

APPENDIX A. GLOSSARY OF TERMS AND DEFINITIONS

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 <i>millimetres (mm)</i> , 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 $1/\text{kilometres (km}^{-1}\text{)}$, but the value of curvature can be inverted, if required, to obtain the radius of curvature, which is usually expressed in <i>kilometres (km)</i> . 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.

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.
Subcritical 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 <i>millimetres (mm)</i>. 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.
Subsidence effects	The deformations of the ground mass surrounding a mine, sometimes referred to as 'components' or 'parameters' of mine subsidence induced ground movements, including vertical and horizontal displacements, tilts, curvatures, strains, upsidence and closure.
Subsidence impacts	The physical changes or damage to the fabric or structure of the ground, its surface and natural features, or built structures that are caused by the subsidence effects. These impacts considerations can include tensile and shear cracking of the rock mass, localised buckling of strata, bed separation, rock falls, collapse of overhangs, failure of pillars, failure of pillar floors, dilation, slumping and also include subsidence depressions or troughs.
Subsidence consequences	The knock-on results of subsidence impacts, i.e. any change in the amenity or function of a natural feature or built structure that arises from subsidence impacts. Consequence considerations include public safety, loss of flows, reduction in water quality, damage to artwork, flooding, draining of aquifers, the environment, community, land use, loss of profits, surface improvements and infrastructure. Consequences related to natural features are referred to as environmental consequences.
Supercritical 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 <i>millimetres per metre (mm/m)</i> . 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 term uplift is used for the cases where the ground level is raised above the pre-mining level, i.e. when the upsidence is greater than the subsidence. The magnitude of upsidence, which is typically expressed in the units of <i>millimetres (mm)</i> , 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 B. REFERENCES

References

- DPE (2012). *Strategic Regional Land Use Plan – Upper Hunter*. The New South Wales Department of Planning and Environment, September 2012.
- Li et al. (2007). *A Case Study on Multi-seam Subsidence with Specific Reference to Longwall Mining under Existing Longwall Goaf*. Li, G., Steuart, P., Pâquet, R. Mine Subsidence Technological Society Seventh Triennial Conference. The University of Wollongong, November 2007. pp111 ~ 125.
- Li et al. (2010). *A Case Study on Mine Subsidence Due to Multi-Seam Longwall Extraction*. Li, G., Steuart, P., Paquet, R., Ramage, R. Proceedings of the second Australasian Institute of Mining and Metallurgy Conference on Australian Ground Control in Mining, Sydney 23 to 24 November 2010.
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- Stevenson, et al (1998). *Stratigraphy of the Hunter Coalfield*. Stevenson, D.K., Pratt, W., Beckett, J. Geotechnical Engineering and Engineering Geology in the Hunter Valley, pp 13-37.
- Waddington and Kay (1998). *Development of the Incremental Profile Method of Predicting Subsidence and its Application in the Newcastle Coalfield*. Mine Subsidence Technological Society, Fourth Triennial Conference on Buildings and Structures Subject to Ground Movement. Newcastle, July, 1998
- 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.

APPENDIX C. FIGURES

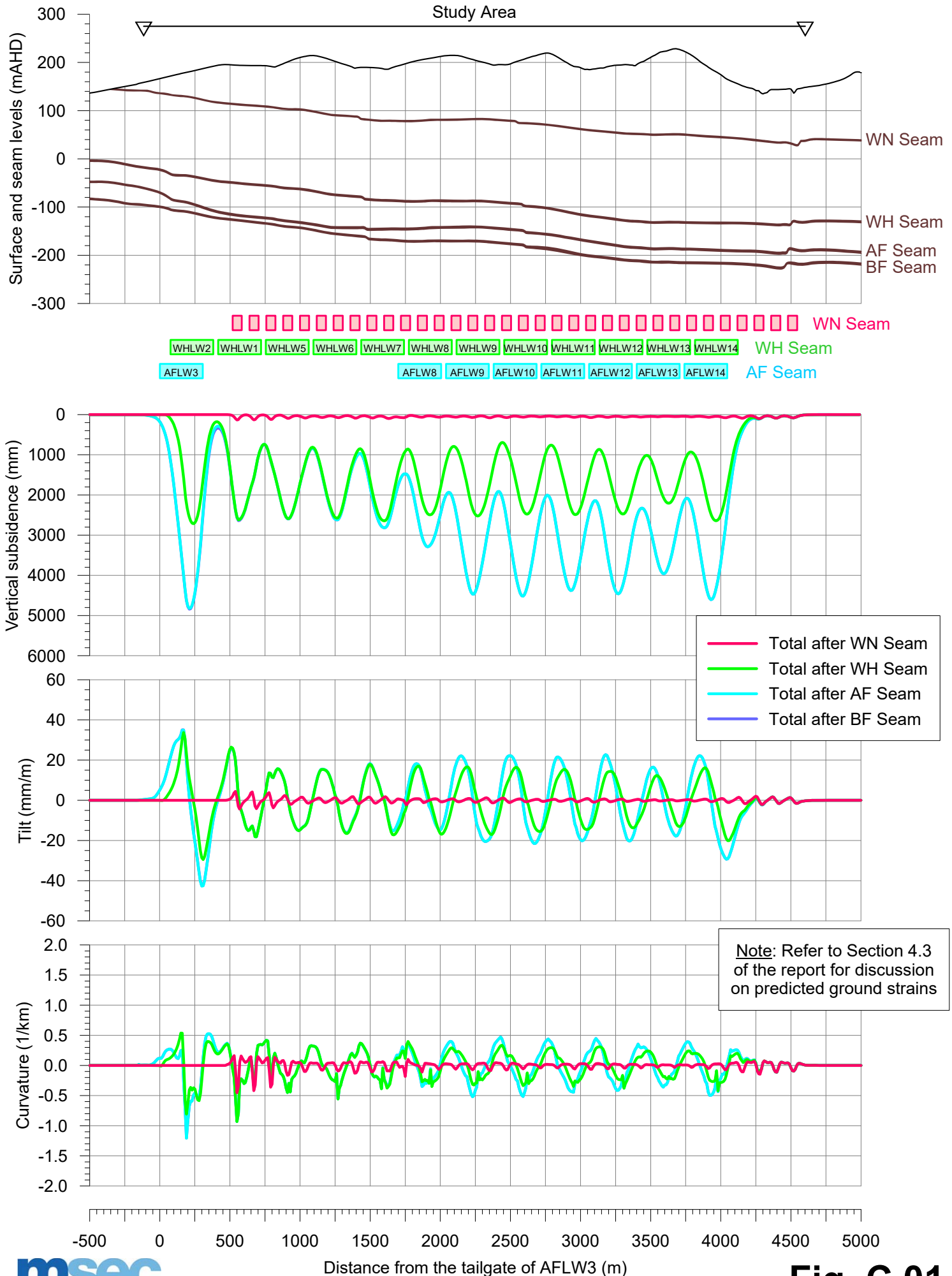
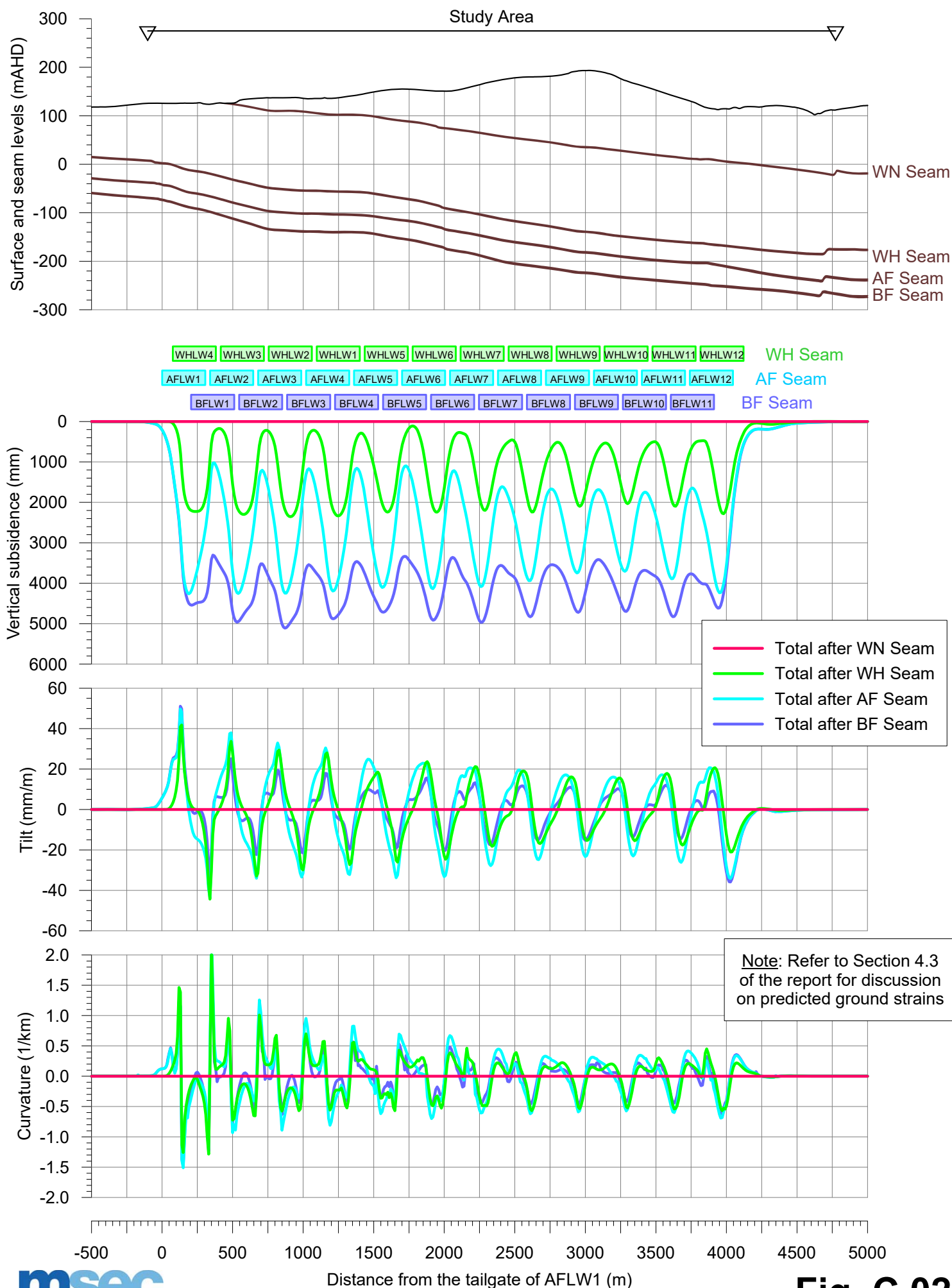
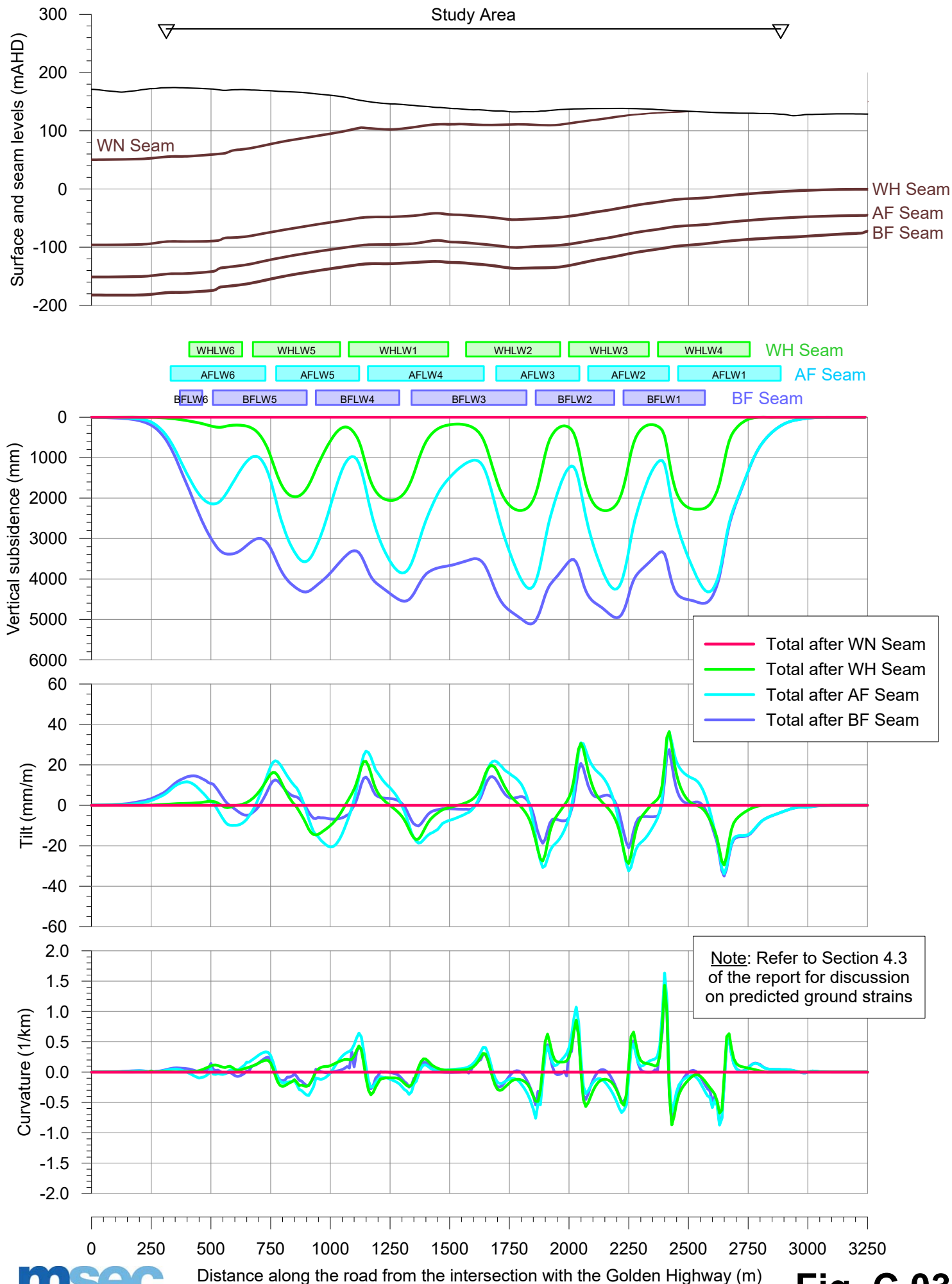


Fig. C.01

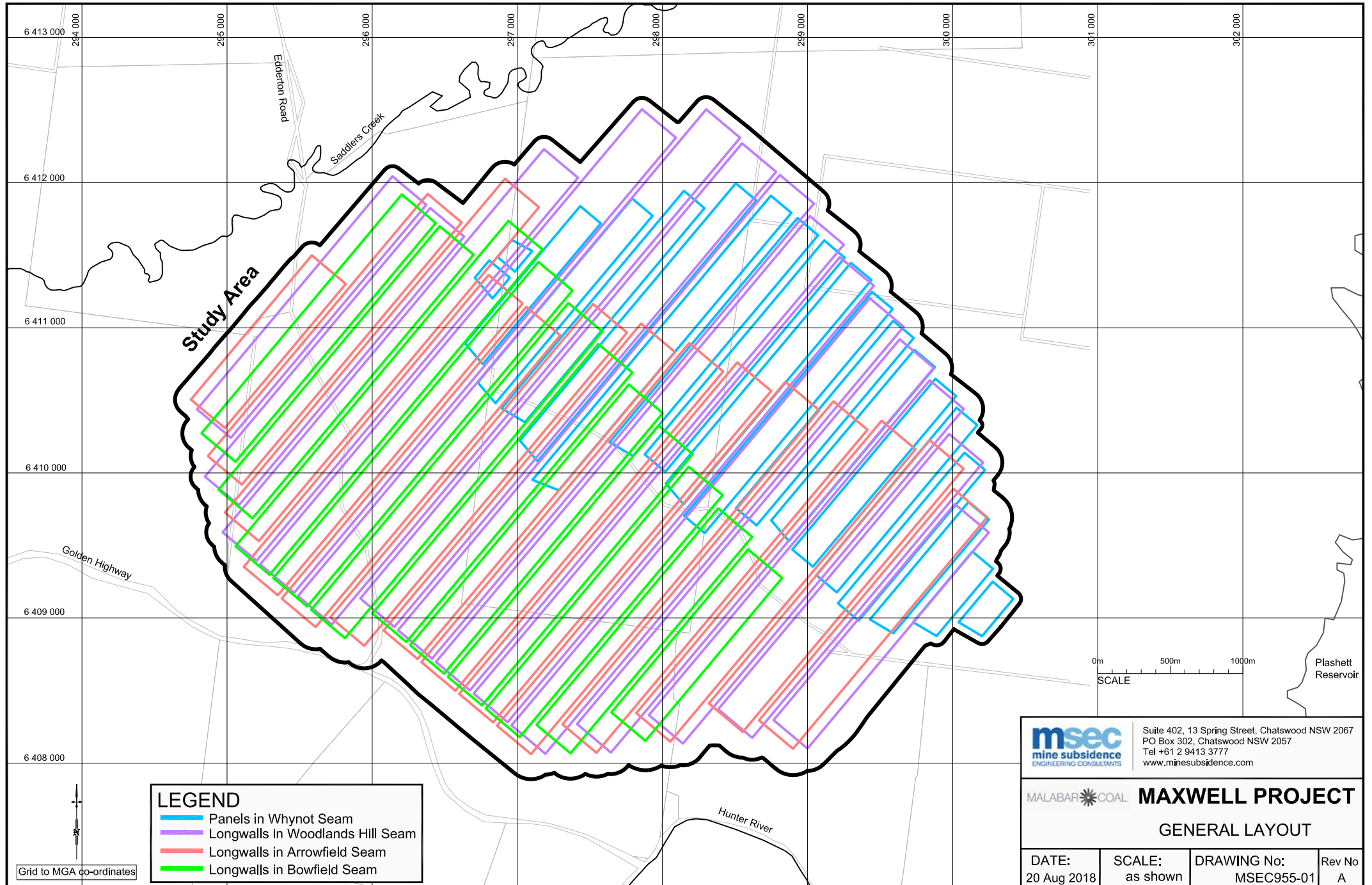
Predicted profiles of vertical subsidence, tilt and curvature along Prediction Line 2 due to the extraction of the WN, WH, AF and BF Seams



Predicted profiles of vertical subsidence, tilt and curvature along Edderton Road due to the extraction of the WN, WH, AF and BF Seams



APPENDIX D. DRAWINGS

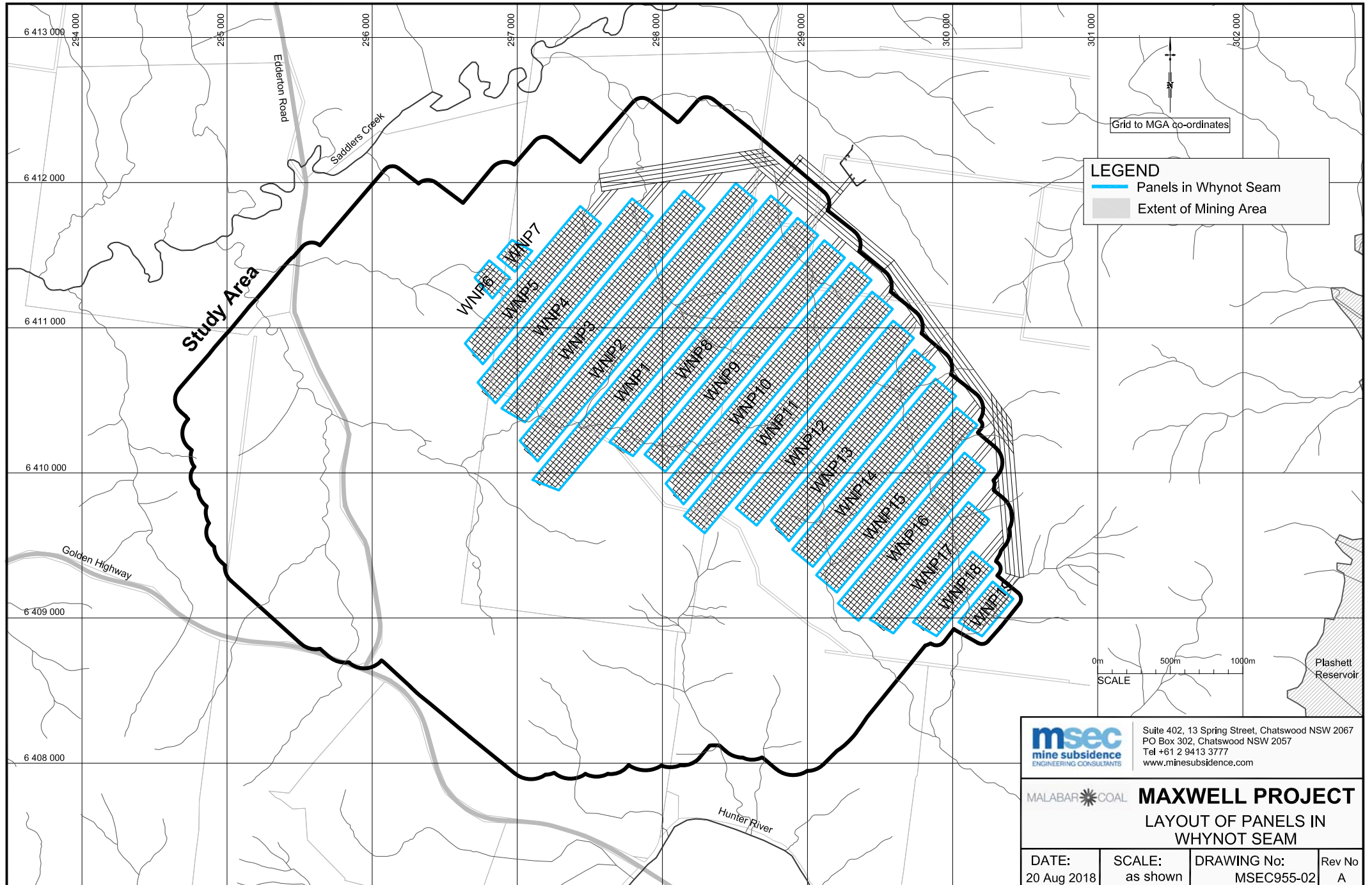


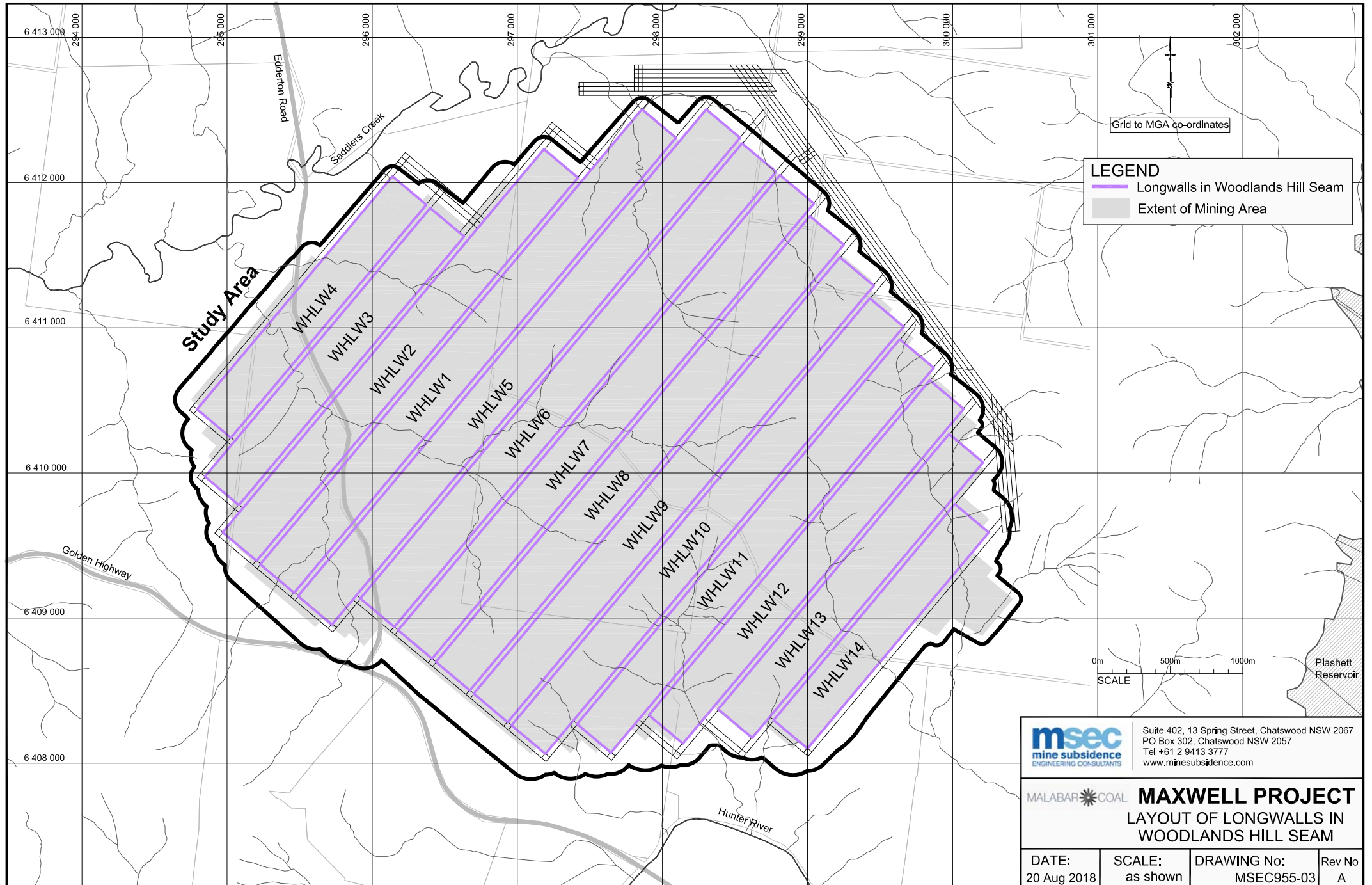
LEGEND

- Panels in Whynot Seam
- Longwalls in Woodlands Hill Seam
- Longwalls in Arrowfield Seam
- Longwalls in Bowfield Seam

Grid to MGA co-ordinates

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		MAXWELL PROJECT GENERAL LAYOUT	
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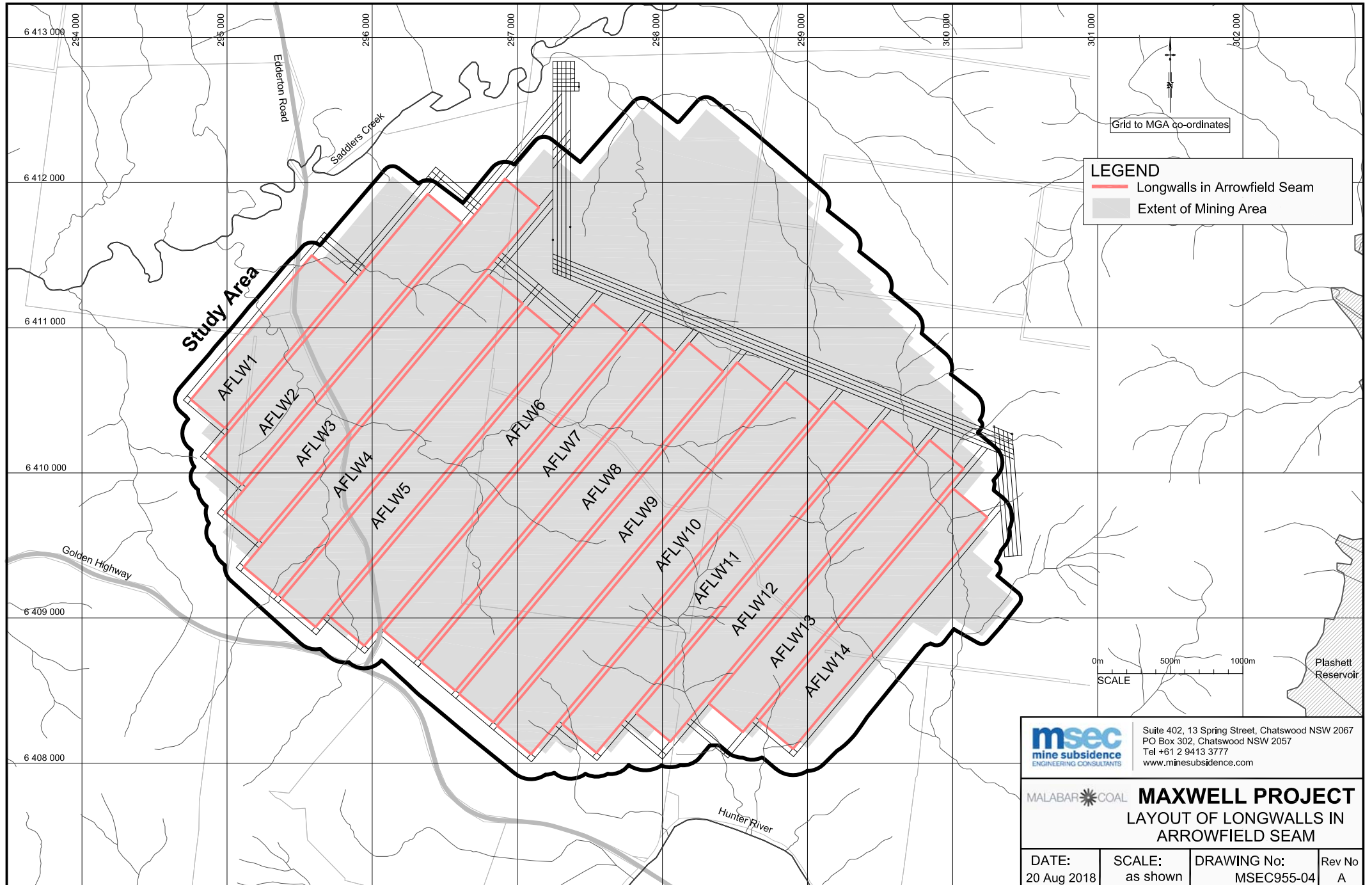
MAXWELL PROJECT
LAYOUT OF LONGWALLS IN
WOODLANDS HILL SEAM

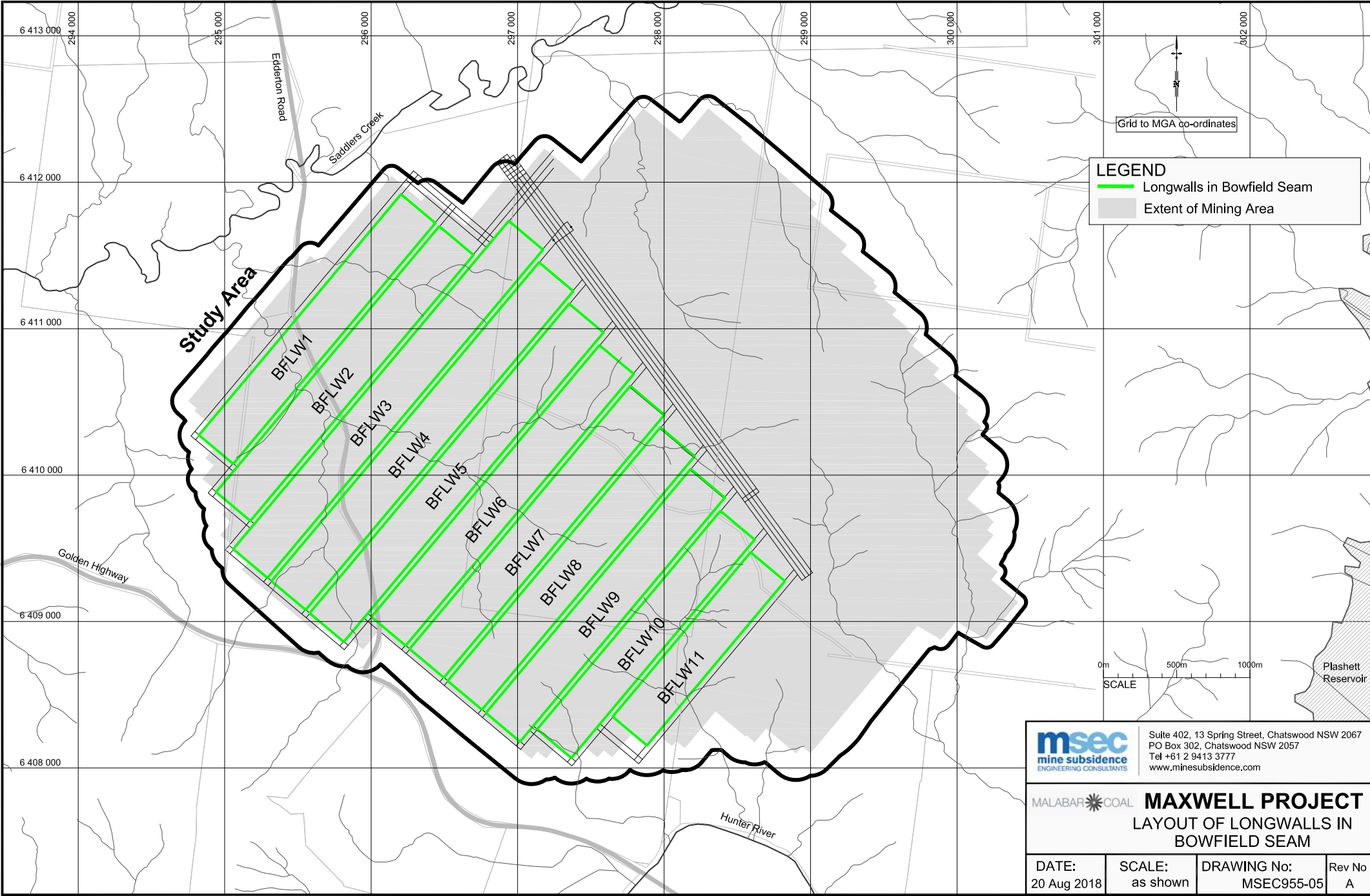
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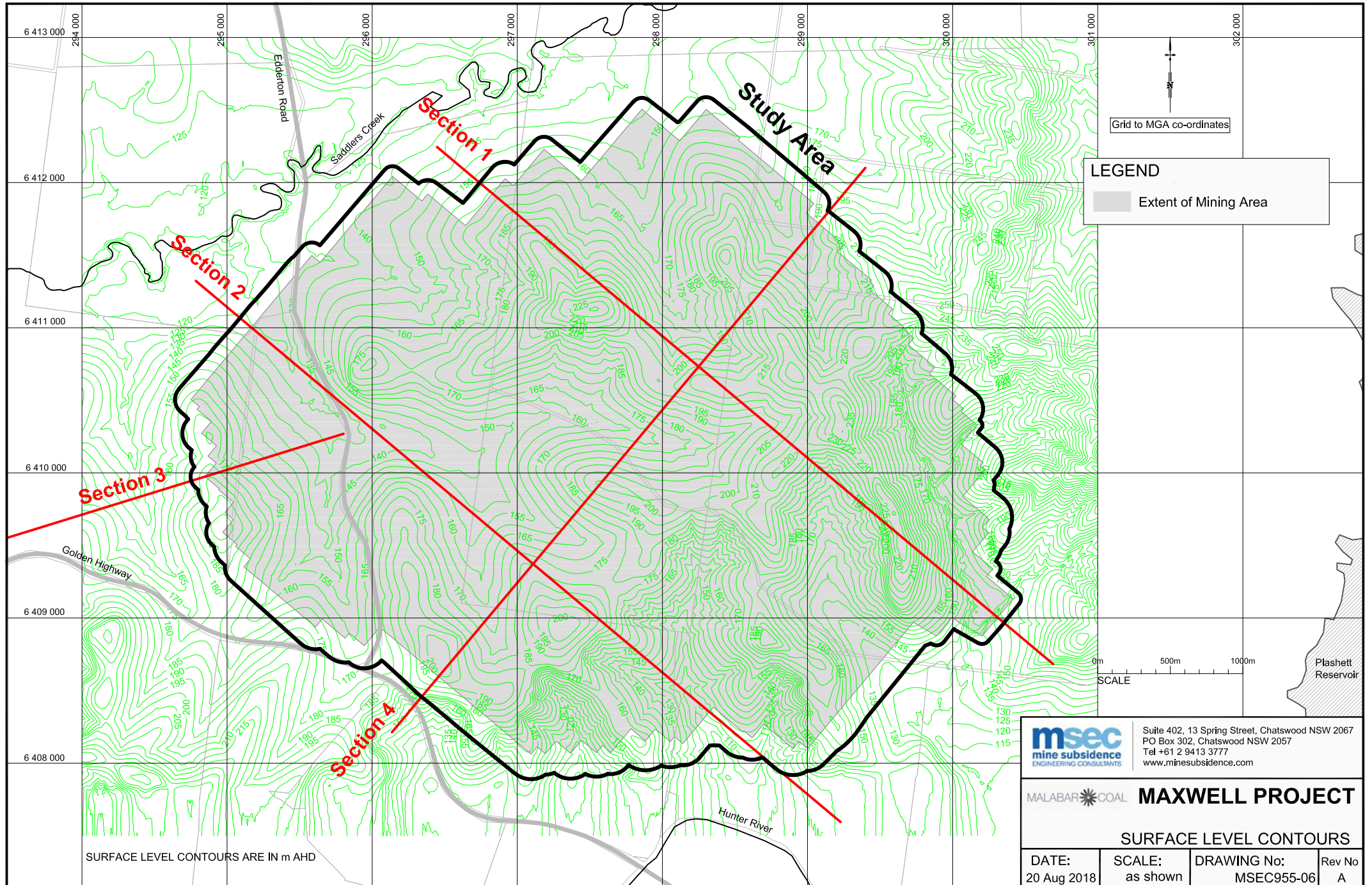
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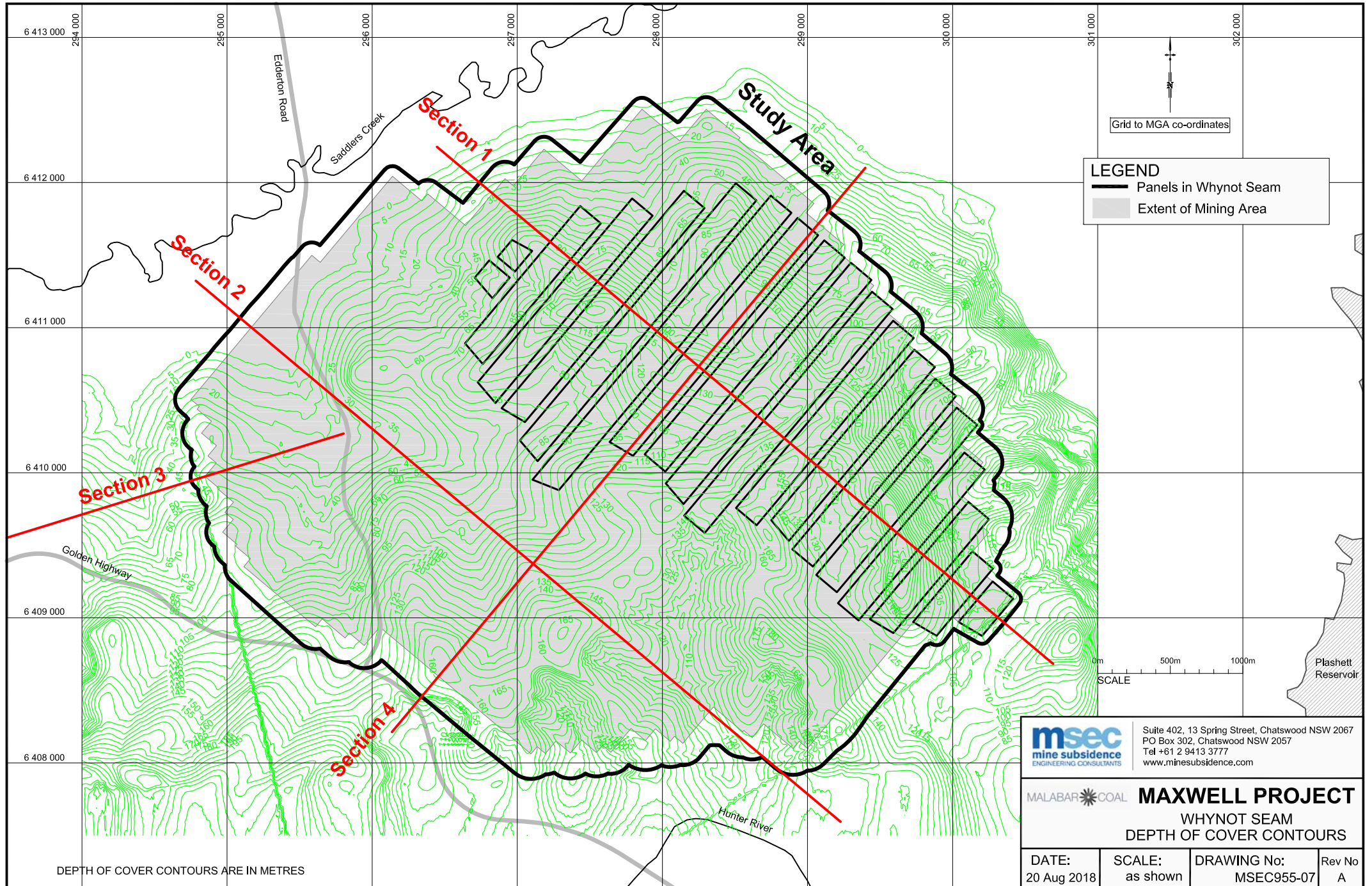
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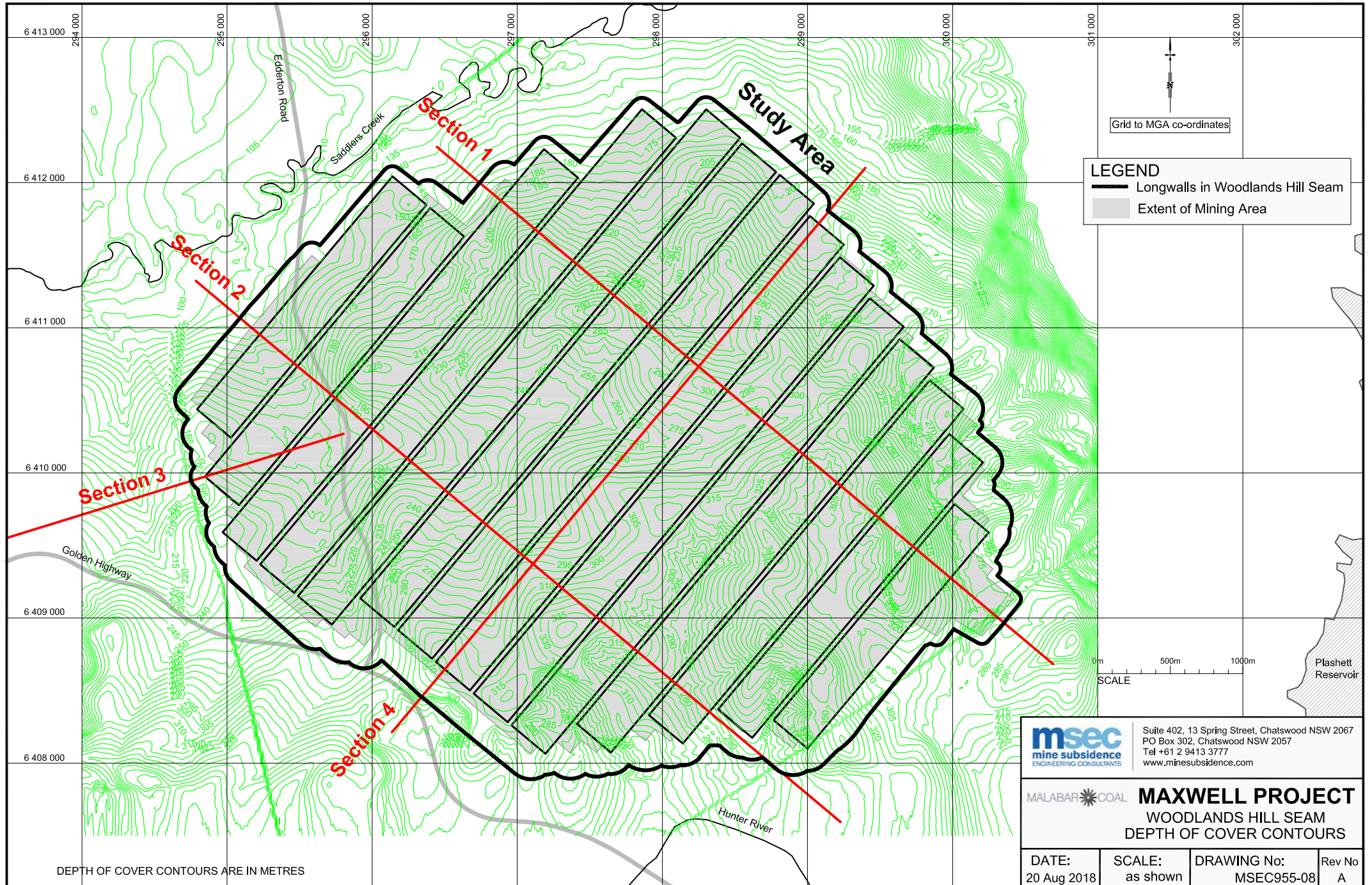
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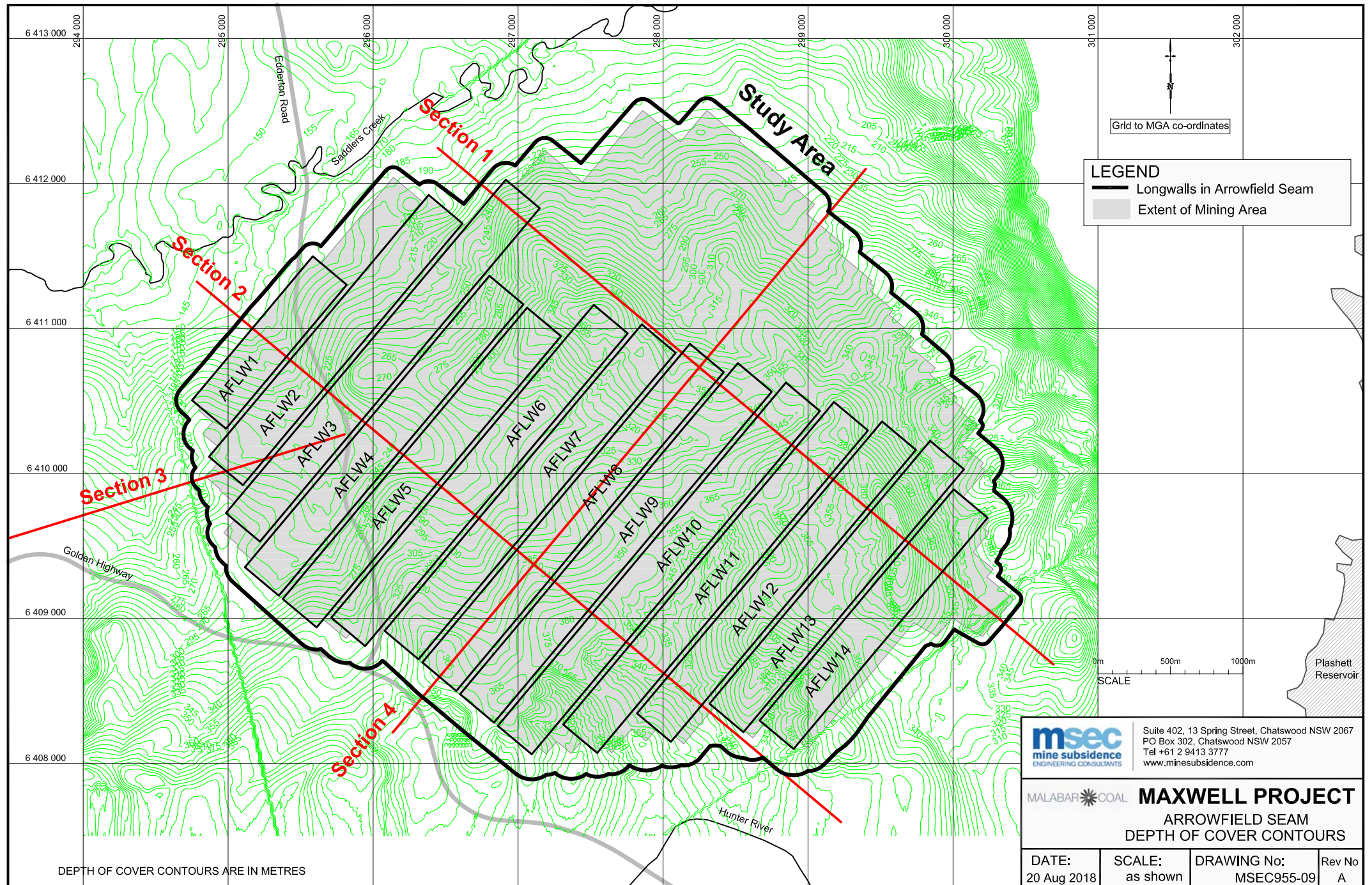












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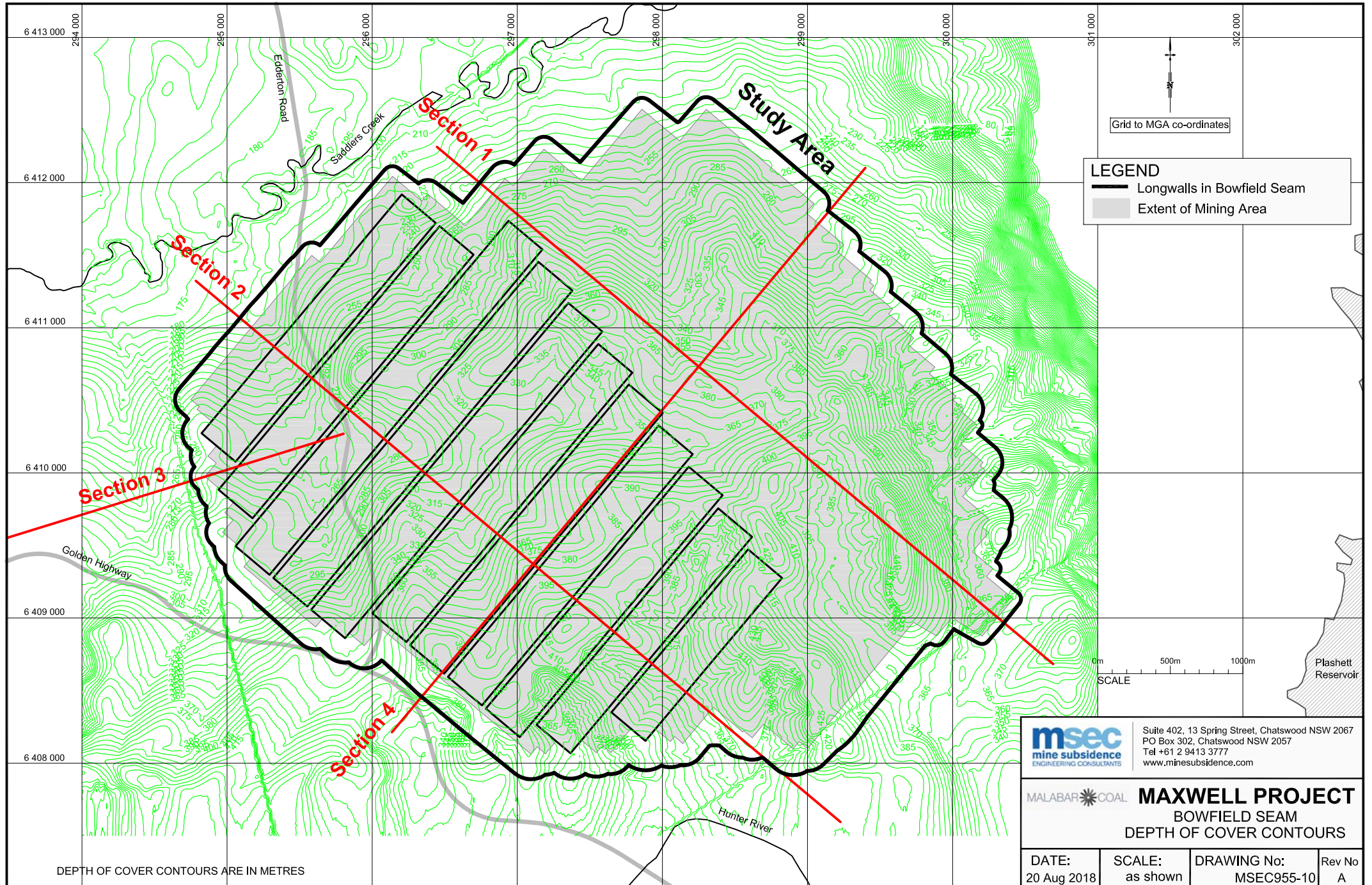
ARROWFIELD SEAM
DEPTH OF COVER CONTOURS

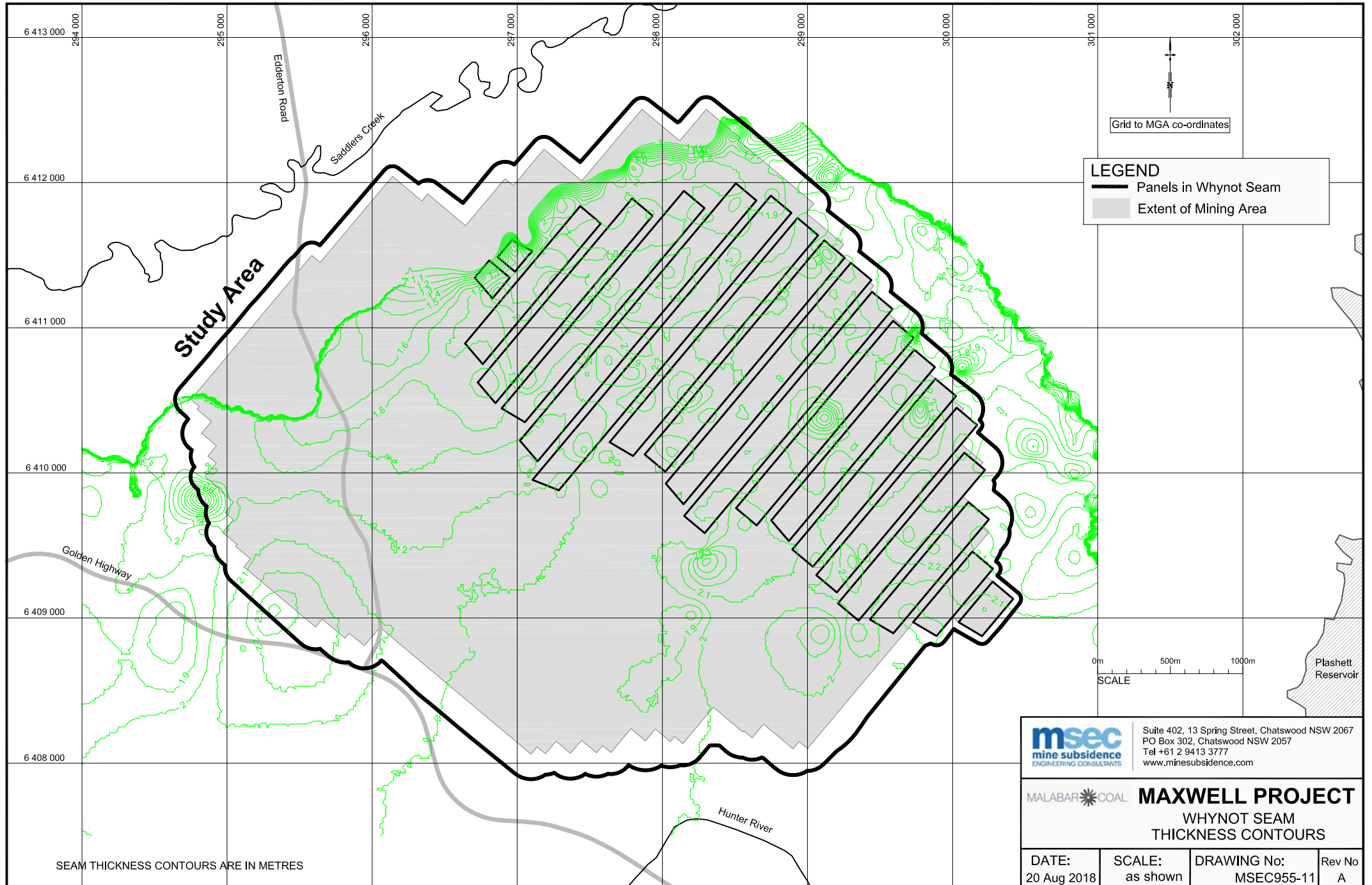
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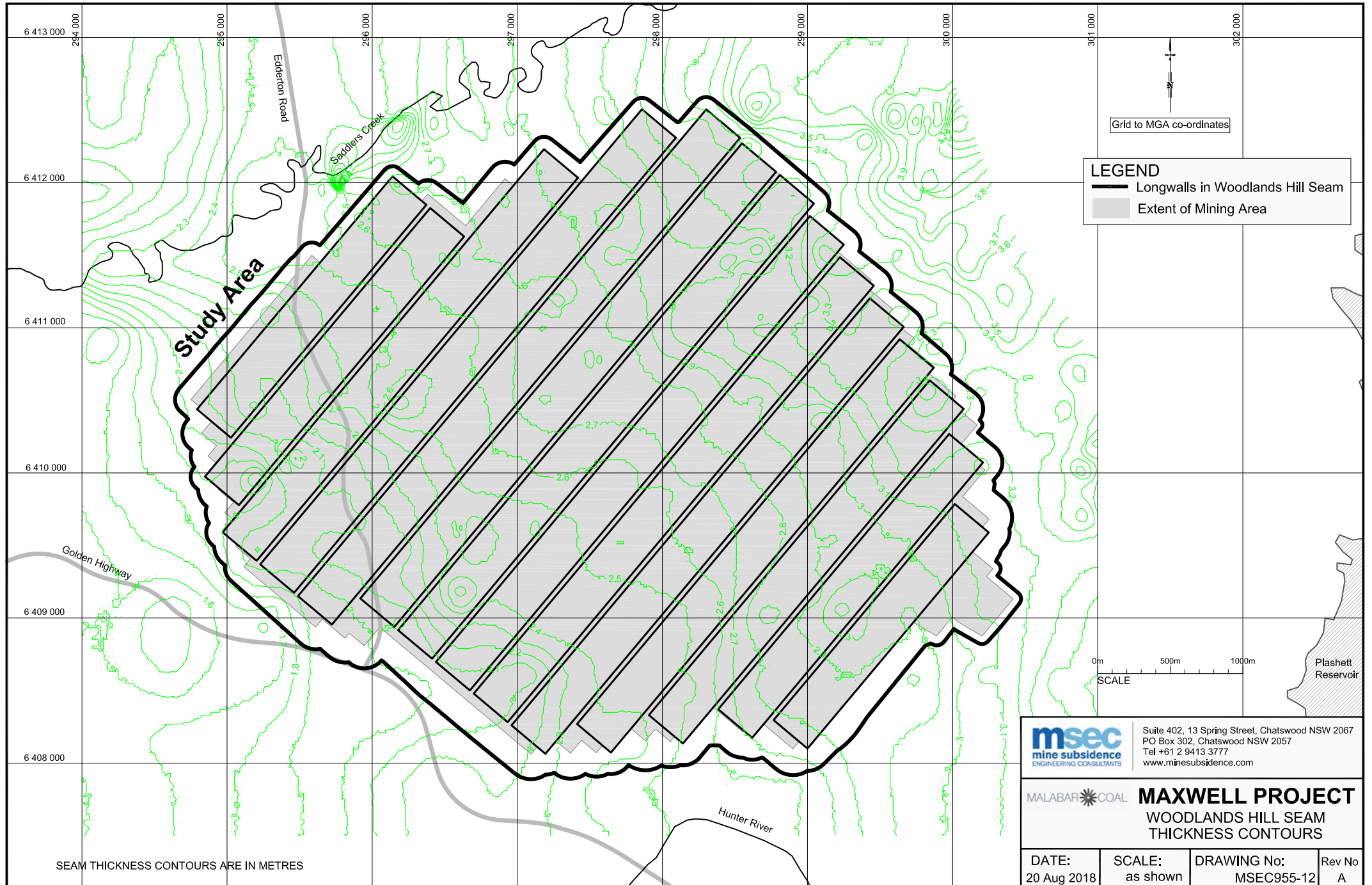
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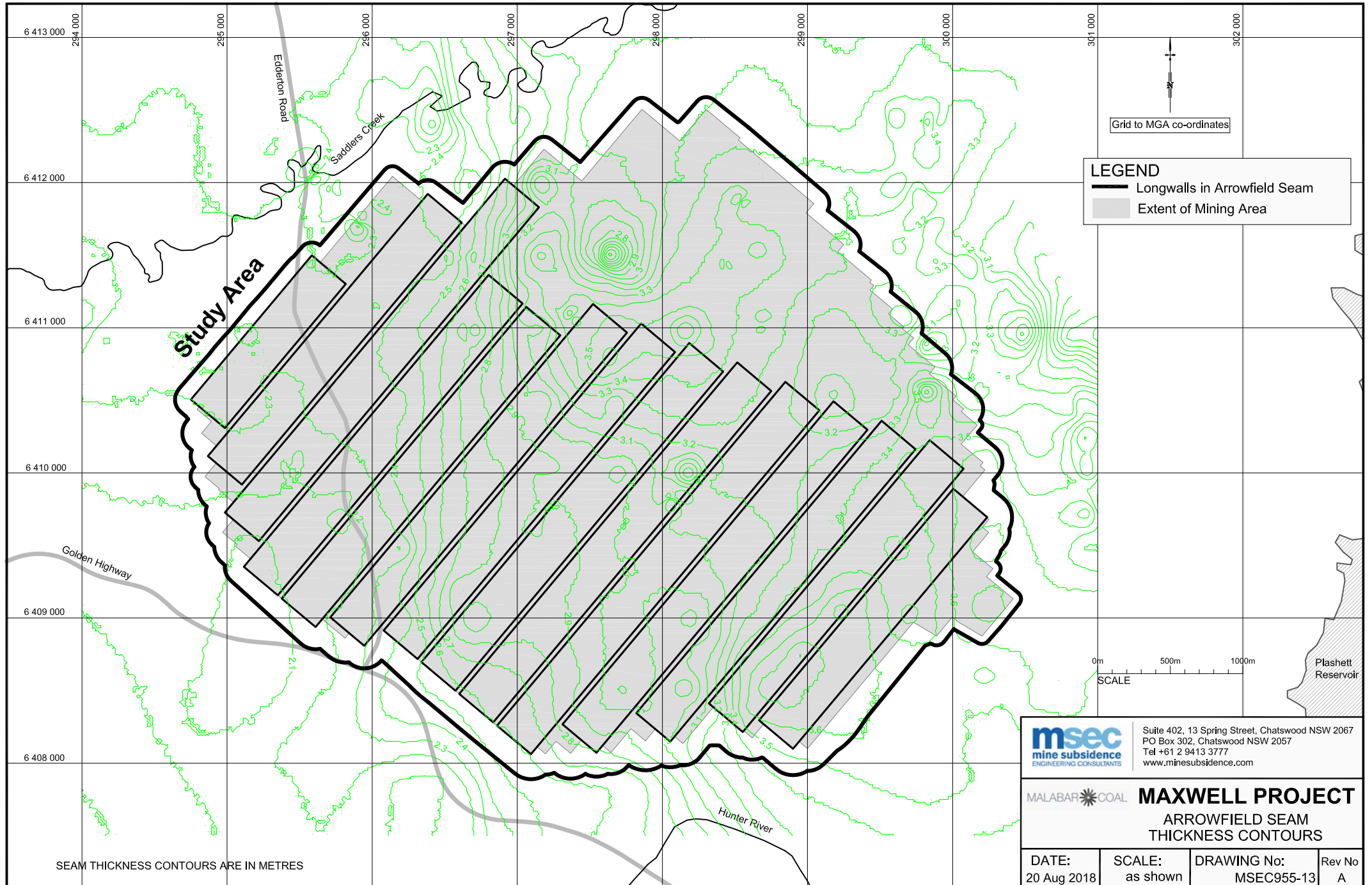
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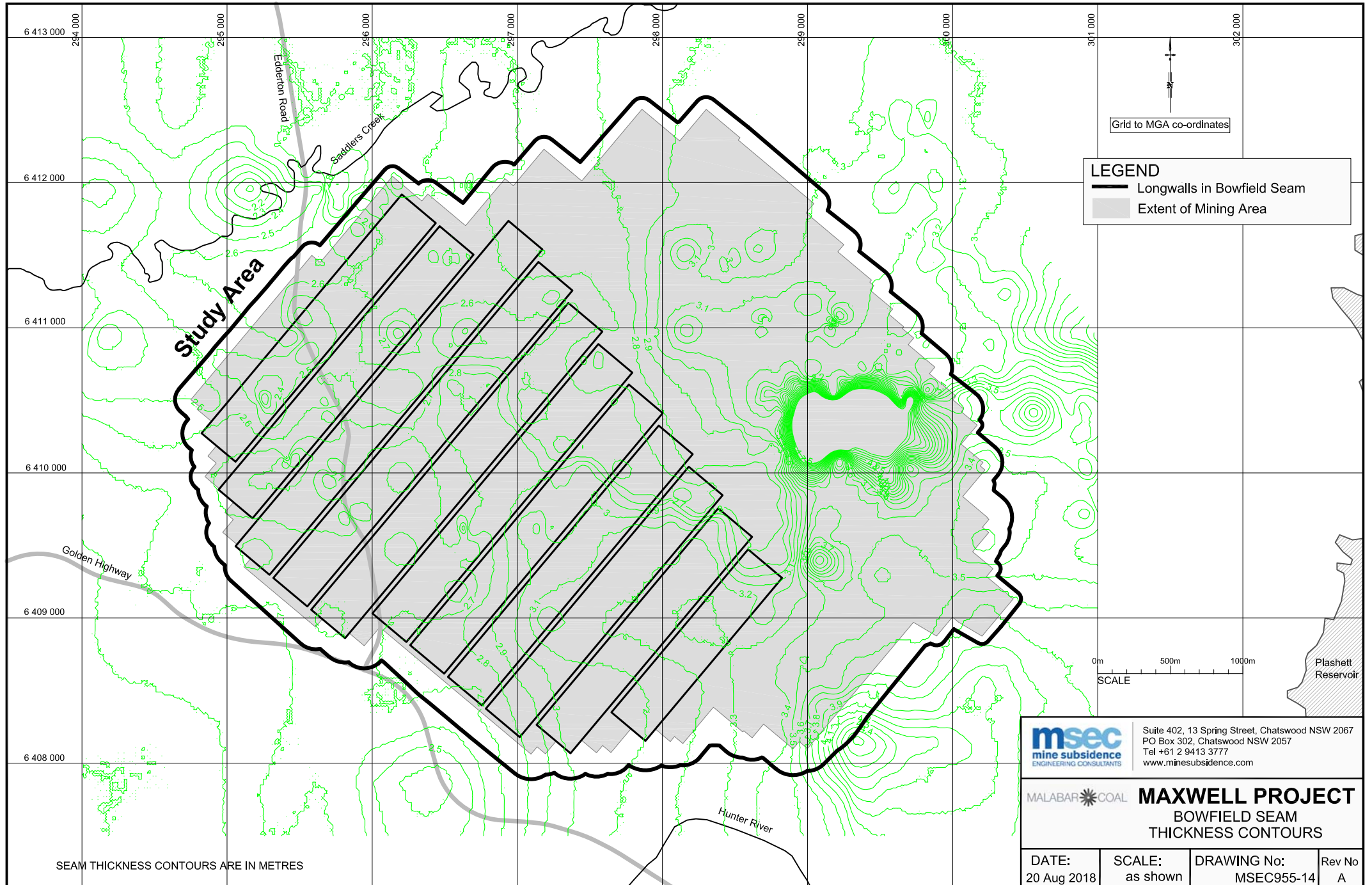
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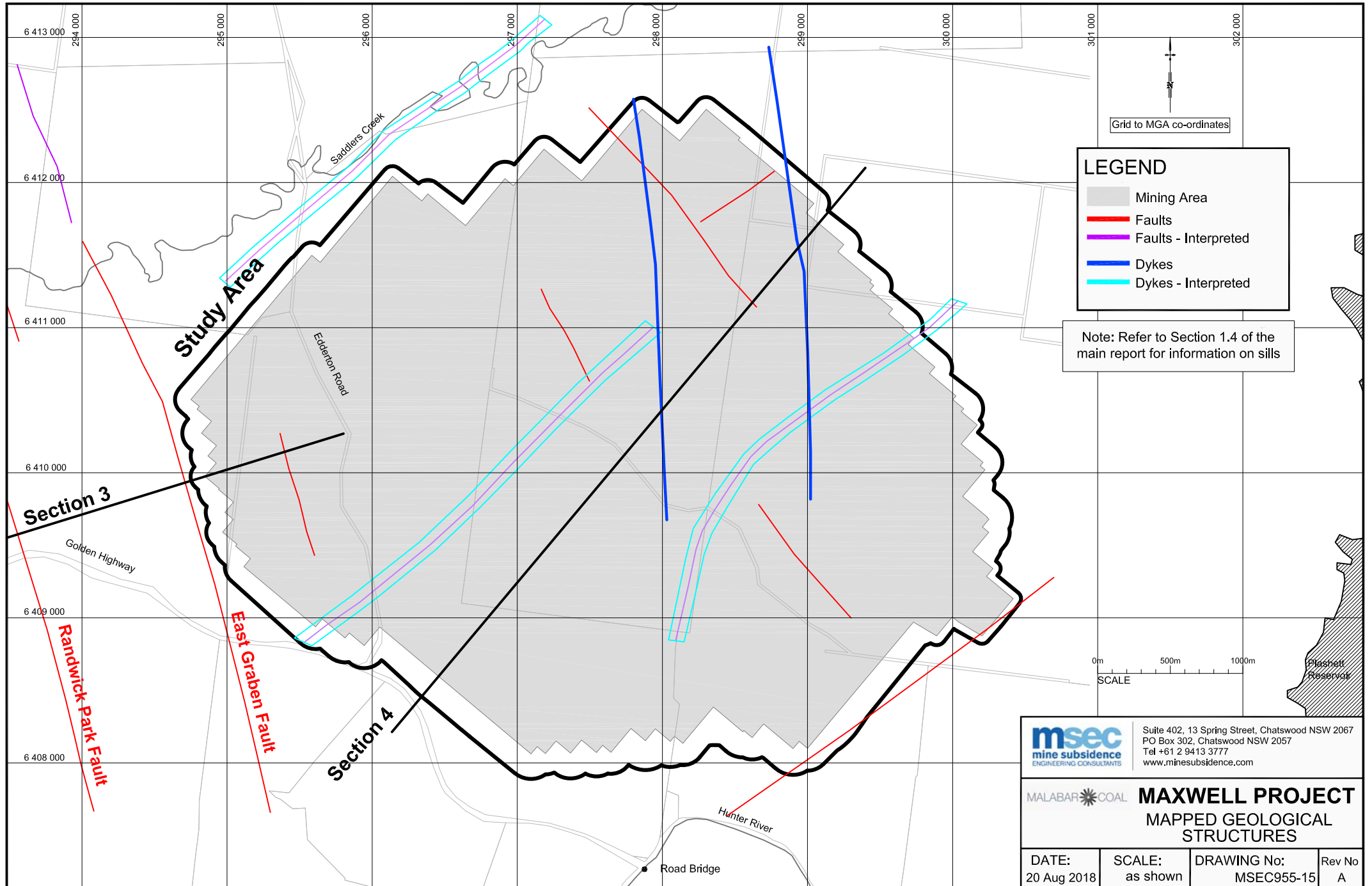
- Longwalls in Arrowfield Seam
- Extent of Mining Area

0m 500m 1000m
SCALE

Plashett Reservoir

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LEGEND

- Mining Area
- Faults
- Faults - Interpreted
- Dykes
- Dykes - Interpreted

Note: Refer to Section 1.4 of the main report for information on sills

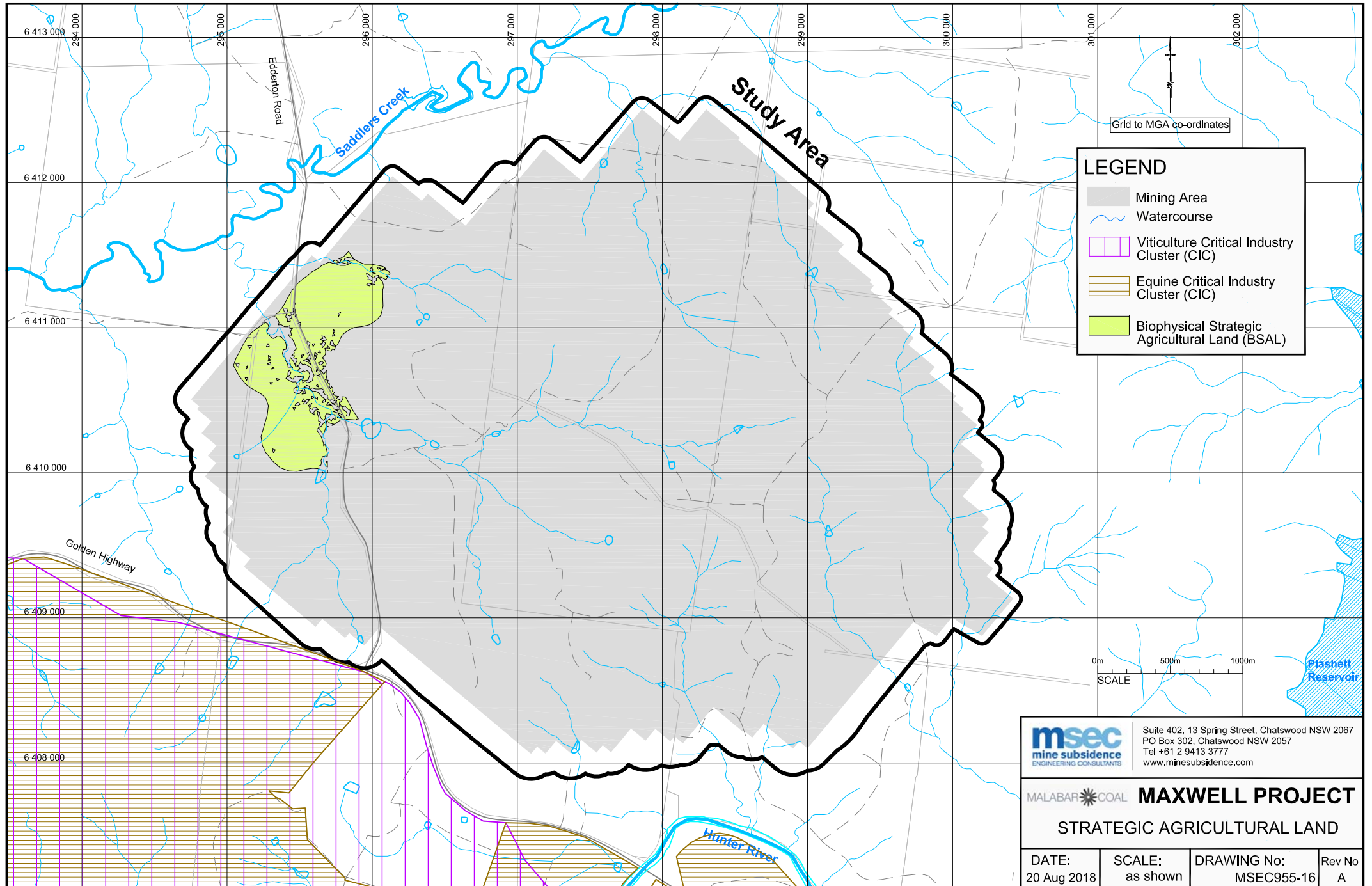


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MAXWELL PROJECT MAPPED GEOLOGICAL STRUCTURES

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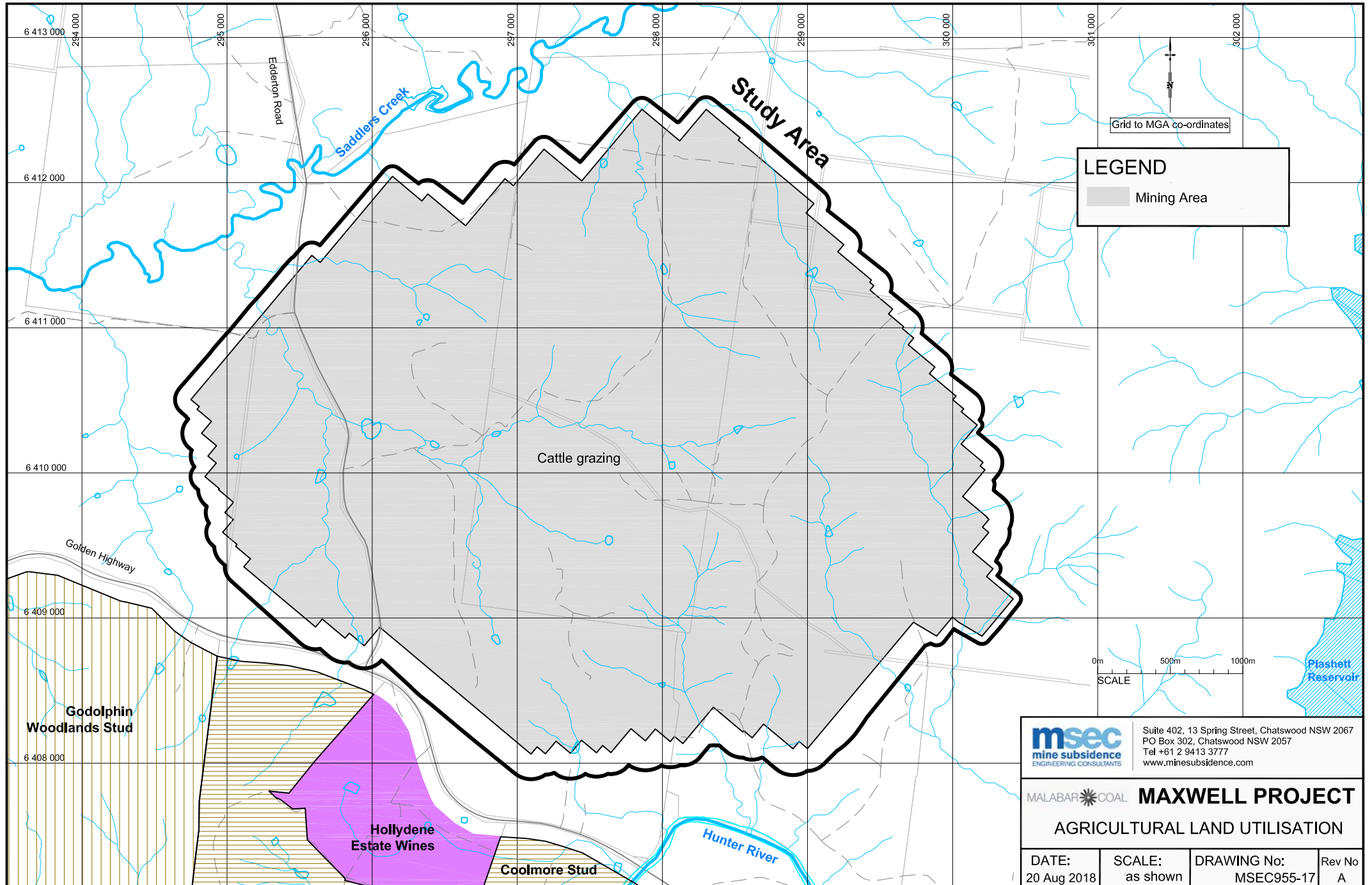
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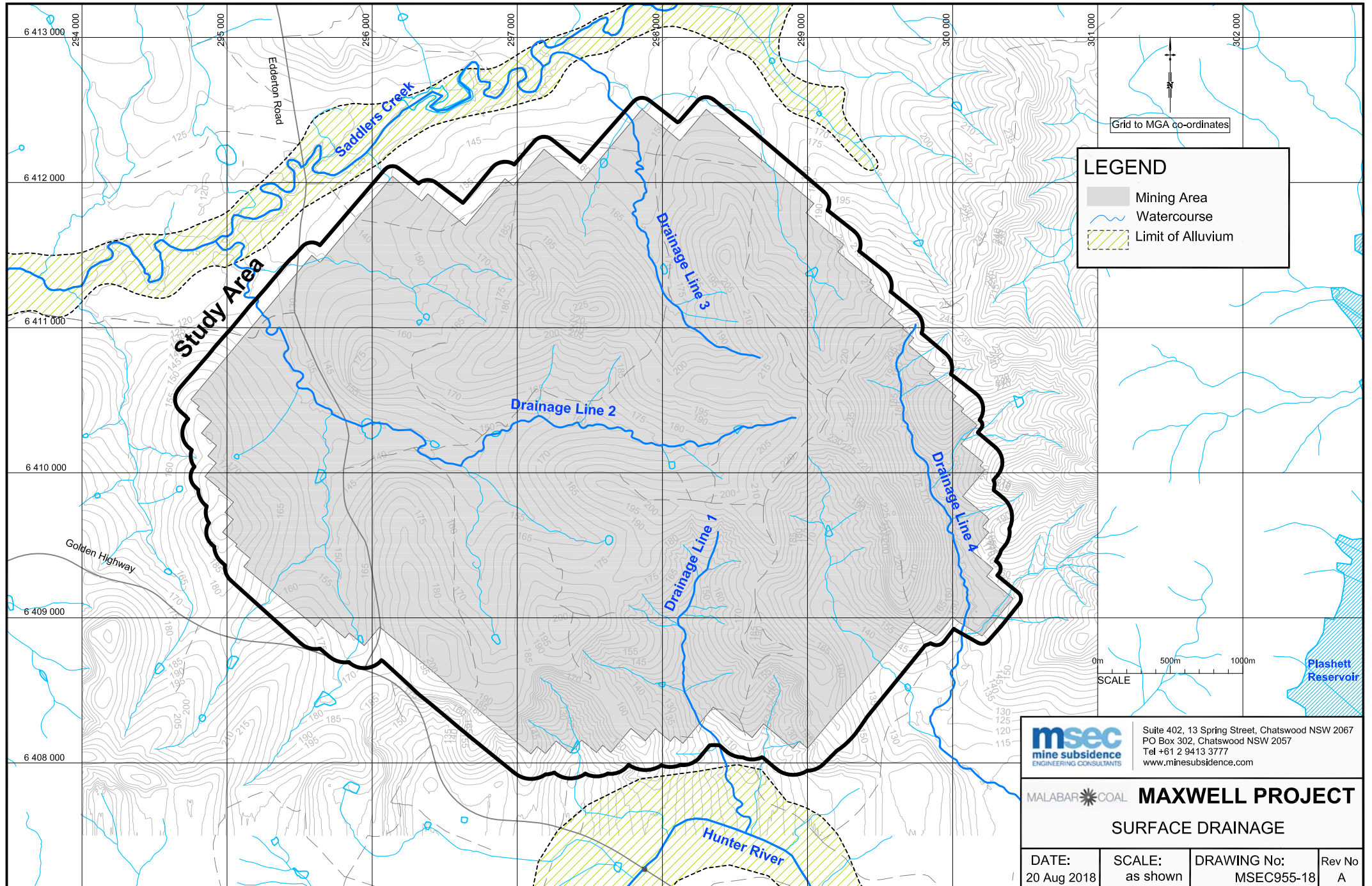
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