1.5	1.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.03	0.04	0.04	0.2	0.6	-0.2	-1.2	60.1	25.5	11.7	2.7
O03r01	286696	6216934	Rural	< 20	225	225	600	600	< 0.5	1.0	1.0	2.5	2.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.03	0.04	0.04	0.2	0.8	-0.3	-1.6	-	-	-	-

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
O03r02	286695	6216970	Rural	< 20	225	225	600	600	< 0.5	1.5	1.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.02	0.03	0.03	0.2	0.5	-0.2	-1.1	-	-	-	-
O03r03	286686	6217001	Rural	< 20	180	180	600	600	< 0.5	1.5	1.5	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	0.6	-0.1	-0.7	-	-	-	-
O03t01	286695	6216986	Tank	< 20	200	200	600	600	< 0.5	1.5	1.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.02	0.02	0.02	0.2	0.5	-0.1	-0.9	-	-	-	-
O03t02	286706	6216927	Tank	< 20	225	225	575	575	< 0.5	1.0	1.0	2.5	2.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.03	0.04	0.04	0.2	0.8	-0.4	-1.7	-	-	-	-
O03t03	286697	6217005	Tank	< 20	180	180	600	600	< 0.5	1.5	1.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.1	-0.7	-	-	-	-
O04h01	286692	6217045	House	< 20	150	150	625	625	< 0.5	1.5	1.5	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.1	-0.3	82.4	12.8	4.4	0.5
O04r01	286683	6217025	Rural	< 20	150	150	600	600	< 0.5	1.5	1.5	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.1	-0.4	-	-	-	-
O04r02	286699	6217025	Rural	< 20	160	160	600	600	< 0.5	1.5	1.5	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.1	-0.5	-	-	-	-
O04r03	286713	6217040	Rural	< 20	150	150	625	625	< 0.5	1.5	1.5	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.1	-0.4	-	-	-	-
O04t01	286689	6217066	Tank	< 20	110	110	625	625	< 0.5	1.0	1.0	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	-0.2	-	-	-	-
O04t02	286696	6217067	Tank	< 20	110	110	625	625	< 0.5	1.0	1.0	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	-0.2	-	-	-	-
O04t03	286696	6217069	Tank	< 20	100	100	625	625	< 0.5	1.0	1.0	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.2	-0.7	-	-	-	-
O05h01	286772	6217191	House	< 20	60	60	675	675	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	0.8	-0.5	-1.5	54.8	28.1	13.4	3.7
O05r01	286855	6217233	Rural	< 20	70	70	675	675	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.01	0.01	0.3	0.8	-0.5	-1.5	-	-	-	-
O05t01	286786	6217173	Tank	< 20	70	70	650	650	< 0.5	0.5	0.5	< 0.5	< 0.5	< 0.01	0.01	0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.3	-1.2	-	-	-	-
O05t02	286846	6217176	Tank	< 20	90	90	650	650	< 0.5	1.0	1.0	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.3	-1.0	-	-	-	-
O05t03	286849	6217174	Tank	< 20	90	90	650	650	< 0.5	1.0	1.0	< 0.5	< 0.5	< 0.01	0.01	0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.2	-1.0	-	-	-	-
O06h01	286879	6217363	House	< 20	50	50	950	950	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.14	0.14	0.6	1.6	-1.0	-3.2	43.8	34.1	15.5	6.6
O06r01	286897	6217390	Rural	< 20	50	50	950	950	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.14	0.14	0.5	1.6	-0.9	-3.2	-	-	-	-
O06t01	286899	6217341	Tank	< 20	50	50	875	875	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.04	0.04	0.6	1.4	-1.0	-2.8	-	-	-	-
O06t02	286895	6217380	Tank	< 20	50	50	950	950	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.13	0.13	0.6	1.6	-0.9	-3.2	-	-	-	-
O07r01	286847	6217460	Rural	< 20	40	40	825	825	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.07	0.07	< 0.01	< 0.01	< 0.01	0.10	0.10	0.3	0.9	-0.3	-1.8	-	-	-	-
O07r02	286838	6217435	Rural	< 20	40	40	900	900	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.13	0.13	0.3	1.1	-0.4	-2.3	-	-	-	-
O07r03	286830	6217384	Rural	< 20	50	50	950	950	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.14	0.14	0.4	1.5	-0.7	-3.1	-	-	-	-
O07r04	286836	6217431	Rural	< 20	40	40	900	900	< 0.5	< 0.5	< 0.5	7.0	7.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.13	0.13	0.3	1.1	-0.4	-2.3	-	-	-	-
O07t01	286840	6217499	Tank	< 20	40	40	550	550	< 0.5	< 0.5	< 0.5	6.5	6.5	< 0.01	< 0.01	< 0.01	0.08	0.08	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	-0.1	-0.9	-	-	-	-
O07t02	286829	6217379	Tank	< 20	50	50	950	950	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.14	0.14	0.5	1.5	-0.8	-3.1	-	-	-	-
O07t03	286827	6217381	Tank	< 20	50	50	950	950	< 0.5	< 0.5	< 0.5	4.0	4.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.14	0.14	0.4	1.5	-0.8	-3.1	-	-	-	-
O08h01	286783	6217318	House	< 20	50	50	925	925	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.13	0.13	0.6	1.6	-1.0	-3.2	43.9	34.0	15.5	6.6
O08r01	286750	6217282	Rural	< 20	50	50	900	900	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	0.08	0.08	0.6	1.5	-1.0	-3.0	-	-	-	-
O08r02	286751	6217307	Rural	< 20	40	40	925	925	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.12	0.12	0.6	1.6	-1.0	-3.2	-	-	-	-
O08t01	286810	6217292	Tank	< 20	50	50	850	850	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.02	0.02	0.6	1.4	-0.9	-2.8	-	-	-	-
O08t02	286816	6217296	Tank	< 20	50	50	850	850	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.05	0.05	< 0.01	< 0.01	< 0.01	0.02	0.02	0.6	1.4	-0.9	-2.8	-	-	-	-
O08t03	286763	6217301	Tank	< 20	50	50	925	925	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.10	0.10	0.6	1.6	-1.0	-3.1	-	-	-	-
O08t04	286746	6217285	Tank	< 20	50	50	900	900	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.08	0.08	0.6	1.5	-1.0	-3.1	-	-	-	-
O09h01	286390	6216910	House	< 20	90	90	450	450	< 0.5	1.0	1.0	2.0	2.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.4	0.0	-0.2	85.0	11.2	3.5	0.3
O09p01	286389	6216929	Pool	< 20	70	70	450	450	< 0.5	1.0	1.0	2.0	2.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
O09r01	286344	6216909	Rural	< 20	60	60	375	375	< 0.5	0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	-0.1	-0.6	-	-	-	-
O09r02	286319	6216919	Tennis court	< 20	40	40	350	350	< 0.5	0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	-0.2	-0.7	-	-	-	-
O09t01	286368	6216926	Tank	< 20	60	60	425	425	< 0.5	0.5	0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.1	-0.6	-	-	-	-
O10h01	286263	6217002	House	< 20	20	20	375	375	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.3	-0.5	-1.7	72.9	18.4	7.5	1.2
O10h02	286239	6216922	House	< 20	20	20	225	225	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	-0.3	-1.0	81.4	13.3	4.7	0.6
O10r02	286300	6217044	Rural	< 20	30	30	500	500	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	0.02	0.02	0.6	1.4	-0.5	-1.9	-	-	-	-
O10r03	286299	6217034	Rural	< 20	30	30	475	475	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.4	-0.5	-1.8	-	-	-	-
O10r04	286208	6217062	Rural	< 20	< 20	< 20	375	375	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.05	0.05	0.5	1.5	-0.5	-2.2	-	-	-	-
O10r05	286249	6217031	Rural	< 20	20	20	400	400	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.02	0.02	0.6	1.5	-0.5	-2.0	-	-	-	-
O10t01	286302	6217024	Tank	< 20	30	30	450	450	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.3	-0.5	-1.7	-	-	-	-
O10t02	286204	6217064	Tank	< 20	< 20	< 20	350	350	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.04	0.04	0.5	1.5	-0.4	-2.1	-	-	-	-
O11h01	286033	6216905	House	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.4	-0.5	-1.8	92.2	6.3	1.3	0.2
O11h02	286014	6216924	House	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.5	-0.5	-2.0	90.4	7.5	1.9	0.2
O11r01	286066	6216921	Rural	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.4	-0.5	-1.8	-	-	-	-
O11r02	286062	6216920	Rural	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.4	-0.5	-1.8	-	-	-	-
O11r03	286075	6216935	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.4	-0.5	-1.9	-	-	-	-
O11r04	286036	6216917	Rural	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.4	-0.5	-1.9	-	-	-	-
O11r05	285993	6216927	Rural	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.6	-0.5	-2.1	-	-	-	-
O11r06	286058	6216937	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.5	-0.5	-2.0	-	-	-	-
O11t01	286008	6216904	Tank	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.4	-0.5	-1.9	-	-	-	-
O12h01	285982	6217012	House	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	1.1	-0.2	-1.7	87.4	9.6	2.8	0.3
O12p01	285994	6217023	Pool	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	1.1	-0.2	-1.6	-	-	-	-
O12r01	285962	6217048	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.7	-0.1	-1.0	-	-	-	-
O12t01	285986	6216992	Tank	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	1.3	-0.3	-1.9	-	-	-	-
O13h01	286021	6217089	House	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.6	-0.1	-0.8	88.5	8.8	2.4	0.3
O13p01	286035	6217100	Pool	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.1	-0.8	-	-	-	-
O13r01	286087	6217102	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.7	-0.1	-1.1	-	-	-	-
O13r02	286088	6217070	Rural	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.2	1.1	-0.2	-1.6	-	-	-	-
O13t01	286024	6217120	Tank	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	-	-	-	-
O14h01	286141	6217178	House	< 20	< 20	< 20	180	180	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.5	70.4	19.9	8.3	1.4
O14r01	286147	6217141	Rural	< 20	< 20	< 20	225	225	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.01	0.01	0.1	0.6	-0.1	-1.0	-	-	-	-
O14r02	286184	6217134	Rural	< 20	< 20	< 20	325	325	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	0.03	0.03	0.2	0.9	-0.2	-1.3	-	-	-	-
O14r03	286151	6217150	Rural	< 20	< 20	< 20	200	200	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.6	-0.1	-0.9	-	-	-	-
O14r04	286157	6217146	Rural	< 20	< 20	< 20	225	225	< 0.5	< 0.5	< 0.5	3.0	3.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.6	-0.1	-1.0	-	-	-	-
O14r05	286145	6217071	Rural	< 20	< 20	< 20	225	225	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	0.03	0.03	0.3	1.3	-0.3	-1.9	-	-	-	-
O15h01	286231	6217449	House	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	92.7	6.0	1.2	0.2
O15r01	286241	6217443	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
O15r02	286236	6217437	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
O15r03	286184	6217450	Rural	< 20	< 20	< 20	110	110	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
O15r08	286167	6217423	Rural	< 20	< 20	< 20	110	110	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
O15r09	285988	6217457	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O15r10	286030	6217452	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O15r11	286082	6217444	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O15r12	286143	6217445	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	0.0	-	-	-	-
O15t01	286231	6217468	Tank	< 20	< 20	< 20	120	120	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
O15t02	286192	6217471	Tank	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
O15t04	286157	6217423	Tank	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
O16h01	285966	6217416	House	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	92.9	5.8	1.1	0.2
O16p01	285987	6217412	Pool	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O16r01	285988	6217423	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O16r02	285987	6217404	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O16r03	285995	6217422	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O16r04	286009	6217398	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O16r05	285999	6217421	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O16r06	285974	6217421	Rural	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
O16t01	285971	6217433	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
O16t02	285993	6217404	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
O17h01	286364	6216687	House	< 20	70	70	160	160	< 0.5	0.5	0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	83.4	12.1	4.0	0.4
O17r01	286402	6216672	Rural	< 20	80	80	140	140	< 0.5	1.0	1.0	2.0	2.0	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	-0.3	-1.0	-	-	-	-
O17r02	286374	6216610	Rural	< 20	30	30	70	70	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.7	-	-	-	-
O17r03	286381	6216613	Rural	< 20	40	40	70	70	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.7	-	-	-	-
O17t01	286369	6216607	Tank	< 20	30	30	60	60	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.7	-	-	-	-
O17t02	286337	6216672	Tank	< 20	50	50	120	120	< 0.5	0.5	0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
O18h01	286255	6216670	House	< 20	40	40	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	88.7	8.7	2.4	0.2

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
O18h02	286226	6216662	House	< 20	30	30	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	90.9	7.2	1.7	0.2
O18r01	286232	6216653	Rural	< 20	30	30	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	-	-	-	-
O18r02	286238	6216647	Rural	< 20	30	30	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	-	-	-	-
O18r03	286238	6216666	Rural	< 20	30	30	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	-	-	-	-
O18t01	286278	6216667	Tank	< 20	40	40	90	90	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.3	-	-	-	-
O18t02	286283	6216645	Tank	< 20	30	30	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
O18t03	286242	6216633	Tank	< 20	30	30	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
O18t04	286244	6216633	Tank	< 20	30	30	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.9	-0.3	-1.2	-	-	-	-
P01h01	285753	6216652	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.8	95.1	4.4	0.4	0.1
P01p01	285752	6216660	Pool	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	-0.2	-0.9	-	-	-	-
P01r01	285815	6216597	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
P01t01	285785	6216638	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.1	-0.6	-	-	-	-
P39h01	285635	6216821	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	1.3	-0.3	-1.9	94.7	4.6	0.5	0.1
P39r04	285632	6216901	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.1	-0.8	-	-	-	-
P39t03	285665	6216851	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	1.2	-0.3	-1.7	-	-	-	-
P39t04	285666	6216853	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	1.2	-0.3	-1.7	-	-	-	-
P40h01	285772	6216808	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.5	-0.5	-2.1	94.2	5.0	0.7	0.1
P40p01	285757	6216824	Pool	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.6	-0.5	-2.2	-	-	-	-
P40r01	285696	6216806	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.6	-0.5	-2.2	-	-	-	-
P40r02	285759	6216787	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.5	-0.5	-2.0	-	-	-	-
P40r03	285706	6216876	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	1.2	-0.2	-1.7	-	-	-	-
P40r04	285769	6216863	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.5	-0.4	-2.1	-	-	-	-
P40r05	285760	6216810	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.6	1.5	-0.5	-2.1	-	-	-	-
P40t01	285778	6216846	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.6	-0.5	-2.2	-	-	-	-
P40t02	285769	6216845	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.6	-0.5	-2.2	-	-	-	-
P40t03	285766	6216846	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.5	1.5	-0.5	-2.2	-	-	-	-
P41h01	285830	6216990	House	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.6	-0.1	-0.9	93.9	5.2	0.8	0.1
P41r01	285801	6216973	Rural	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.6	-0.1	-0.9	-	-	-	-
P41r02	285827	6217032	Rural	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	-0.1	-0.4	-	-	-	-
P41r04	285789	6217035	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	-0.3	-	-	-	-
P41r05	285821	6217001	Rural	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.5	-0.1	-0.7	-	-	-	-
P41t01	285819	6216984	Tank	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.6	-0.1	-0.9	-	-	-	-
P41t02	285798	6216979	Tank	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.6	-0.1	-0.8	-	-	-	-
P41t03	285827	6217038	Tank	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.3	0.0	-0.4	-	-	-	-
P42h01	285616	6217059	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	95.1	4.4	0.4	0.1
P42r01	285627	6217052	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P42r02	285594	6217072	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P42r03	285547	6217102	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P44h01	285835	6217231	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	94.9	4.5	0.5	0.1
P44p01	285815	6217236	Pool	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P44r02	285801	6217253	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P44t01	285811	6217209	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P45h01	285877	6217372	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	94.5	4.8	0.6	0.1
P45r01	285899	6217353	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P45t01	285875	6217354	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46h01	285786	6217436	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	95.1	4.4	0.4	0.1
P46p01	285791	6217453	Pool	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46r01	285760	6217452	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46r02	285765	6217417	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46r03	285744	6217343	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46r05	285805	6217451	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46r06	285773	6217417	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46r07	285765	6217425	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46t01	285811	6217468	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46t02	285766	6217412	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46t03	285775	6217415	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P46t04	285805	6217415	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
P47h01	285627	6217480	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	95.3	4.2	0.4	0.1
P47r02	285660	6217474	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R01h01	286372	6217573	House	< 20	< 20	< 20	120	120	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	93.0	5.8	1.1	0.2
R01r01	286368	6217593	Rural	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	0.0	-	-	-	-
R01r02	286380	6217595	Rural	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	0.0	-	-	-	-
R01r03	286365	6217612	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	0.0	-	-	-	-
R01r04	286402	6217543	Rural	< 20	< 20	< 20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
R01t01	286364	6217598	Tank	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.2	0.0	0.0	-	-	-	-
R02h01	286259	6217551	House	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	0.0	92.7	6.0	1.2	0.2
R02p01	286267	6217560	Pool	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	0.0	-	-	-	-
R02r01	286265	6217553	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	0.0	-	-	-	-
R02r02	286247	6217579	Rural	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	0.0	-	-	-	-
R02r03	286256	6217578	Rural	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.2	0.0	0.0	-	-	-	-
R02r04	286251	6217599	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R02t01	286238	6217581	Tank	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R02t02	286238	6217586	Tank	< 20	< 20	< 20	70	70	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R03h01	286246	6217744	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.0	5.8	1.1	0.2
R03h02	286227	6217764	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.5	5.4	0.9	0.1
R03r01	286232	6217736	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R03r02	286208	6217746	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R03r03	286257	6217738	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R03t01	286263	6217711	Tank	< 20	< 20	< 20	30	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R03t02	286267	6217760	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R03t03	286261	6217730	Tank	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R03t04	286261	6217727	Tank	< 20	< 20	< 20	20	20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R04h01	286107	6217577	House	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	92.8	5.9	1.1	0.2
R04p01	286119	6217575	Pool	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r01	286136	6217585	Rural	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r02	286144	6217576	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r03	286150	6217566	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r04	286156	6217572	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r05	286156	6217567	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r06	286140	6217563	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r07	286139	6217567	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04r08	286133	6217560	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R04t01	286134	6217589	Tank	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	-	-	-	-
R05h01	286153	6217710	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.4	5.5	0.9	0.1
R05r01	286143	6217718	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R05r02	286165	6217700	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R05r03	286166	6217692	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R05t01	286136	6217722	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R05t02	286169	6217701	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R05t03	286169	6217699	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R06h01	286137	6217766	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	94.1	5.0	0.7	0.1

Table D.02 - Predicted subsidence effects for the structures within the Study Area

Structure Reference	Centroid MGA Easting	Centroid MGA Northing	Structure Type	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW7111 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	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 (%)
R06r01	286153	6217761	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R06r02	286121	6217753	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R06r03	286162	6217768	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R06r04	286168	6217767	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R06r05	286174	6217765	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R06t01	286159	6217757	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R06t02	286162	6217765	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R09h01	286323	6217889	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	94.5	4.7	0.6	0.1
R09r01	286316	6217846	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R09r02	286319	6217839	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R09t01	286339	6217854	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R0pt01	286260	6217746	Pool	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R10h01	285890	6217579	House	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	94.7	4.6	0.6	0.1
R10p01	285891	6217558	Pool	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R10r01	285906	6217603	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R10r02	285908	6217561	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R10r03	285872	6217565	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R10t01	285877	6217594	Tank	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R11r03	285788	6217620	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
R11r04	285792	6217591	Rural	< 20	< 20	< 20	< 20	< 20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S01h01	287848	6218090	House	< 20	< 20	< 20	150	150	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.7	0.0	0.0	65.7	22.6	9.9	1.8
S01r01	287792	6218083	Rural	< 20	< 20	< 20	120	120	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
S01r02	287794	6218126	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
S01r03	287799	6218128	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
S01t01	287793	6218058	Tank	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
S01t02	287871	6218064	Tank	< 20	< 20	< 20	190	190	< 0.5	< 0.5	< 0.5	2.5	2.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	-	-	-	-
S02h01	287733	6218067	House	< 20	< 20	< 20	110	110	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	75.7	16.7	6.6	1.0
S02r01	287764	6218073	Rural	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
S02t01	287760	6218093	Tank	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	-	-	-	-
S02t02	287778	6218052	Tank	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
S02t03	287779	6218049	Tank	< 20	< 20	< 20	130	130	< 0.5	< 0.5	< 0.5	1.5	1.5	< 0.01	< 0.01	< 0.01	0.03	0.03	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.3	0.8	0.0	0.0	-	-	-	-
S03h01	287612	6218033	House	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.5	0.0	0.0	84.6	11.4	3.6	0.3
S03p01	287589	6218044	Pool	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
S03r01	287652	6218056	Rural	< 20	< 20	< 20	90	90	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
S03r02	287621	6218079	Rural	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
S03t01	287676	6218032	Tank	< 20	< 20	< 20	100	100	< 0.5	< 0.5	< 0.5	1.0	1.0	< 0.01	< 0.01	< 0.01	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.2	0.6	0.0	0.0	-	-	-	-
S04h01	287688	6218265	House	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	94.0	5.1	0.8	0.1
S04p01	287691	6218281	Pool	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04r01	287653	6218266	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04r02	287615	6218231	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04r03	287701	6218280	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04t01	287633	6218269	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04t02	287643	6218277	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04t03	287646	6218279	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04t04	287609	6218236	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S04t05	287611	6218238	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S05h01	287547	6218230	House	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.8	5.2	0.8	0.1
S05h02	287522	6218236	House	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	93.8	5.2	0.8	0.1
S05p01	287546	6218250	Pool	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S05r01	287585	6218235	Rural	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S05t01	287516	6218257	Tank	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S05t02	287528	6218261	Tank	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S05t03	287531	6218261	Tank	< 20	< 20	< 20	40	40	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S05t04	287596	6218239	Tank	< 20	< 20	< 20	50	50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S09a	287313	6218065	House	< 20	< 20	< 20	80	80	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.1	0.0	0.0	93.0	5.8	1.1	0.2
S10r01	287187	6218038	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S10r02	287187	6218043	Rural	< 20	< 20	< 20	60	60	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.0	0.0	0.0	0.0	-	-	-	-
S11h01	286987	6217780	House	< 20	20	20	160	160	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	92.3	6.2	1.3	0.2
S11r01	286962	6217781	Rural	< 20	20	20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
S11r02	286954	6217783	Rural	< 20	20	20	140	140	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.3	0.0	0.0	-	-	-	-
S11t01	286971	6217776	Tank	< 20	20	20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
S11t02	286966	6217775	Tank	< 20	20	20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
S11t03	286963	6217776	Tank	< 20	20	20	150	150	< 0.5	< 0.5	< 0.5	0.5	0.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.1	0.4	0.0	0.0	-	-	-	-
S13r01	287645	6217878	Rural	< 20	< 20	< 20	450	450	< 0.5	< 0.5	< 0.5	5.0	5.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	-0.1	-0.6	-	-	-	-
S14h01	287637	6217928	House	< 20	< 20	< 20	275	275	< 0.5	< 0.5	< 0.5	3.5	3.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.0	0.0	-0.1	57.1	27.0	12.7	3.3
S14r01	287648	6217897	Rural	< 20	< 20	< 20	375	375	< 0.5	< 0.5	< 0.5	4.5	4.5	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	1.1	-0.1	-0.4	-	-	-	-
S14t01	287619	6217950	Tank	< 20	< 20	< 20	190	190	< 0.5	< 0.5	< 0.5	2.0	2.0	< 0.01	< 0.01	< 0.01	0.04	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4	0.9	0.0	0.0	-	-	-	-
			Maximum	**1400**	**1400**	**1425**	**1425**	**1425**	**6.5**	**7.0**	**6.5**	**7.0**	**7.0**	**0.07**	**0.07**	**0.07**	**0.08**	**0.08**	**0.13**	**0.13**	**0.14**	**0.14**	**0.14**	**0.6**	**1.7**	**-1.1**	**-3.5**				

Table D.03 - Details and predicted subsidence effects for the farm dams within the Study Area

Reference	Centroid MGA Easting	Centroid MGA Northing	Maximum Dimension (m)	Plan Area (m2)	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW711 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	Predicted Change in Freeboard after LW709 (mm)	Predicted Change in Freeboard after LW710A (mm)	Predicted Change in Freeboard after LW710B (mm)	Predicted Change in Freeboard after LW711 (mm)	Predicted Change in Freeboard after LW905 (mm)
A06d03	291056	6218160	47	969	1100	1100	1100	1100	1100	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	0.11	0.11	0.11	0.11	0.11	0.5	1.2	-0.8	-2.5	<50	<50	<50	<50	<50
A06d05	291107	6218458	38	603	200	200	200	200	200	1.5	1.5	1.5	1.5	1.5	0.04	0.04	0.04	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.2	0.0	-0.2	<50	<50	<50	<50	<50
A06d06	291239	6218512	62	198	225	225	225	225	225	2.5	2.5	2.5	2.5	2.5	0.05	0.05	0.05	0.05	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	-0.2	<50	<50	<50	<50	<50
A06d07	291250	6218807	136	888	60	60	60	60	60	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	-0.1	-0.4	<50	<50	<50	<50	<50
A24d02	289511	6216995	90	283	1400	1400	1425	1425	1425	5.0	5.0	5.0	5.0	5.0	0.05	0.05	0.05	0.05	0.05	0.12	0.12	0.12	0.12	0.12	0.5	1.3	-0.8	-2.6	150	150	150	150	150
A24d03	289618	6217016	47	130	1375	1375	1375	1375	1375	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.09	0.09	0.09	0.09	0.09	0.3	0.9	-0.6	-1.9	100	100	100	100	100
A24d04	289665	6217098	29	429	1400	1400	1425	1425	1425	4.5	4.5	4.5	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-1.0	-3.3	<50	<50	<50	<50	<50
C02d01	289821	6217278	33	575	1125	1125	1150	1150	1150	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.7	-0.2	-0.8	50	50	50	50	50
C02d02	289898	6217234	34	480	1125	1125	1150	1150	1150	5.5	5.5	5.5	5.5	5.5	<0.01	<0.01	<0.01	<0.01	<0.01	0.09	0.09	0.09	0.09	0.09	0.6	1.7	-0.7	-2.3	50	50	50	50	50
C03d01	290074	6217295	32	635	375	375	400	400	400	2.0	2.0	2.0	2.0	2.0	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.6	1.7	-0.6	-2.3	<50	<50	<50	<50	<50
C03d02	289997	6217194	35	652	700	700	700	700	700	5.0	5.0	5.0	5.0	5.0	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.3	0.8	-0.3	-1.1	50	50	50	50	50
C03d03	290011	6217047	11	82	725	725	725	725	725	3.5	3.5	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.1	0.2	0.0	-0.2	<50	<50	<50	<50	<50
C04d01	289984	6217467	36	610	300	300	325	325	325	1.5	1.5	1.5	1.5	1.5	0.03	0.03	0.03	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.2	0.0	-0.2	<50	<50	<50	<50	<50
C05d01	290508	6217488	46	122	1425	1425	1425	1450	1450	5.5	5.5	5.5	5.5	5.5	0.03	0.03	0.03	0.03	0.03	0.13	0.13	0.13	0.13	0.13	0.5	1.4	-0.8	-2.5	100	100	100	100	100
C05d02	290740	6217503	59	148	1200	1200	1200	1200	1200	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.5	-0.1	-0.7	50	50	50	50	50
C05d03	290798	6217524	37	872	1150	1150	1150	1150	1150	4.5	4.5	4.5	4.5	4.5	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.5	-0.1	-0.6	<50	<50	<50	<50	<50
C06d01	289978	6217903	26	330	650	650	775	800	800	1.0	1.0	1.5	2.0	2.0	0.03	0.03	0.05	0.05	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.4	-0.1	-0.5	<50	<50	<50	<50	<50
C06d03	290017	6217593	30	515	250	250	300	300	300	2.0	2.0	2.5	2.5	2.5	0.02	0.02	0.03	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	-0.2	-0.9	<50	<50	<50	<50	<50
C06d04	290134	6217607	67	135	425	425	450	450	450	3.0	3.0	3.0	3.0	3.0	0.04	0.04	0.04	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	-0.1	-0.5	100	100	100	100	100
C07d01	290203	6217858	14	126	1150	1150	1225	1250	1250	5.0	5.0	5.0	4.5	4.5	0.03	0.03	0.03	0.03	0.03	0.08	0.08	0.08	0.08	0.08	0.2	0.8	-0.3	-1.2	<50	<50	<50	<50	<50
C07d02	290511	6217749	73	223	975	975	1000	1000	1000	2.0	2.0	2.0	2.0	2.0	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.2	0.5	-0.1	-0.4	<50	<50	<50	<50	<50
C07d03	291063	6217721	37	763	1375	1400	1400	1400	1400	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.3	0.8	-0.5	-1.7	100	100	100	100	100
C08d01	290189	6218115	26	306	975	975	1225	1300	1300	3.0	3.0	4.5	5.0	5.0	0.04	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.3	0.9	-0.5	-1.7	<50	<50	50	50	50
C08d02	290318	6218143	60	205	950	950	1150	1175	1175	3.0	3.0	4.5	5.0	5.0	0.04	0.04	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.1	0.5	-0.3	-1.0	<50	<50	50	100	100
C08d03	290316	6218293	60	221	1025	1025	1325	1375	1375	7.0	7.0	5.5	5.5	5.5	0.03	0.03	0.03	0.03	0.03	0.11	0.11	0.13	0.13	0.13	0.5	1.4	-0.8	-2.8	100	100	50	50	50
C09d01	290210	6218239	25	257	1000	1000	1325	1400	1400	6.5	6.5	5.5	5.0	5.0	0.03	0.03	0.03	0.03	0.03	0.11	0.11	0.12	0.12	0.12	0.5	1.4	-0.8	-2.9	50	50	<50	<50	<50
C10d01	290175	6218353	21	264	350	350	850	950	950	4.5	4.5	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	<50	<50	<50	<50	<50
C11d02	290591	6218528	20	178	500	525	625	625	625	6.0	6.0	6.0	6.0	6.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	<50	<50	<50	<50	<50
C11d04	290346	6218695	43	710	80	80	825	900	900	<0.5	<0.5	4.5	5.0	5.0	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	0.09	0.10	0.10	0.6	1.6	-0.8	-2.6	<50	<50	50	50	50
C11d05	290287	6218683	28	369	70	70	850	950	950	<0.5	<0.5	5.5	5.5	5.5	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	0.10	0.10	0.10	0.5	1.4	-0.7	-2.7	<50	<50	<50	<50	<50
C11d06	290197	6218725	14	98	40	40	550	700	700	<0.5	<0.5	6.0	6.0	6.0	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.3	<50	<50	<50	<50	<50
C12d02	290411	6219224	100	298	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	-0.1	-0.5	<50	<50	<50	<50	<50
C12d03	290538	6219289	26	369	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	-0.1	-0.5	<50	<50	<50	<50	<50
C15d02	290935	6219053	39	517	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	-0.1	-0.6	<50	<50	<50	<50	<50
C15d03	290969	6219013	7	25	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5	1.5	-0.5	-2.1	<50	<50	<50	<50	<50
C18d01	289975	6219429	39	894	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
C18d13	289752	6219435	69	185	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
C20d01	289866	6219336	15	106	<20	<20	<20	30	30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
D04d01	289609	6219328	73	223	<20	<20	<20	20	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
D05d01	289402	6219014	41	852	<20	<20	<20	110	110	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
D05d02	289072	6219140	61	140	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
D06d01	289081	6219035	35	476	<20	<20	<20	30	30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
D07d01	289614	6219055	69	221	<20	<20	<20	150	150	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.2	0.0	0.0	<50	<50	<50	<50	<50
D07d02	289627	6219119	60	156	<20	<20	<20	110	110	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
D07d03	289614	6219205	97	428	<20	<20	<20	80	80	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
D07d04	289621	6219271	43	855	<20	<20	<20	40	40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
D08d01	289686	6219078	33	415	<20	<20	<20	140	140	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	0.0	0.0	<50	<50	<50	<50	<50
D09d01	289607	6218875	27	306	<20	<20	30	550	550	<0.5	<0.5	<0.5	6.5	6.5	<0.01	<0.01	<0.01	0.07	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	0.4	1.1	0.0	-0.1	<50	<50	<50	50	50
D09d02	289677	6218916	62	127	<20	<20	30	550	550	<0.5	<0.5	<0.5	6.5	6.5	<0.01	<0.01	<0.01	0.07	0.07	<0.01	<0.01	<0.01	0.01	0.01	0.4	1.1	0.0	-0.1	<50	<50	<50	100	100
D09d03	289648	6218997	37	837	<20	<20	<20	190	190	<0.5	<0.5	<0.5	1.5	1.5	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	0.0	0.0	<50	<50	<50	<50	<50
D10d01	289889	6218983	10	44	<20	<20	40	550	550	<0.5	<0.5	<0.5	6.0	6.0	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	0.01	0.01	0.3	0.9	-0.1	-0.4	<50	<50	<50	<50	<50
D10d02	289904	6218954	11	53	<20	<20	50	725	725	<0.5	<0.5	<0.5	6.0	6.0	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	0.06	0.06	0.2	0.7	-0.2	-1.1	<50	<50	<50	<50	<50
D11d01	289969	6218871	32	405	<20	<20	100	875	875	<0.5	<0.5	<0.5	3.5	3.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	0.08	0.6	1.5	-0.8	-2.3	<50	<50	<50	<50	<50
D12d01	289919	6218736	32	550	<20	<20	150	775	775	<0.5	<0.5	1.0	2.0	2.0	<0.01	<0.01	0.02	0.04	0.04	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.4	-0.2	-0.8	<50	<50	<50	<50	<50
D12d02	289874	6218740	67	274	<20	<20	150	900	900	<0.5	<0.5	1.0	3.0	3.0	<0.01	<0.01	0.01	0.04	0.04	<0.01	<0.01	<0.01	0.02	0.02	0.2	0.6	-0.3	-1.1	<50	<50	<50	50	50
D13d02	289713	6218718	33	609	<20	<20	110	1000	1000	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	0.07	0.07	0.4	1.1	-0.7	-2.1	<50	<50	<50	<50	<50
D13d04	289688	6218840	71	141	<20	<20	60	1025	1025	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	<0.01	0.06	0.06	<0.01	<0.01	<0.01	0.12	0.12	0.2	0.8	-0.4	-1.5	<50	<50	<50	200	200
D14d01	289519	6218745	21	237	<20	<20	60	975	975	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	0.11	0.11	0.3	1.0	-0.5	-2.0	<50	<50	<50	50	50
D14d02	289546	6218787	26	416	<20	<20	50	850	850	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	0.01	0.06	0.06	<0.01	<0.01	<0.01	0.07	0.07	0.3	0.9	-0.2	-1.0	<50	<50	<50	100	100
D15d01	289374	6218860	51	795	<20	<20	<20	200	200	<0.5	<0.5	<0.5	1.5	1.5	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	0.0	0.0	<50	<50	<50	<50	<50
D15d02	289052	6218916	24	167	<20	<20	<20	70	70	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
D15d03	289082	6218849	35	304	<20	<20	<20	110	110	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
D15d04	289099	6218789	20	196	<20	<20	<20	140	140	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	0.0	0.0	<50	<50	<50	<50	<50
D17d01	289633	6218528	16	166	<20	<20	250	825	825	<0.5	<0.5	3.0	2.0	2.0	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	<50	<50	<50	<50	<50
D17d02	289717	6218615	49	742	<20	<20	200	800	800	<0.5	<0.5	2.0	1.5	1.5	<0.01	<0.01	0.04	0.04	0.04	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.4	-0.1	-0.6	<50	<50	<50	<50	<50
D17d03	289749	6218557	29	399	20	20	375	900	900	<0.5	<0.5	5.0	3.5	3.5	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	<0.01	0.01	0.01	0.4	1.0	0.0	-0.1	<50	<50	<50	<50	<50
D17d04	289872	6218597	26	420	30	30	450	975	975	<0.5	<0.5	6.0	4.5	4.5	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	<0.01	0.01	0.01	0.4	1.0	0.0	-0.1	<50	<50	<50	<50	<50
D18d01	289786	6218508	32	613	40	40	775	1225	1225	<0.5	<0.5	6.5	5.0	5.0	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	0.05	0.06	0.06	0.3	0.9	-0.1	-0.6	<50	<50	100	100	100
D19d01	289911	6218239	51	134	300	300	825	950	950	4.0	4.0	3.0	2.5	2.5	0.06	0.06	0.06	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.4	1.0	0.0	0.0	<50	<50	<50	<50	<50
D20d01	289835	6218369	27	508	110	110	975	1275	1275	<0.5	<0.5	3.0	4.5	4.5	<0.01	<0.01	0.03	0.05	0.05	<0.01	<0.01	0.08	0.08	0.08	0.4	1.0	-0.6	-2.1	<50	<50	<50	50	50
D20d02	289884	6218333	24	303	130	130	850	1050	1050	0.5	0.5	2.5	4.0	4.0	<0.01	<0.01	0.04	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.1	0.5	-0.3	-1.0	<50	<50	<50	<50	<50
D21d01	289615	6218431	36	702	50	50	700	1150	1150	<0.5	<0.5	6.5	5.0	5.0	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	0.02	0.02	0.02	0.4	1.0	-0.1	-0.5	<50	<50	100	50	50
D22d01	289079	6218532	66	134	<20	<20	60	1050	1050	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	0.12	0.12	0.3	0.9	-0.5	-1.8	<50	<50	<50	150	150
D23d01	288912	6218478	13	87	<20	<20	40	825	825	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	<0.01	0.06	0.06	<0.01	<0.01	<0.01	0.05	0.05	0.3	0.9	-0.2	-0.9	<50	<50	<50	<50	<50
D23d02	289157	6218483	84	123	<20	<20	110	1075	1075	<0.5	<0.5	<0.5	4.5	4.5	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	0.12	0.12	0.6	1.5	-1.0	-3.0	<50	<50	<50	50	50
D23d03	289243	6218519	39	913	<20	<20	100	1075	1075	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	0.12	0.12	0.5	1.4	-0.9	-2.9	<50	<50	<50	<50	<50
D24d01	289118	6218340	49	106	<20	<20	160	875	875	<0.5	<0.5	1.0	2.5	2.5	<0.01	<0.01	0.02	0.04	0.04	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.4	-0.1	-0.7	<50	<50	<50	<50	<50
D25d01	289008	6218230	44	107	<20	<20	250	825	825	<0.5	<0.5	3.0	2.0	2.0	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	<50	<50	<50	<50	<50
D27d01	289778	6218191	26	426	200	200	750	875	875	2.5	2.5	1.0	1.0	1.0	0.06	0.06	0.06	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	<50	<50	<50	<50	<50
D27d02	289948	6218087	28	477	950	950	1275	1350	1350	5.5	5.5	4.0	4.0	4.0	0.03	0.03	0.03	0.03	0.03	0.11	0.11	0.12	0.12	0.12	0.6	1.7	-1.0	-3.4	<50	<50	<50	<50	<50
D28d01	289595	6217943	49	130	925	925	1275	1350	1350	6.0	6.0	5.0	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.4	1.3	-0.7	-2.7	100	100	50	50	50
D29d01	289735	6217877	40	804	825	825	1075	1125	1125	3.0	3.0	4.5	5.0	5.0	0.04	0.04	0.05	0.05	0.05	0.03	0.03	0.03	0.03	0.03	0.2	0.7	-0.4	-1.5	<50	<50	50	50	50
D30d01	289415	6217973	92	176	575	575	1025	1125	1125	6.5	6.5	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	150	150	100	100	100
D30d02	289493	6218093	14	156	160	160	750	900	900	1.0	1.0	1.0	2.0	2.0	0.03	0.03	0.04	0.05	0.05	<0.01	<0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.6	<50	<50	<50	<50	<50
D31d01	288982	6218082	54	137	50	50	875	1275	1275	<0.5	<0.5	6.5	5.0	5.0	<0.01	<0.01	0.05	0.05	0.05	<0.01	<0.01	0.09	0.11	0.11	0.2	0.7	-0.4	-1.4	<50	<50	100	100	100
D32d01	288920	6217970	48	130	80	80	950	1300	1300	<0.5	<0.5	4.5	4.5	4.5	<0.01	<0.01	0.02	0.02	0.02	<0.01	<0.01	0.11	0.12	0.12	0.6	1.6	-1.0	-3.2	<50	<50	<50	<50	<50
D34d01	289067	6217856	42	894	200	200	750	850	850	2.0	2.0	1.5	1.0	1.0	0.05	0.05	0.05	0.05	0.05	<0.01	<0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.3	<50	<50	<50	<50	<50
D35d01	289681	6217745	52	145	700	700	825	850	850	1.5	1.5	1.5	2.0	2.0	0.04	0.04	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.2	0.4	-0.1	-0.4	<50	<50	<50	<50	<50
D35d02	289370	6217833	63	862	950	950	1300	1375	1375	6.5	6.5	5.0	5.0	5.0	0.02	0.02	0.02	0.02	0.02	0.11	0.11	0.12	0.12	0.12	0.4	1.3	-0.7	-2.6	150	150	100	100	100
D37d01	289431	6217678	43	939	775	775	950	1000	1000	2.0	2.0	3.5	3.5	3.5	0.04	0.04	0.05	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.2	-0.7	<50	<50	<50	<50	<50
D37d02	289481	6217626	71	973	850	850	950	975	975	3.5	3.5	3.5	3.5	3.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	0.9	0.0	0.0	<50	<50	<50	<50	<50
D37d03	289583	6217564	37	601	1225	1225	1300	1325	1325	5.5	5.5	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.09	0.09	0.09	0.09	0.09	0.3	0.8	-0.3	-1.1	100	100	100	100	100
D38d01	288987	6217617	42	775	925	925	1275	1325	1325	6.0	6.0	4.5	4.5	4.5	0.02	0.02	0.02	0.02	0.02	0.10	0.10	0.12	0.12	0.12	0.6	1.7	-1.0	-3.4	50	50	<50	<50	<50
D38d02	289271	6217685	23	296	925	925	1250	1300	1300	2.5	2.5	4.5	4.5	4.5	0.02	0.02	0.04	0.04	0.04	0.09	0.09	0.10	0.10	0.10	0.4	1.1	-0.7	-2.2	<50	<50	<50	50	50
D39d01	288940	6217750	47	129	350	350	850	950	950	4.5	4.5	3.5	3.0	3.0	0.06	0.06	0.06	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	50	50	<50	<50	<50
D41d01	288779	6217474	45	972	825	825	1175	1225	1225	3.0	3.0	4.5	5.0	5.0	0.01	0.01	0.01	0.01	0.01	0.09	0.09	0.11	0.11	0.11	0.6	1.5	-0.8	-2.6	<50	<50	50	100	100
D41d02	288767	6217525	35	736	825	825	1175	1250	1250	5.5	5.5	4.5	4.0	4.0	0.01	0.01	0.01	0.01	0.01	0.10	0.10	0.11	0.11	0.11	0.5	1.5	-0.7	-2.7	50	50	<50	<50	<50
D41d05	288994	6217524	33	601	900	900	1175	1225	1225	2.5	2.5	4.5	4.5	4.5	0.03	0.03	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.3	0.8	-0.5	-1.7	<50	<50	50	50	50
D41d06	289153	6217562	11	55	800	800	1000	1025	1025	2.5	2.5	4.0	4.0	4.0	0.04	0.04	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.0	<50	<50	<50	<50	<50
D41d07	289262	6217500	23	209	825	825	925	925	925	3.0	3.0	3.0	2.5	2.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	0.0	-0.1	<50	<50	<50	<50	<50
D41d08	289241	6217413	37	718	1150	1150	1225	1250	1250	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.3	0.9	-0.2	-0.8	100	100	100	100	100
D43d01	289298	6217475	44	555	975	975	1075	1100	1100	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.3	<50	<50	<50	<50	<50
D43d02	289309	6217008	29	404	1225	1225	1250	1250	1250	4.5	4.5	4.5	4.5	4.5	0.03	0.03	0.03	0.03	0.03	0.09	0.09	0.09	0.09	0.09	0.2	0.7	-0.3	-1.3	<50	<50	<50	<50	<50
D44d01	289482	6217428	35	659	1300	1300	1375	1375	1375	4.0	4.0	4.0	4.0	4.0	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.12	0.12	0.6	1.6	-1.0	-3.3	<50	<50	<50	<50	<50
D47d01	289376	6217220	20	198	900	900	950	950	950	2.0	2.0	2.5	2.5	2.5	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.7	<50	<50	<50	<50	<50
D50d01	289274	6216876	38	583	1025	1025	1050	1050	1050	5.5	5.5	5.5	5.5	5.5	0.02	0.02	0.02	0.02	0.02	0.08	0.08	0.08	0.08	0.08	0.5	1.3	-0.5	-1.7	100	100	100	100	100
D51d01	288838	6217191	43	944	525	525	600	625	625	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.2	0.7	-0.2	-1.1	50	50	50	50	50
D51d02	288967	6217174	52	826	950	950	1025	1025	1025	4.5	4.5	5.0	5.0	5.0	0.02	0.02	0.02	0.02	0.02	0.08	0.08	0.08	0.08	0.08	0.6	1.6	-0.6	-2.2	100	100	100	100	100
D51d03	289045	6217028	35	562	550	550	575	575	575	3.0	3.0	3.0	3.0	3.0	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.1	0.3	-0.1	-0.4	<50	<50	<50	<50	<50
D53d01	288767	6216805	26	288	50	50	50	60	60	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	-0.2	<50	<50	<50	<50	<50
D55d01	289192	6216670	29	445	200	200	225	225	225	1.5	1.5	1.5	1.5	1.5	0.02	0.02	0.02	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.2	0.0	-0.2	<50	<50	<50	<50	<50
D56d01	289328	6218305	20	128	30	30	550	1075	1075	<0.5	<0.5	6.5	5.0	5.0	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.3	<50	<50	<50	<50	<50
E15d01	289469	6216762	33	542	850	850	850	850	850	3.0	3.0	3.0	3.0	3.0	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.3	0.7	0.0	0.0	<50	<50	<50	<50	<50
E16d01	289360	6216716	67	165	625	625	650	650	650	3.0	3.0	3.0	3.0	3.0	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.1	0.2	0.0	0.0	50	50	50	50	50
E17d01	289354	6216595	83	391	500	500	500	500	500	3.5	3.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.4	1.3	-0.4	-1.8	100	100	100	100	100
F02d01	288566	6216549	52	839	80	80	80	80	90	1.0	1.0	1.0	1.0	1.0	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.2	0.0	0.0	<50	<50	<50	<50	<50

Table D.03 - Details and predicted subsidence effects for the farm dams within the Study Area

Reference	Centroid MGA Easting	Centroid MGA Northing	Maximum Dimension (m)	Plan Area (m2)	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW711 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	Predicted Change in Freeboard after LW709 (mm)	Predicted Change in Freeboard after LW710A (mm)	Predicted Change in Freeboard after LW710B (mm)	Predicted Change in Freeboard after LW711 (mm)	Predicted Change in Freeboard after LW905 (mm)
F03d01	288348	6216456	34	499	375	375	375	375	425	5.0	5.0	5.0	5.0	5.0	0.06	0.06	0.06	0.06	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.4	0.9	0.0	-0.1	<50	<50	<50	<50	<50
F03d02	288450	6216406	76	818	625	625	625	625	650	6.0	6.0	6.0	6.0	6.0	0.05	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.2	0.7	-0.1	-0.5	100	100	100	100	100
F05d01	288517	6216647	56	951	70	70	70	80	100	0.5	0.5	0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
F05d02	288611	6216662	33	413	30	30	30	30	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F05d03	288610	6216909	15	109	40	40	50	50	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	0.8	-0.3	-1.1	<50	<50	<50	<50	<50
F06d01	288631	6217051	44	680	80	80	110	120	120	0.5	0.5	1.0	1.0	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.4	1.4	-0.4	-1.9	<50	<50	<50	<50	<50
F06d02	288496	6216957	16	132	20	20	30	30	40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F07d01	288488	6217209	53	803	50	50	90	130	130	<0.5	<0.5	1.0	1.0	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	-0.1	-0.5	<50	<50	<50	<50	<50
F07d02	288493	6217249	22	191	60	60	110	160	160	<0.5	<0.5	1.0	1.5	1.5	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	-0.2	-0.8	<50	<50	<50	<50	<50
F08d01	288641	6217317	30	361	225	225	350	400	400	2.5	2.5	3.5	3.5	3.5	0.03	0.03	0.03	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	-0.2	-0.8	<50	<50	<50	<50	<50
F08d02	288539	6217325	4	13	100	100	225	300	300	1.0	1.0	2.0	2.5	2.5	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.4	1.1	-0.4	-1.5	<50	<50	<50	<50	<50
F09d01	288571	6217375	36	621	190	190	425	500	500	2.0	2.0	3.0	3.5	3.5	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.6	1.5	-0.5	-2.1	<50	<50	<50	<50	<50
F09d02	288712	6217588	20	182	450	450	900	1000	1000	5.0	5.0	4.0	3.5	3.5	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.02	0.02	0.02	0.3	0.9	-0.1	-0.3	<50	<50	<50	<50	<50
F10d01	288738	6217789	36	455	120	120	900	1125	1125	<0.5	<0.5	2.5	4.5	4.5	<0.01	<0.01	0.04	0.05	0.05	<0.01	<0.01	0.02	0.02	0.02	0.2	0.6	-0.3	-1.3	<50	<50	<50	<50	<50
F11d01	288598	6217602	35	789	150	150	650	775	775	2.0	2.0	2.0	2.0	2.0	0.03	0.03	0.03	0.03	0.03	<0.01	<0.01	0.02	0.02	0.02	0.2	0.5	0.0	0.0	<50	<50	<50	<50	<50
F12d01	288478	6217496	55	123	80	80	400	525	525	1.0	1.0	2.5	2.5	2.5	<0.01	<0.01	0.02	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.1	0.0	-0.1	<50	<50	50	50	50
F13d01	288430	6217357	23	339	60	60	150	250	250	<0.5	<0.5	1.5	1.5	1.5	<0.01	<0.01	0.02	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.5	1.5	-0.5	-2.1	<50	<50	<50	<50	<50
F13d02	288421	6217170	56	174	30	30	60	60	60	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	-0.1	-0.5	<50	<50	<50	<50	<50
F14d01	288357	6217004	33	693	<20	<20	<20	20	30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F15d03	288007	6218589	70	187	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F17d01	288249	6217100	43	979	<20	<20	<20	30	40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F18d01	288003	6217226	45	949	<20	<20	<20	40	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	-0.1	<50	<50	<50	<50	<50
F19d01	287894	6217372	37	820	<20	80	80	170	170	<0.5	1.0	1.0	2.0	2.0	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.5	-0.2	-0.7	<50	<50	<50	<50	<50
F19d02	287954	6217386	23	390	<20	40	50	100	110	<0.5	0.5	0.5	1.0	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	-0.1	-0.6	<50	<50	<50	<50	<50
F19d03	288015	6217333	43	816	<20	<20	20	60	60	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.2	0.0	-0.2	<50	<50	<50	<50	<50
F19d04	288236	6217497	24	368	<20	<20	70	130	130	<0.5	<0.5	<0.5	1.0	1.0	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	-0.1	-0.4	<50	<50	<50	<50	<50
F20d01	287844	6217591	43	870	<20	60	60	225	225	<0.5	0.5	0.5	1.0	1.0	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	-0.1	<50	<50	<50	<50	<50
F20d02	287546	6217590	43	110	<20	60	60	750	750	<0.5	<0.5	<0.5	3.5	3.5	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	<50	<50	<50	<50	<50
F20d03	287479	6217492	34	532	<20	110	110	650	650	<0.5	1.5	1.5	0.5	0.5	<0.01	0.02	0.02	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.4	-0.1	-0.6	<50	<50	<50	<50	<50
F20d04	287374	6217592	122	336	<20	60	60	950	950	<0.5	<0.5	<0.5	4.5	4.5	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	0.14	0.14	0.5	1.4	-0.9	-2.8	<50	<50	<50	150	150
F20d05	287361	6217346	74	218	<20	350	350	725	725	<0.5	2.5	2.5	1.0	1.0	<0.01	0.02	0.02	0.02	0.02	<0.01	0.02	0.02	0.03	0.03	0.2	0.6	-0.1	-0.3	<50	50	50	<50	<50
F20d06	287464	6217336	28	401	<20	375	375	725	725	<0.5	2.5	2.5	1.0	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.04	0.06	0.06	0.2	0.5	-0.2	-1.1	<50	<50	<50	<50	<50
F20d07	287803	6217303	29	512	<20	150	150	250	275	<0.5	1.5	1.5	3.0	3.0	<0.01	0.02	0.02	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	-0.1	-0.5	<50	<50	<50	<50	<50
F20d08	287517	6217139	10	38	<20	180	180	225	250	<0.5	2.0	2.0	3.0	3.0	<0.01	0.02	0.02	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	-0.1	-0.6	<50	<50	<50	<50	<50
F20d09	287706	6216927	35	754	<20	60	60	60	170	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	0.0	0.0	<50	<50	<50	<50	<50
F20d10	287666	6216759	34	603	60	90	90	90	550	<0.5	<0.5	<0.5	<0.5	4.5	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	0.03	0.2	0.6	-0.1	-0.8	<50	<50	<50	<50	50
F21d01	288232	6217628	56	107	<20	<20	140	450	450	<0.5	<0.5	1.0	2.5	2.5	<0.01	<0.01	0.02	0.02	0.02	<0.01	<0.01	0.01	0.02	0.02	0.4	1.0	-0.3	-1.3	<50	<50	<50	50	50
F22d01	288132	6217905	35	668	<20	<20	20	825	825	<0.5	<0.5	<0.5	4.0	4.0	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.7	-0.4	-1.5	<50	<50	<50	50	50
F22d02	288211	6217950	38	995	<20	<20	50	900	900	<0.5	<0.5	0.5	3.0	3.0	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	0.03	0.03	0.3	0.8	-0.4	-1.6	<50	<50	<50	<50	<50
F23d01	288493	6217761	37	578	40	40	850	1225	1225	<0.5	<0.5	4.0	4.5	4.5	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01	0.10	0.11	0.11	0.6	1.6	-0.9	-2.9	<50	<50	<50	<50	<50
F24d01	288615	6217849	19	130	60	60	950	1300	1300	<0.5	<0.5	5.5	4.0	4.0	<0.01	<0.01	0.02	0.02	0.02	<0.01	<0.01	0.11	0.12	0.12	0.5	1.6	-0.9	-3.2	<50	<50	<50	<50	<50
F25d01	288334	6218033	39	100	<20	<20	100	1000	1000	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	0.07	0.07	0.4	1.0	-0.6	-2.0	<50	<50	<50	50	50
F26d01	288567	6218219	40	884	<20	<20	90	1050	1050	<0.5	<0.5	<0.5	5.0	5.0	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	0.12	0.12	0.6	1.7	-1.0	-3.4	<50	<50	<50	<50	<50
F26d02	288528	6218092	35	472	<20	<20	120	900	900	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	0.02	0.02	0.2	0.6	-0.4	-1.3	<50	<50	<50	<50	<50
F27d01	288761	6218016	35	505	30	30	600	1075	1075	<0.5	<0.5	6.5	5.0	5.0	<0.01	<0.01	0.06	0.06	0.06	<0.01	<0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.4	<50	<50	50	50	50
F29d01	288661	6218309	24	411	<20	<20	70	1025	1025	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	0.12	0.12	0.4	1.3	-0.7	-2.6	<50	<50	<50	50	50
F30d01	288825	6218386	28	250	<20	<20	70	1025	1025	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	0.12	0.12	0.4	1.3	-0.7	-2.7	<50	<50	<50	50	50
F30d02	288669	6218353	22	173	<20	<20	50	875	875	<0.5	<0.5	<0.5	7.0	7.0	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	0.08	0.08	0.3	0.9	-0.3	-1.1	<50	<50	<50	50	50
F31d01	287845	6217721	40	742	<20	<20	<20	300	300	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.5	-0.2	-0.9	<50	<50	<50	<50	<50
F31d02	287869	6217769	30	449	<20	<20	<20	400	400	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.7	-0.4	-1.4	<50	<50	<50	<50	<50
F31d03	288015	6217897	18	104	<20	<20	<20	750	750	<0.5	<0.5	<0.5	4.0	4.0	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	0.07	0.07	0.5	1.3	-0.8	-2.5	<50	<50	<50	<50	<50
F31d06	287302	6217851	87	321	<20	30	30	225	225	<0.5	<0.5	<0.5	1.5	1.5	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	0.0	0.0	<50	<50	<50	<50	<50
F32d01	288625	6217904	33	548	50	50	850	1275	1275	<0.5	<0.5	6.5	5.0	5.0	<0.01	<0.01	0.04	0.04	0.04	<0.01	<0.01	0.08	0.09	0.09	0.2	0.8	-0.4	-1.6	<50	<50	100	50	50
F33d01	288307	6217646	30	454	<20	<20	250	575	575	<0.5	<0.5	2.5	3.5	3.5	<0.01	<0.01	0.03	0.04	0.04	<0.01	<0.01	0.02	0.03	0.03	0.5	1.4	-0.5	-1.9	<50	<50	<50	<50	<50
F34d01	288479	6218317	54	112	<20	<20	30	575	575	<0.5	<0.5	<0.5	6.5	6.5	<0.01	<0.01	<0.01	0.07	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	0.4	1.1	-0.1	-0.2	<50	<50	<50	100	100
F35d01	288300	6218362	77	118	<20	<20	<20	180	180	<0.5	<0.5	<0.5	1.5	1.5	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.4	0.0	0.0	<50	<50	<50	<50	<50
F37d01	288588	6218404	48	111	<20	<20	20	375	375	<0.5	<0.5	<0.5	5.0	5.0	<0.01	<0.01	<0.01	0.07	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	0.4	1.0	0.0	-0.1	<50	<50	<50	<50	<50
F37d02	288597	6218611	26	470	<20	<20	<20	110	110	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
F40d01	288731	6218618	50	805	<20	<20	<20	130	130	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	0.0	0.0	<50	<50	<50	<50	<50
F41d01	288892	6218717	28	517	<20	<20	<20	130	130	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.2	0.0	0.0	<50	<50	<50	<50	<50
F41d02	288660	6218799	19	169	<20	<20	<20	40	40	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F43d01	287948	6217793	18	214	<20	<20	<20	350	350	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	-0.3	-1.2	<50	<50	<50	<50	<50
F51d01	287918	6218502	29	574	<20	<20	<20	20	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F51d02	287865	6218558	19	234	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F52d01	287624	6218445	52	122	<20	<20	<20	30	30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F52d02	287767	6218492	24	392	<20	<20	<20	30	30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F52d03	287805	6218500	54	124	<20	<20	<20	20	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
F53d01	288485	6217078	33	523	30	30	40	50	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	-0.1	<50	<50	<50	<50	<50
J02d01	289930	6217592	35	729	500	500	550	575	575	3.0	3.0	3.5	3.5	3.5	0.04	0.04	0.04	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.4	1.0	-0.4	-1.4	50	50	50	50	50
K01d01	288235	6218280	35	419	<20	<20	<20	225	225	<0.5	<0.5	<0.5	2.0	2.0	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	0.7	0.0	0.0	<50	<50	<50	<50	<50
L01d01	289253	6218102	43	995	100	100	975	1350	1350	<0.5	<0.5	3.0	5.0	5.0	<0.01	<0.01	0.03	0.03	0.03	<0.01	<0.01	0.11	0.12	0.12	0.4	1.2	-0.8	-2.5	<50	<50	<50	50	50
N05d01	287598	6215978	50	105	1175	1175	1175	1175	1175	4.5	4.5	4.5	4.5	4.5	0.05	0.05	0.05	0.05	0.05	0.12	0.12	0.12	0.12	0.12	0.2	0.8	-0.4	-1.6	100	100	100	100	100
N05d02	287482	6215847	25	360	1050	1050	1050	1050	1075	4.0	4.0	4.0	4.0	4.5	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.2	0.7	-0.4	-1.5	<50	<50	<50	<50	<50
N05d03	287556	6215825	19	156	950	950	950	950	950	4.0	4.0	4.0	4.0	4.0	0.05	0.05	0.05	0.05	0.06	0.01	0.01	0.01	0.01	0.01	0.2	0.5	-0.3	-1.1	<50	<50	<50	<50	<50
N07d01	287813	6216115	19	179	725	725	725	725	825	1.0	1.0	1.0	1.0	1.0	0.04	0.04	0.04	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.4	-0.1	-0.5	<50	<50	<50	<50	<50
N08d01	287795	6215725	27	396	850	850	850	850	875	3.0	3.0	3.0	3.0	3.0	0.07	0.07	0.07	0.07	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	0.4	0.9	0.0	-0.1	<50	<50	<50	<50	<50
N10d01	287994	6215708	36	886	975	975	975	975	1000	4.5	4.5	4.5	4.5	4.5	0.07	0.07	0.07	0.07	0.07	0.01	0.01	0.01	0.01	0.01	0.4	0.9	0.0	-0.2	<50	<50	<50	<50	<50
N11d02	288136	6216255	19	223	975	975	975	975	1100	2.5	2.5	2.5	2.5	3.5	0.02	0.02	0.02	0.02	0.02	0.08	0.08	0.08	0.08	0.08	0.4	1.1	-0.7	-2.2	<50	<50	<50	<50	<50
N11d03	288242	6216100	18	252	875	875	875	875	900	3.0	3.0	3.0	3.0	3.0	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	0.9	0.0	-0.1	<50	<50	<50	<50	<50
N13d01	288179	6216717	55	116	70	80	80	80	450	<0.5	<0.5	<0.5	<0.5	3.5	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.04	0.3	1.1	-0.3	-1.6	<50	<50	<50	<50	50
N14d01	288214	6216373	58	165	925	925	925	925	1025	6.5	6.5	6.5	6.5	6.5	0.05	0.05	0.05	0.05	0.05	0.09	0.09	0.09	0.09	0.10	0.2	0.7	-0.3	-1.5	150	150	150	150	150
N15d01	288001	6216406	33	696	650	675	675	675	975	6.0	6.0	6.0	6.0	5.0	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.02	0.4	1.0	-0.1	-0.4	100	100	100	100	50
N15d02	288075	6216398	25	383	700	700	700	700	950	6.5	6.5	6.5	6.5	5.5	0.06	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.02	0.03	0.3	0.9	-0.1	-0.6	50	50	50	50	50
N16d01	287740	6216186	35	760	800	800	800	800	925	2.5	2.5	2.5	2.5	3.0	0.03	0.03	0.03	0.03	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.6	-0.3	-1.2	<50	<50	<50	<50	<50
N17d01	287554	6216225	44	749	900	925	925	925	1000	2.5	2.5	2.5	2.5	3.0	0.03	0.03	0.03	0.03	0.04	0.06	0.06	0.06	0.06	0.06	0.4	1.0	-0.6	-2.0	<50	<50	<50	<50	<50
N17d02	287595	6216340	28	212	875	875	875	875	1050	5.5	5.5	5.5	5.5	5.0	0.02	0.02	0.02	0.02	0.02	0.09	0.09	0.09	0.09	0.09	0.3	0.9	-0.4	-1.8	<50	<50	<50	<50	<50
N18d01	287499	6216207	21	273	875	875	875	875	925	2.5	2.5	2.5	2.5	3.0	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.3	0.8	-0.5	-1.6	<50	<50	<50	<50	<50
N19d02	287184	6216103	32	519	750	750	750	750	750	1.0	1.0	1.0	1.0	1.0	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.2	0.4	-0.1	-0.4	<50	<50	<50	<50	<50
N19d03	287087	6216370	23	284	650	650	650	650	675	6.5	6.5	6.5	6.5	6.5	0.06	0.06	0.06	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.4	1.0	-0.1	-0.3	50	50	50	50	50
N21d15	286613	6216457	27	352	40	60	60	60	60	0.5	0.5	0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
O01d01	286254	6216754	52	942	<20	50	50	150	150	<0.5	<0.5	<0.5	1.0	1.0	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.5	-0.1	-0.8	<50	<50	<50	<50	<50
O03d01	286820	6217025	20	201	<20	250	250	600	600	<0.5	1.5	1.5	1.5	1.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.03	0.04	0.04	0.2	0.6	-0.2	-1.2	<50	<50	<50	<50	<50
O04d01	286773	6217095	24	294	<20	130	130	625	625	<0.5	1.5	1.5	<0.5	<0.5	<0.01	0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	0.0	-0.2	<50	<50	<50	<50	<50
O05d01	286831	6217206	45	690	<20	80	80	675	675	<0.5	0.5	0.5	1.0	1.0	<0.01	0.01	0.01	0.04	0.04	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.7	-0.4	-1.4	<50	<50	<50	<50	<50
O08d01	286715	6217220	28	256	<20	50	50	775	775	<0.5	<0.5	<0.5	3.5	3.5	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	0.01	0.01	0.5	1.2	-0.8	-2.4	<50	<50	<50	<50	<50
O09d01	286477	6217026	28	359	<20	60	60	575	575	<0.5	0.5	0.5	1.0	1.0	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	0.01	0.01	0.2	0.7	-0.4	-1.2	<50	<50	<50	<50	<50
O11d01	285930	6216871	103	475	<20	<20	<20	50	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.6	1.5	-0.5	-2.0	<50	<50	<50	<50	<50
O14d01	285953	6217145	73	378	<20	<20	<20	50	50	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	-0.2	<50	<50	<50	<50	<50
O15d02	286050	6217427	16	173	<20	<20	<20	50	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
O15d03	286028	6217511	18	230	<20	<20	<20	30	30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
O18d01	286303	6216695	23	298	<20	50	50	130	130	<0.5	<0.5	<0.5	1.0	1.0	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	0.9	-0.3	-1.3	<50	<50	<50	<50	<50
O19d01	286239	6217252	44	100	<20	20	20	300	300	<0.5	<0.5	<0.5	3.5	3.5	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	0.7	0.0	-0.3	<50	<50	<50	<50	<50
O20d01	286416	6217145	54	115	<20	40	40	850	850	<0.5	<0.5	<0.5	3.0	3.0	<0.01	<0.01	<0.01	0.04	0.04	<0.01	<0.01	<0.01	0.12	0.12	0.6	1.6	-0.8	-2.8	<50	<50	<50	50	50
O20d02	286490	6217110	38	558	<20	50	50	775	775	<0.5	<0.5	<0.5	3.5	3.5	<0.01	<0.01	<0.01	0.05	0.05	<0.01	<0.01	<0.01	0.01	0.01	0.5	1.2	-0.8	-2.3	<50	<50	<50	<50	<50
P01d01	285813	6216676	37	556	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.2	0.6	-0.2	-0.8	<50	<50	<50	<50	<50
P39d01	285582	6216918	50	142	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.3	0.0	-0.4	<50	<50	<50	<50	<50
P40d01	285804	6216910	39	734	<20	<20	<20	30	30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	1.3	-0.3	-1.9	<50	<50	<50	<50	<50
P41d01	285733	6216988	55	101	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.3	0.0	-0.4	<50	<50	<50	<50	<50
P42d01	285631	6216974	40	815	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	-0.2	<50	<50	<50	<50	<50
P42d02	285530	6217065	37	646	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
P43d01	285834	6217159	57	152	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
P45d01	285855	6217475	25	367	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
P47d01	285614	6217348	39	108	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
R02d01	286197	6217572	51	893	<20	<20	<20	70	70	<0.5	<0.5	<0.5	0.5	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
R02d02	286181	6217601	29	227	<20	<20	<20	50	50	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
R03d01	286301	6217745	29	388	<20	<20	<20	20	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50

Table D.03 - Details and predicted subsidence effects for the farm dams within the Study Area

Reference	Centroid MGA Easting	Centroid MGA Northing	Maximum Dimension (m)	Plan Area (m2)	Predicted total subsidence after LW709 (mm)	Predicted total subsidence after LW710A (mm)	Predicted total subsidence after LW710B (mm)	Predicted total subsidence after LW711 (mm)	Predicted total subsidence after LW905 (mm)	Predicted total tilt after LW709 (mm/m)	Predicted total tilt after LW710A (mm/m)	Predicted total tilt after LW710B (mm/m)	Predicted total tilt after LW711 (mm/m)	Predicted total tilt after LW905 (mm/m)
R04d01	286016	6217634	38	733	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5
R05d01	286081	6217704	31	515	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5
R06d01	286027	6217775	66	741	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5
R11d01	285836	6217632	73	234	<20	<20	<20	<20	<20	<0.5	<0.5	<0.5	<0.5	<0.5
S06d01	287393	6218317	46	943	<20	<20	<20	30	30	<0.5	<0.5	<0.5	<0.5	<0.5
S10d01	287146	6217952	31	574	<20	<20	<20	100	100	<0.5	<0.5	<0.5	0.5	0.5
S11d01	287057	6217887	81	400	<20	<20	<20	130	130	<0.5	<0.5	<0.5	0.5	0.5
				Maximum	**1425**	**1425**	**1425**	**1450**	**1450**	**7.0**	**7.0**	**6.5**	**7.0**	**7.0**

Reference	Predicted total hogging curvature after LW709 (1/km)	Predicted total hogging curvature after LW710A (1/km)	Predicted total hogging curvature after LW710B (1/km)	Predicted total hogging curvature after LW711 (1/km)	Predicted total hogging curvature after LW905 (1/km)	Predicted total sagging curvature after LW709 (1/km)	Predicted total sagging curvature after LW710A (1/km)	Predicted total sagging curvature after LW710B (1/km)	Predicted total sagging curvature after LW711 (1/km)	Predicted total sagging curvature after LW905 (1/km)	Predicted mean total tensile strain (mm/m)	Predicted 95% CL for total tensile strain (mm/m)	Predicted mean total comp. strain (mm/m)	Predicted 95% CL for total comp. strain (mm/m)	Predicted Change in Freeboard after LW709 (mm)	Predicted Change in Freeboard after LW710A (mm)	Predicted Change in Freeboard after LW710B (mm)	Predicted Change in Freeboard after LW711 (mm)	Predicted Change in Freeboard after LW905 (mm)
R04d01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
R05d01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
R06d01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
R11d01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
S06d01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.0	0.0	0.0	<50	<50	<50	<50	<50
S10d01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.1	0.0	0.0	<50	<50	<50	<50	<50
S11d01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.0	0.2	0.0	0.0	<50	<50	<50	<50	<50
	0.07	**0.07**	**0.07**	**0.07**	**0.07**	**0.13**	**0.13**	**0.13**	**0.14**	**0.14**	**0.6**	**1.7**	**-1.0**	**-3.4**	**150**	**150**	**150**	**200**	**200**

APPENDIX E. DRAWINGS

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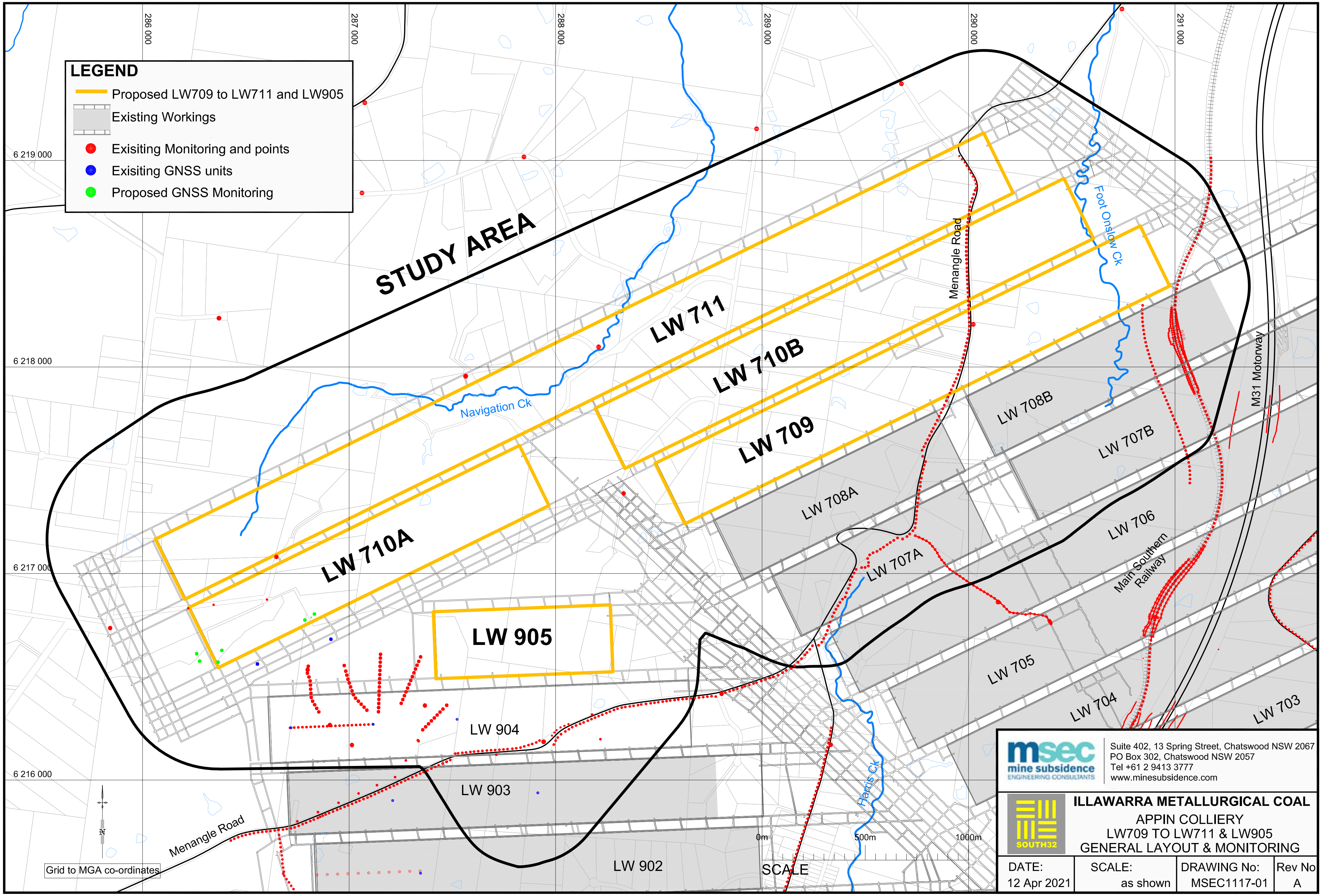

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
GENERAL LAYOUT & MONITORING

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-01	A

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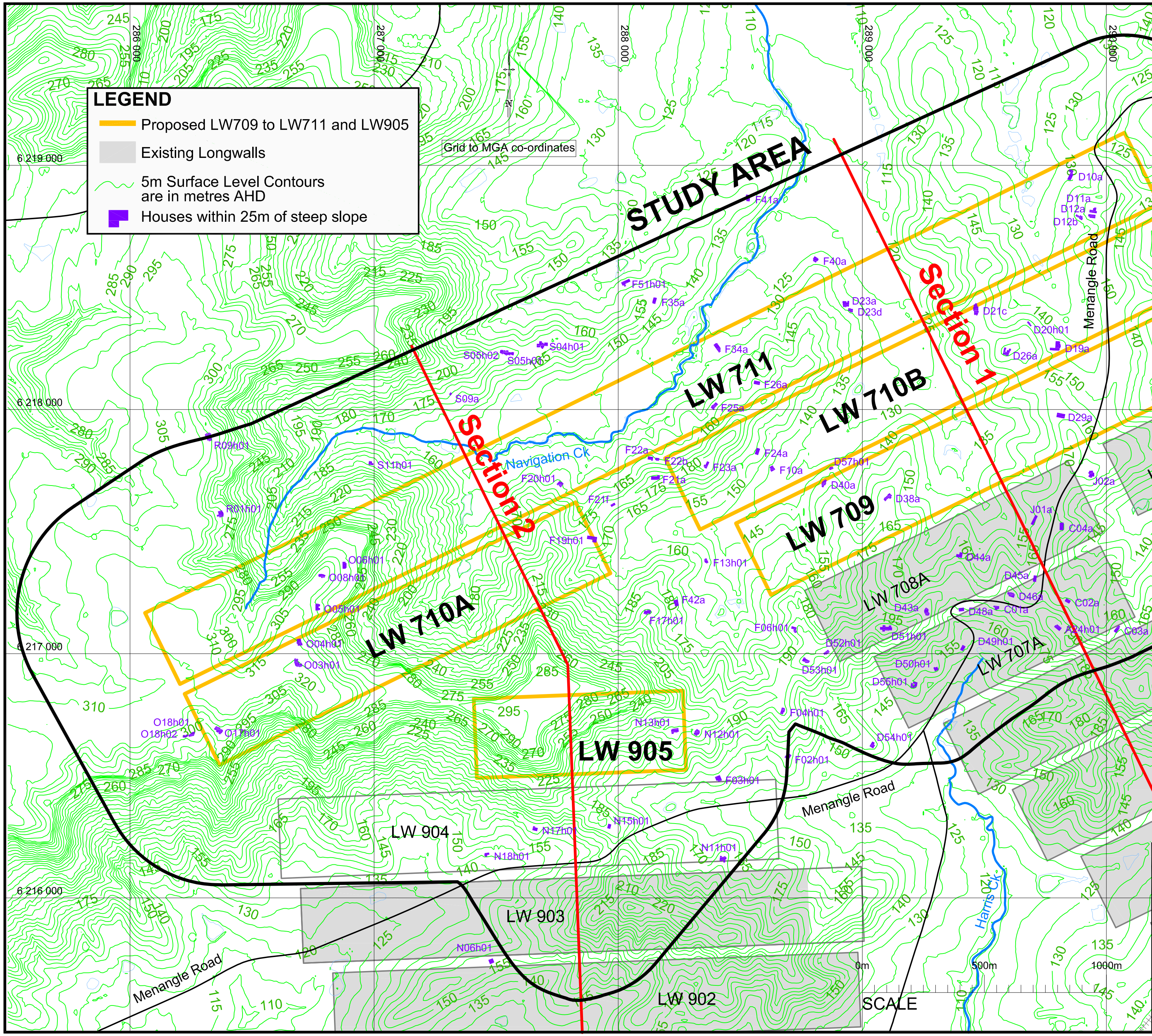

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LW709 TO LW711 & LW905
SURFACE LEVEL CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-02	A

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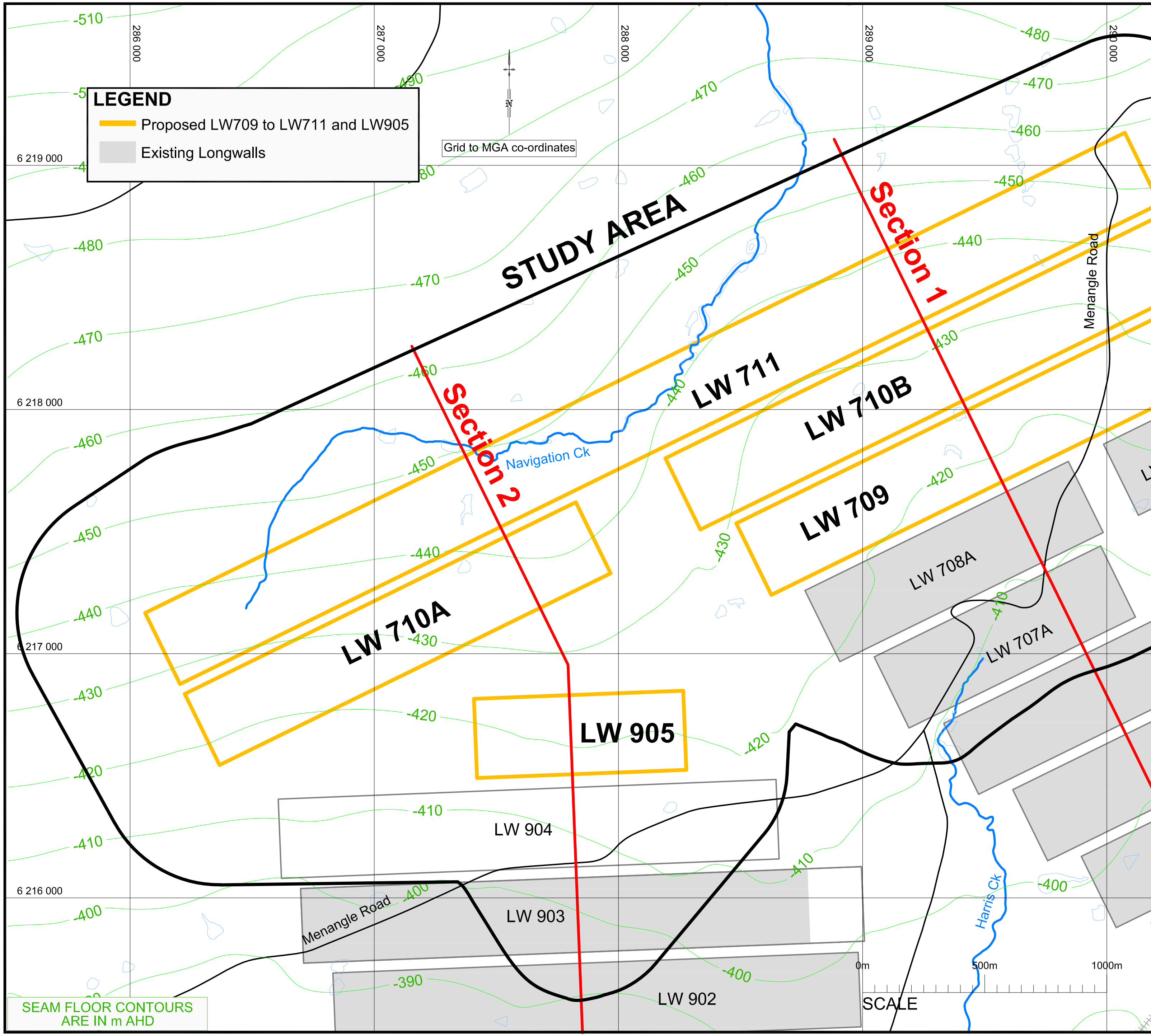

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
BULLI SEAM FLOOR CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-03	A

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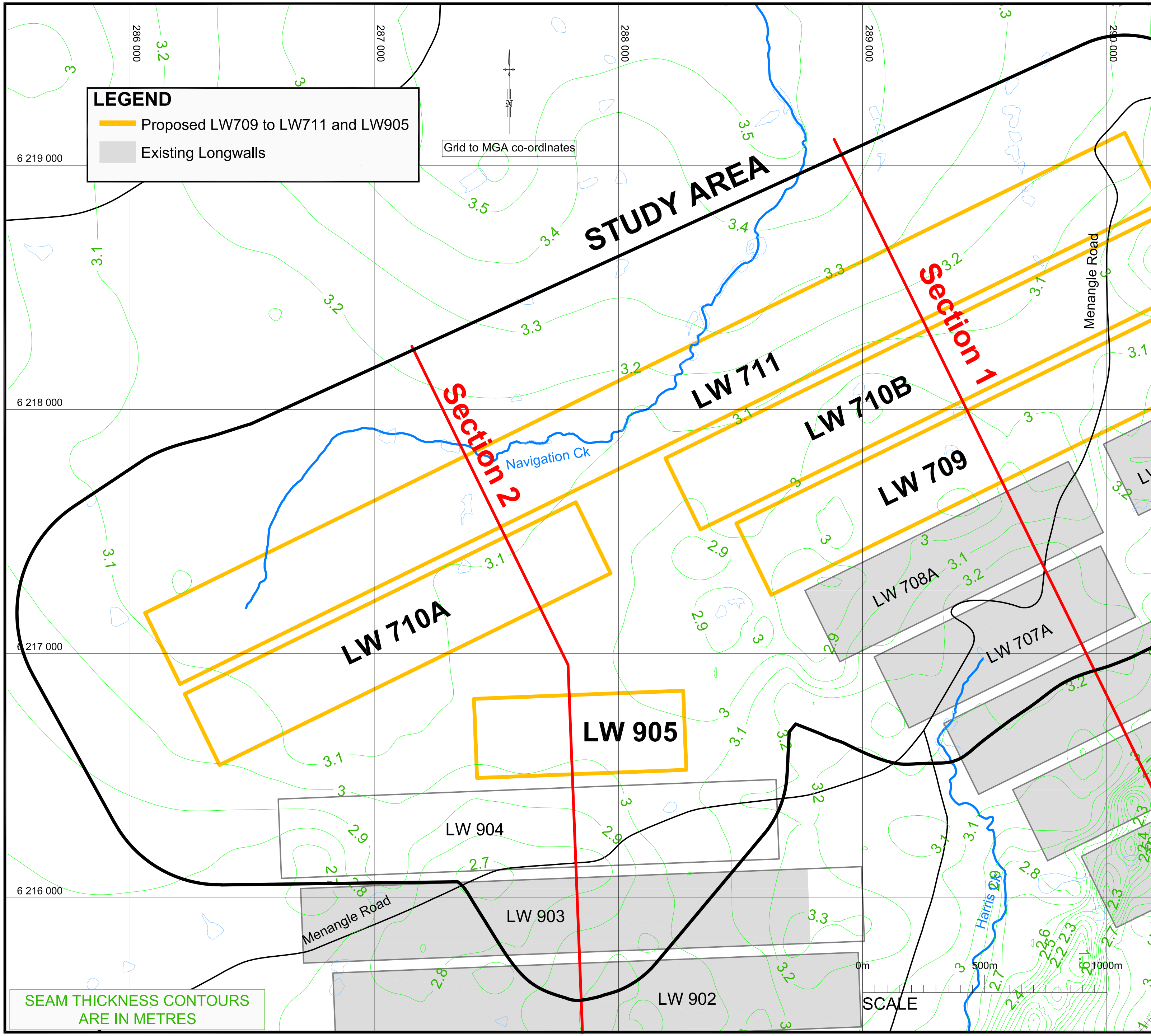

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
BULLI SEAM THICKNESS CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-04	A

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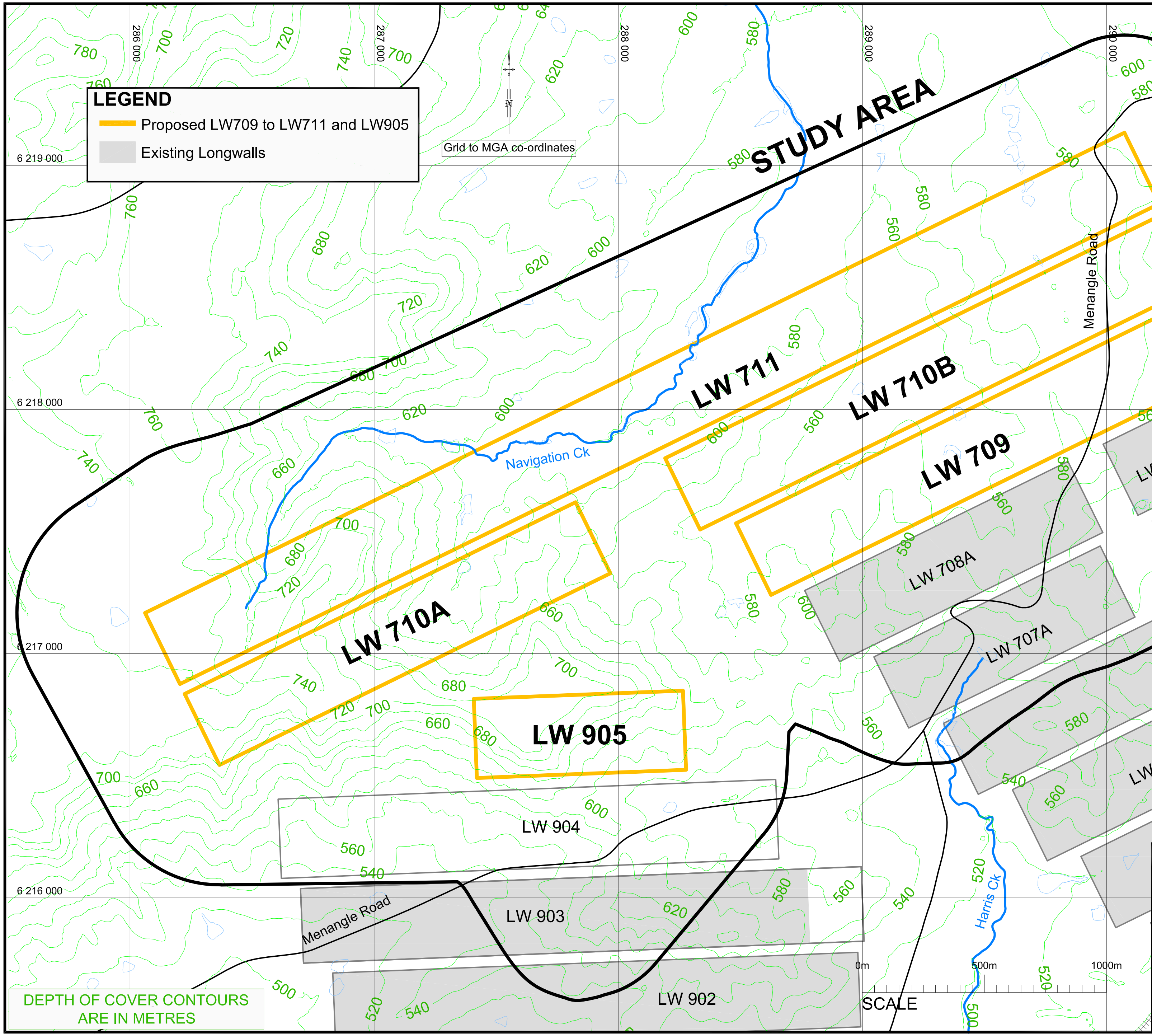

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
BULLI SEAM DEPTH OF COVER CONTOURS

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-05	A

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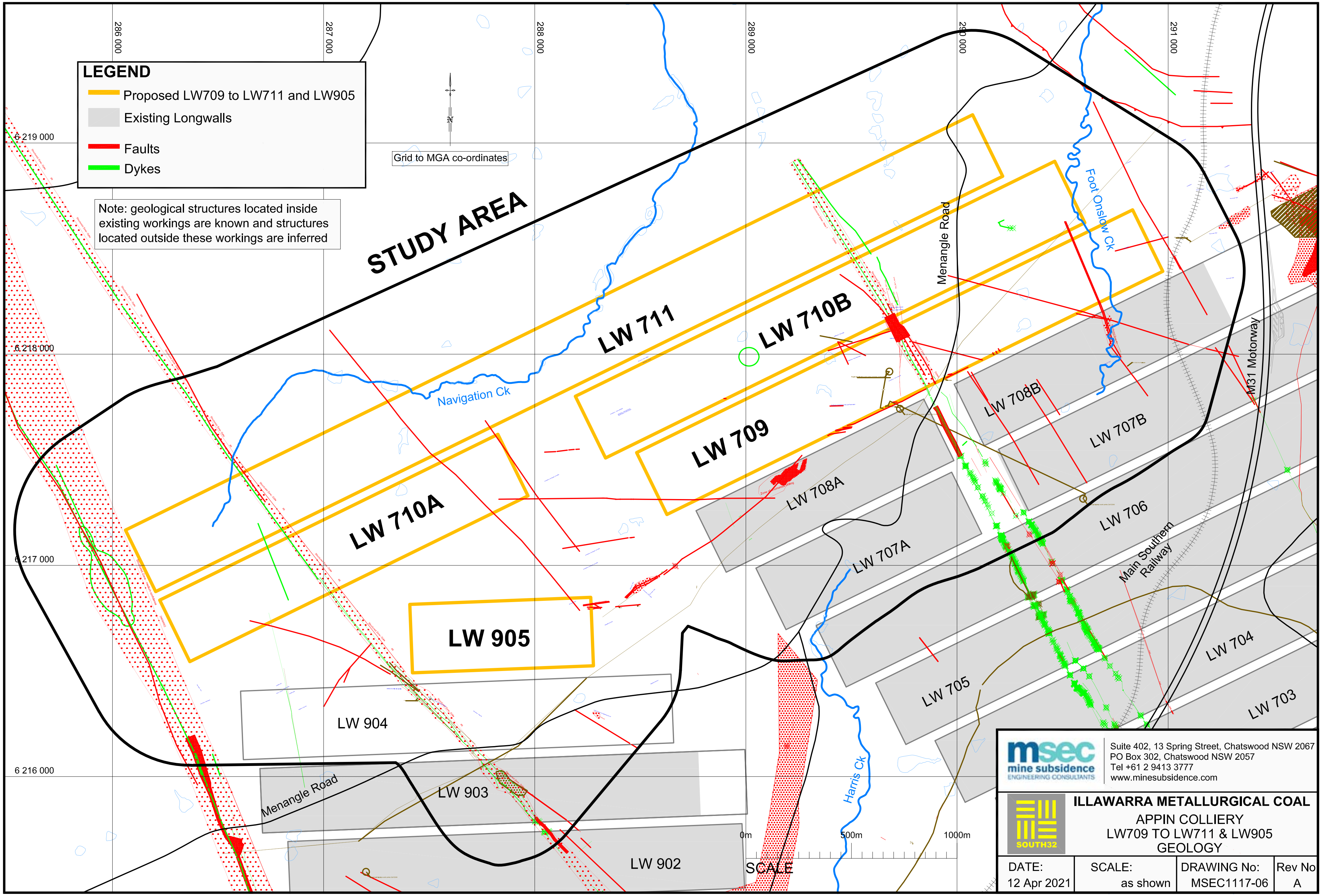

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
GEOLOGY

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-06	A

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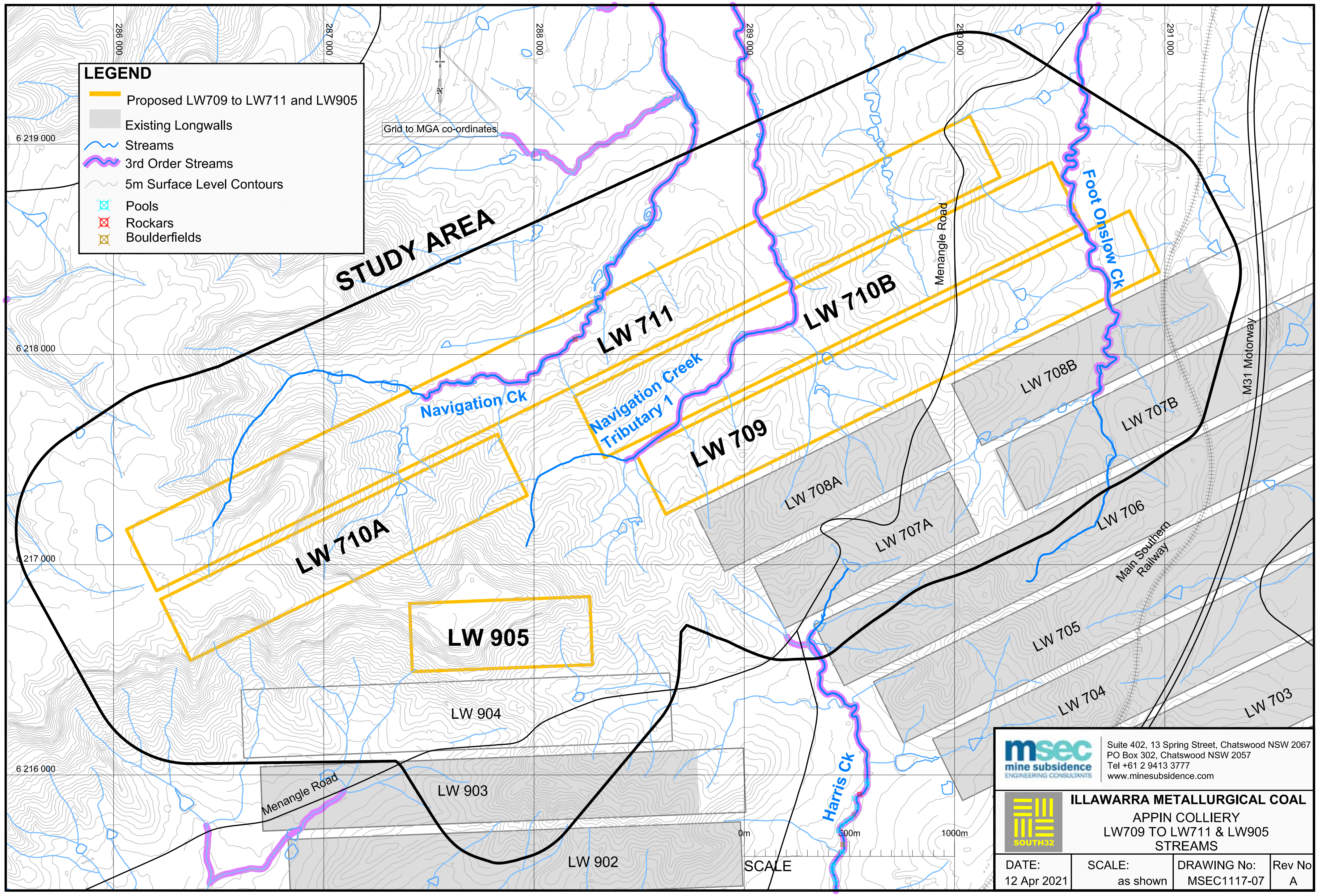

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
STREAMS

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-07	A

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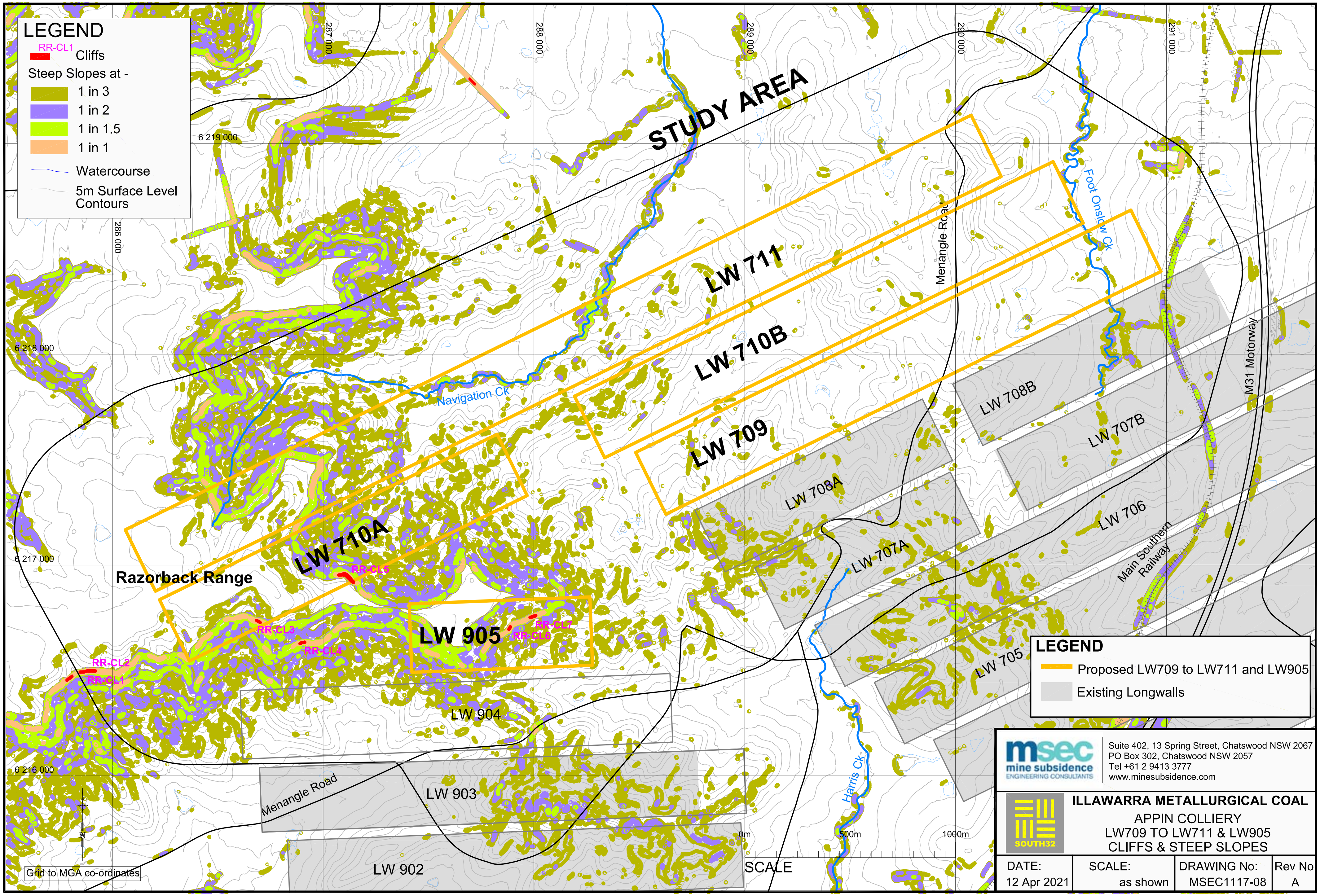

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APPIN COLLIERY
LW709 TO LW711 & LW905
CLIFFS & STEEP SLOPES

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-08	A

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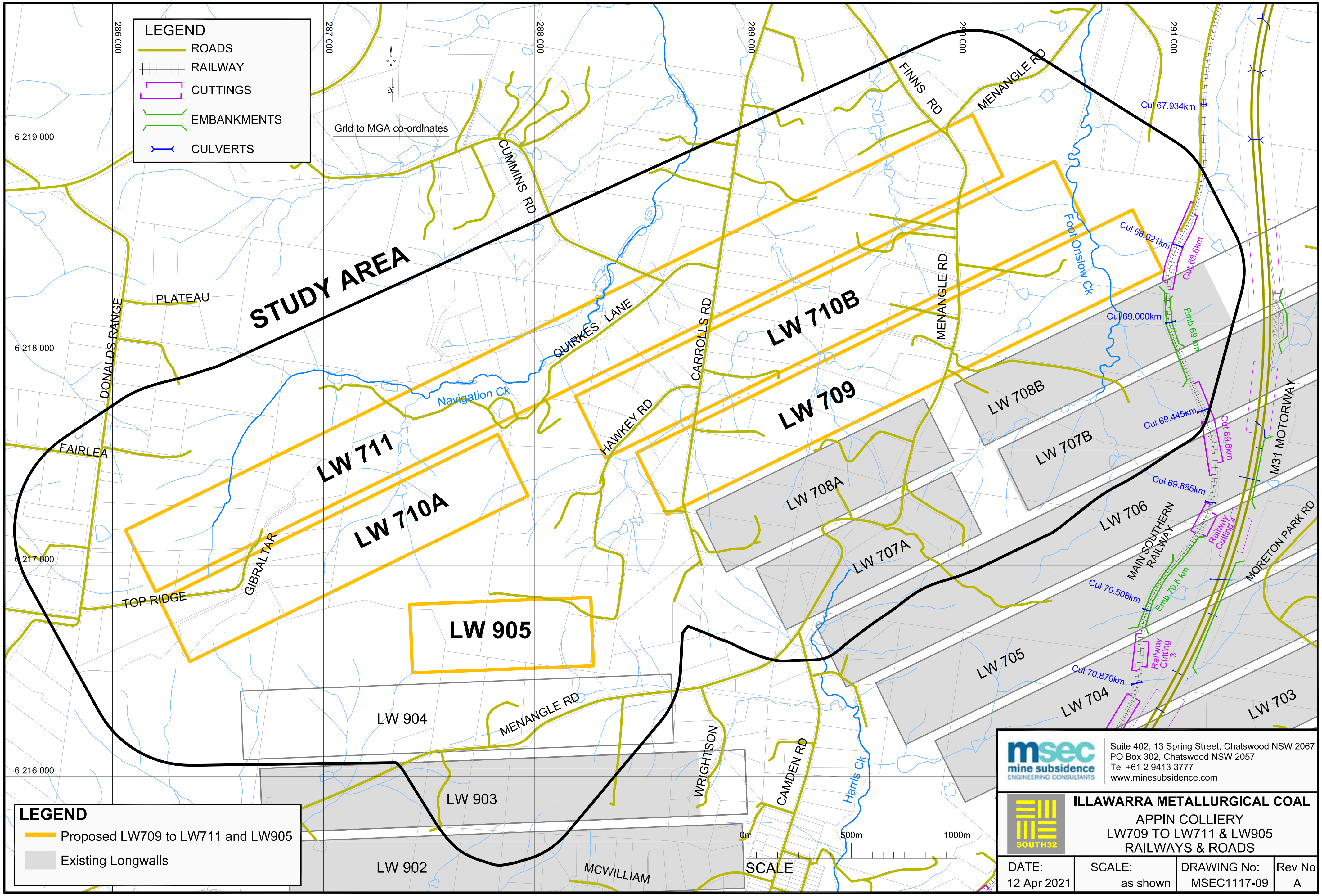

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
RAILWAYS & ROADS

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-09	A

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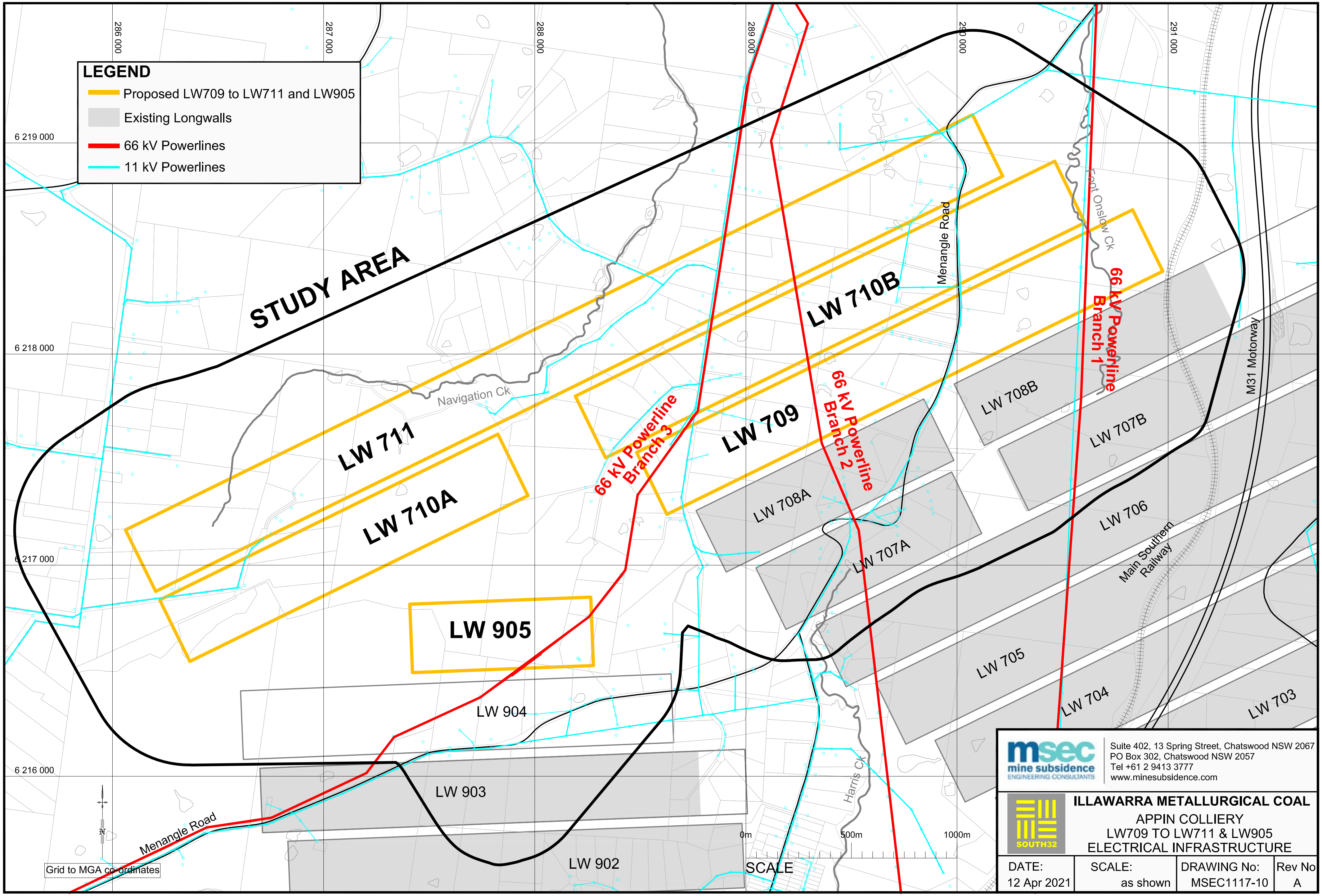

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ILLAWARRA METALLURGICAL COAL
APPIN COLLIERY
LW709 TO LW711 & LW905
ELECTRICAL INFRASTRUCTURE

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-10	A

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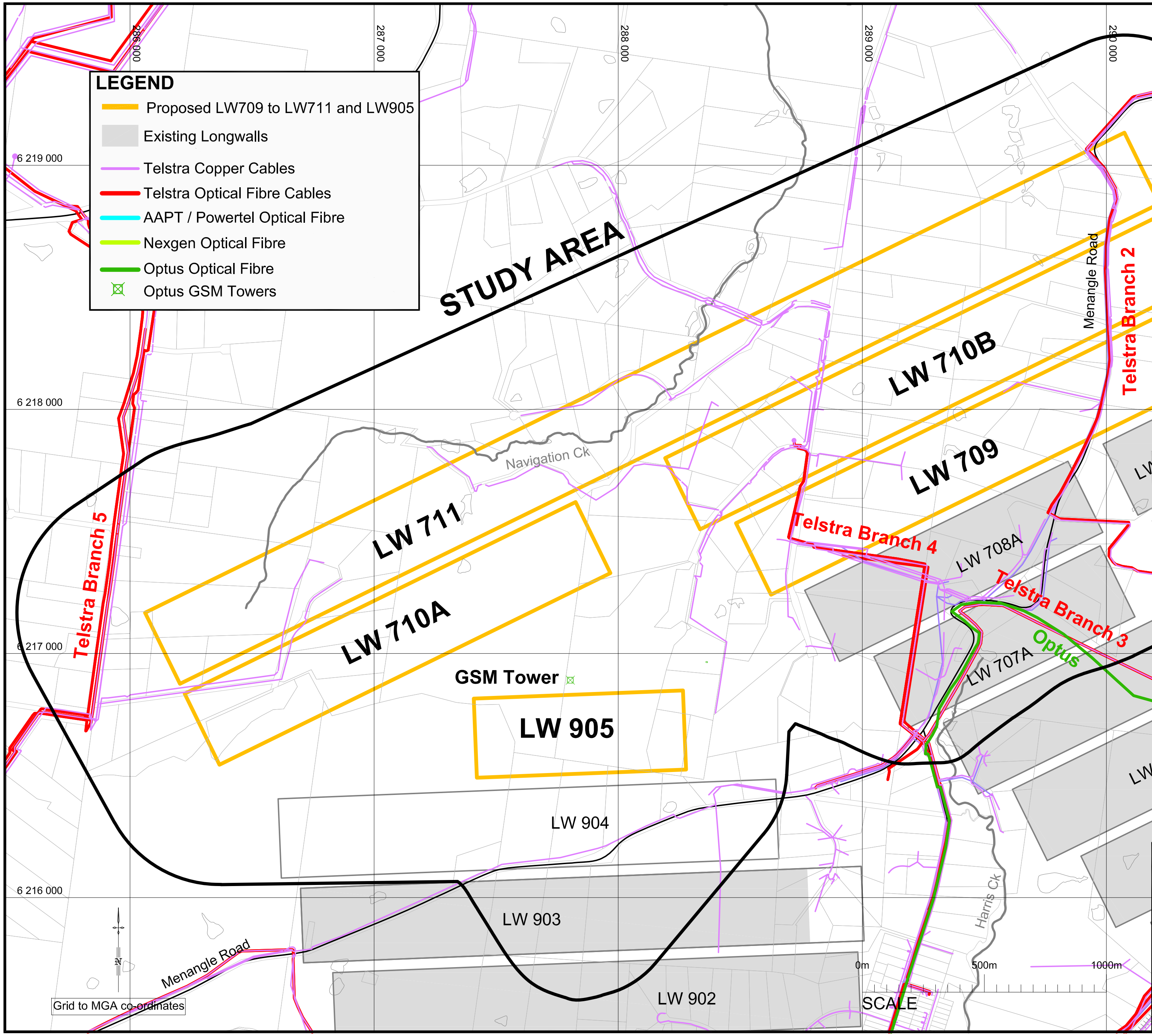

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ILLAWARRA METALLURGICAL COAL

APPIN COLLIERY
LW709 TO LW711 & LW905
TELECOMMUNICATIONS INFRASTRUCTURE

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-11	A

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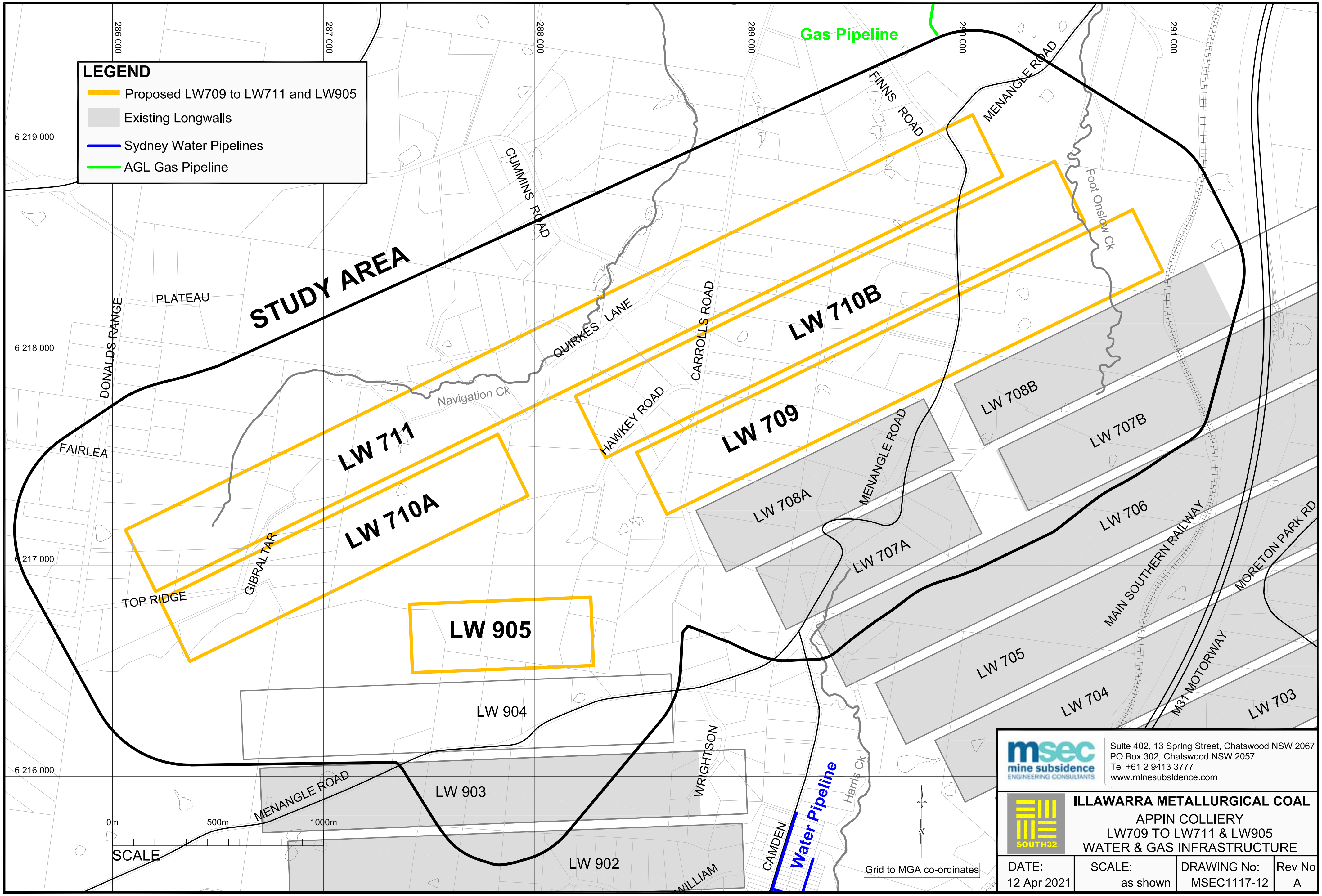

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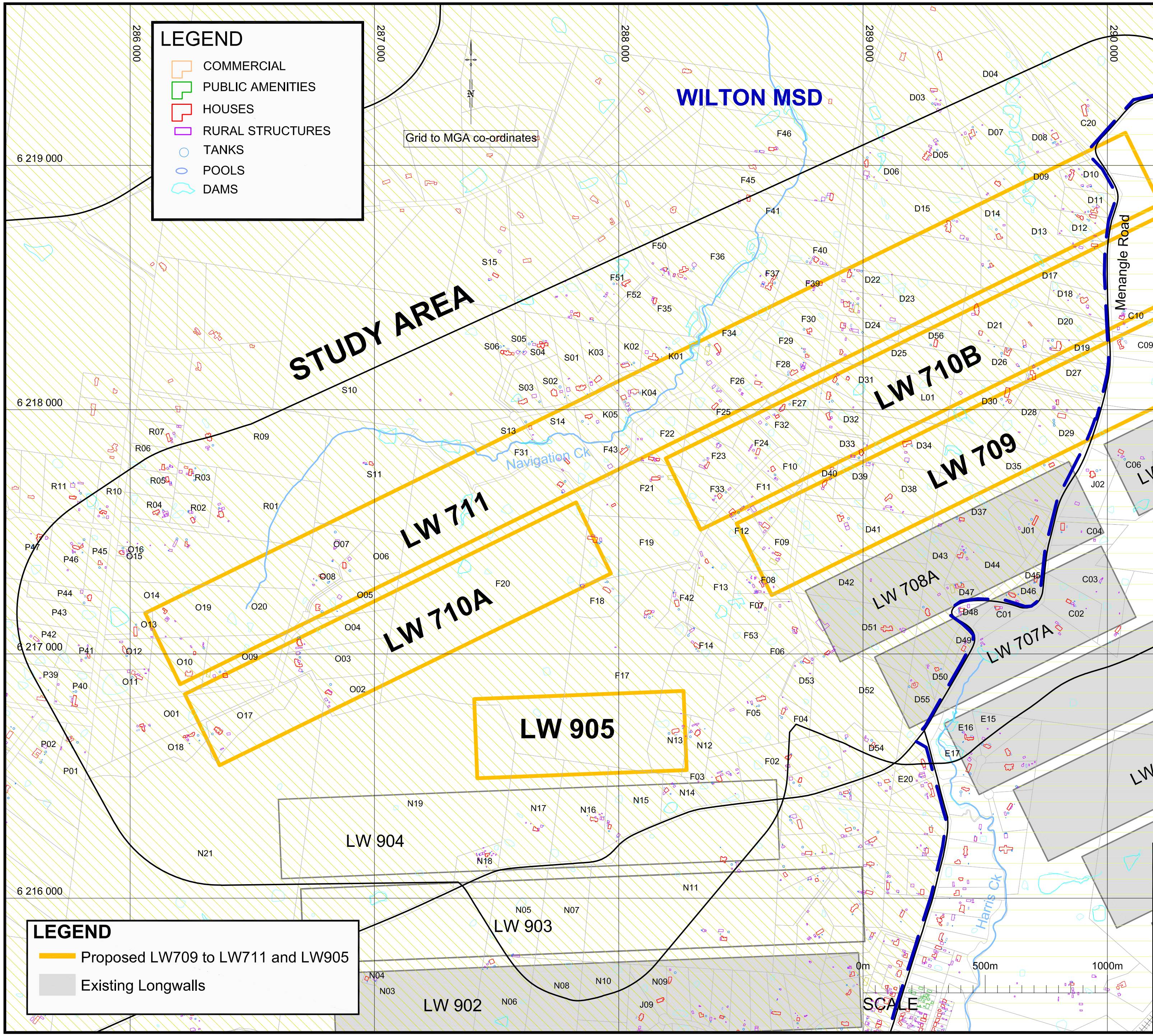

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APPIN COLLIERY
LW709 TO LW711 & LW905
BUILDING STRUCTURES

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-13	A

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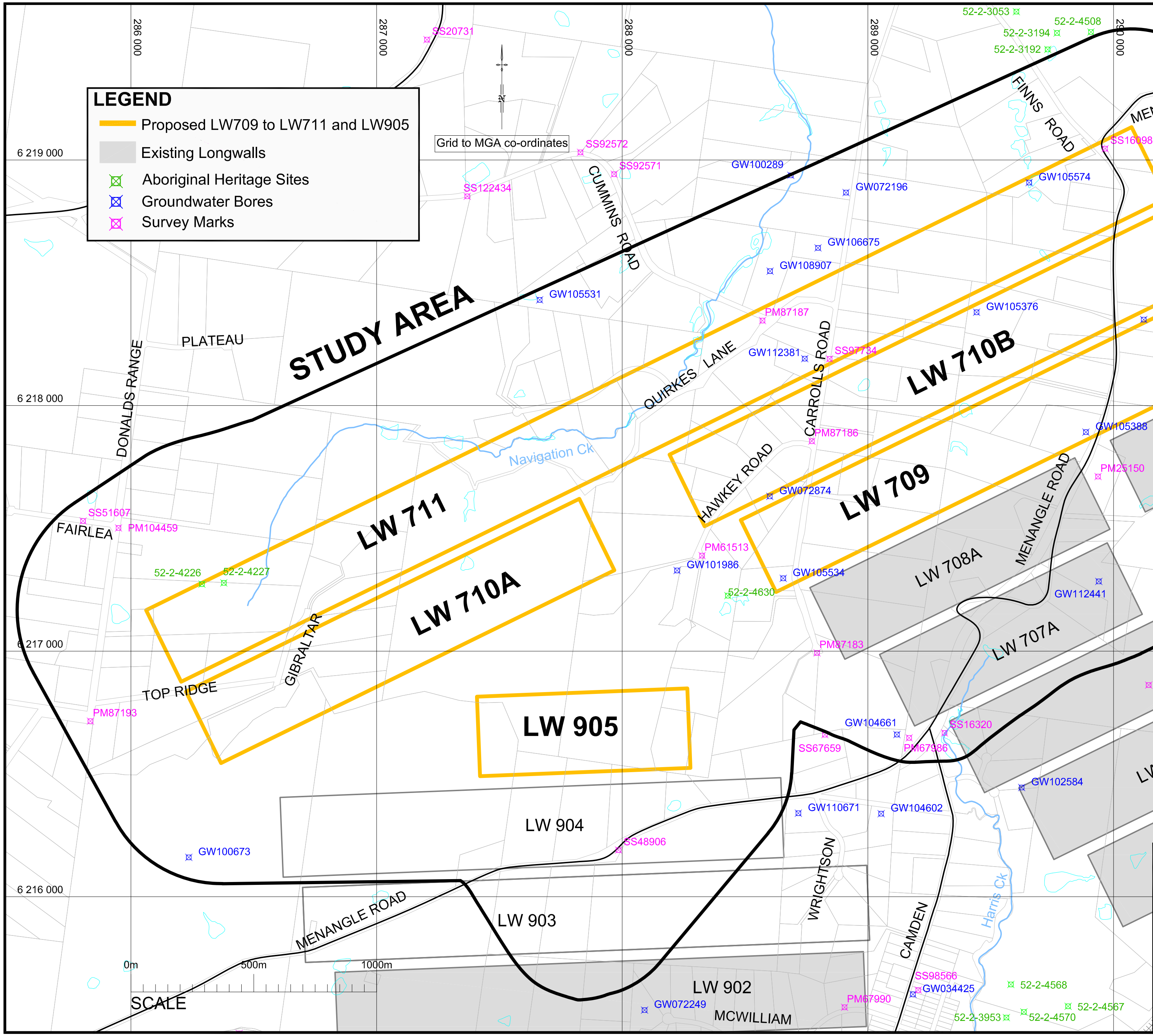

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ILLAWARRA METALLURGICAL COAL

APPIN COLLIERY
LW709 TO LW711 & LW905
OTHER BUILT FEATURES

DATE:	SCALE:	DRAWING No:	Rev No
18 May 2021	as shown	MSEC1117-14	B

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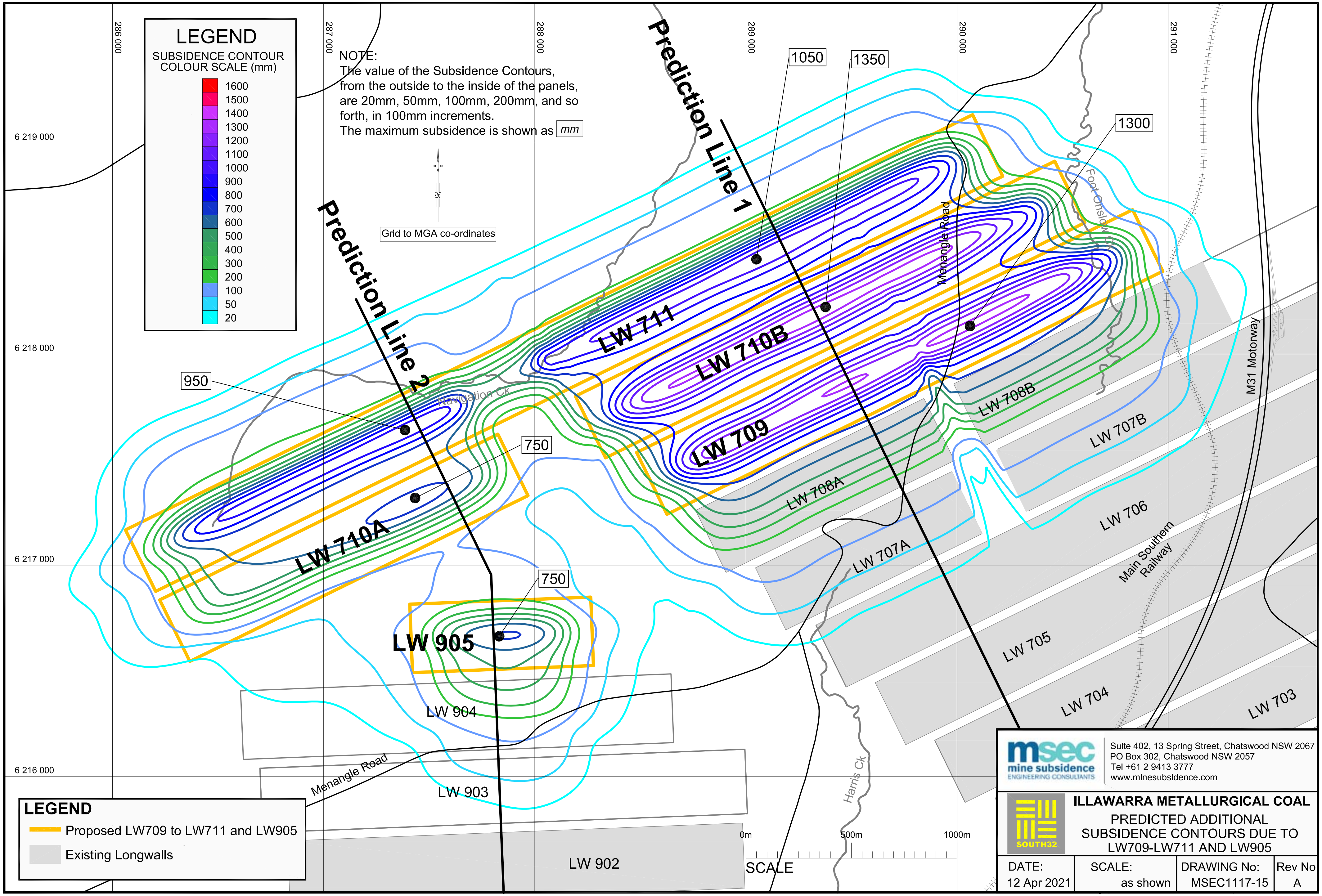

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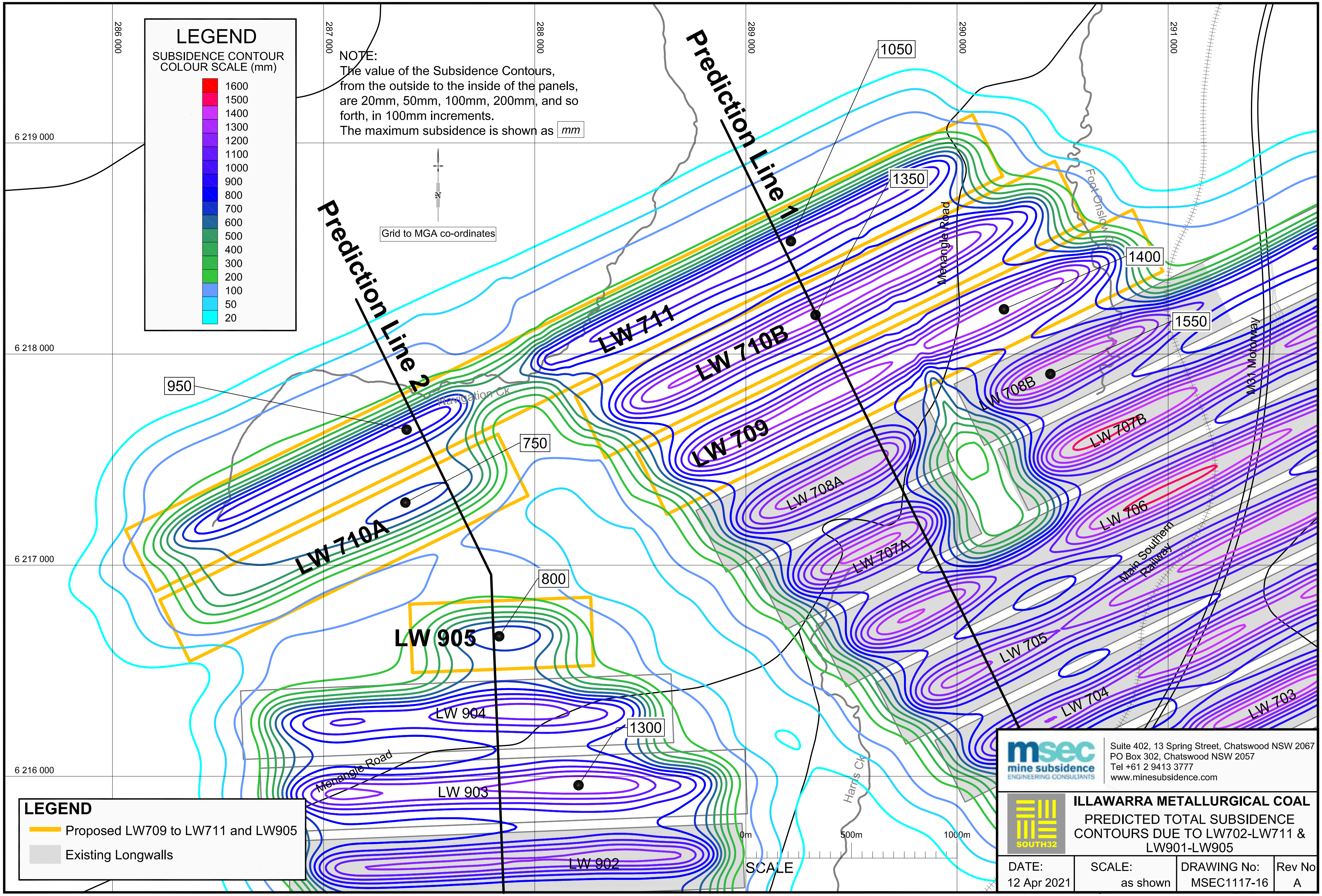

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PREDICTED TOTAL SUBSIDENCE CONTOURS DUE TO LW702-LW711 & LW901-LW905

DATE:	SCALE:	DRAWING No:	Rev No
12 Apr 2021	as shown	MSEC1117-16	A