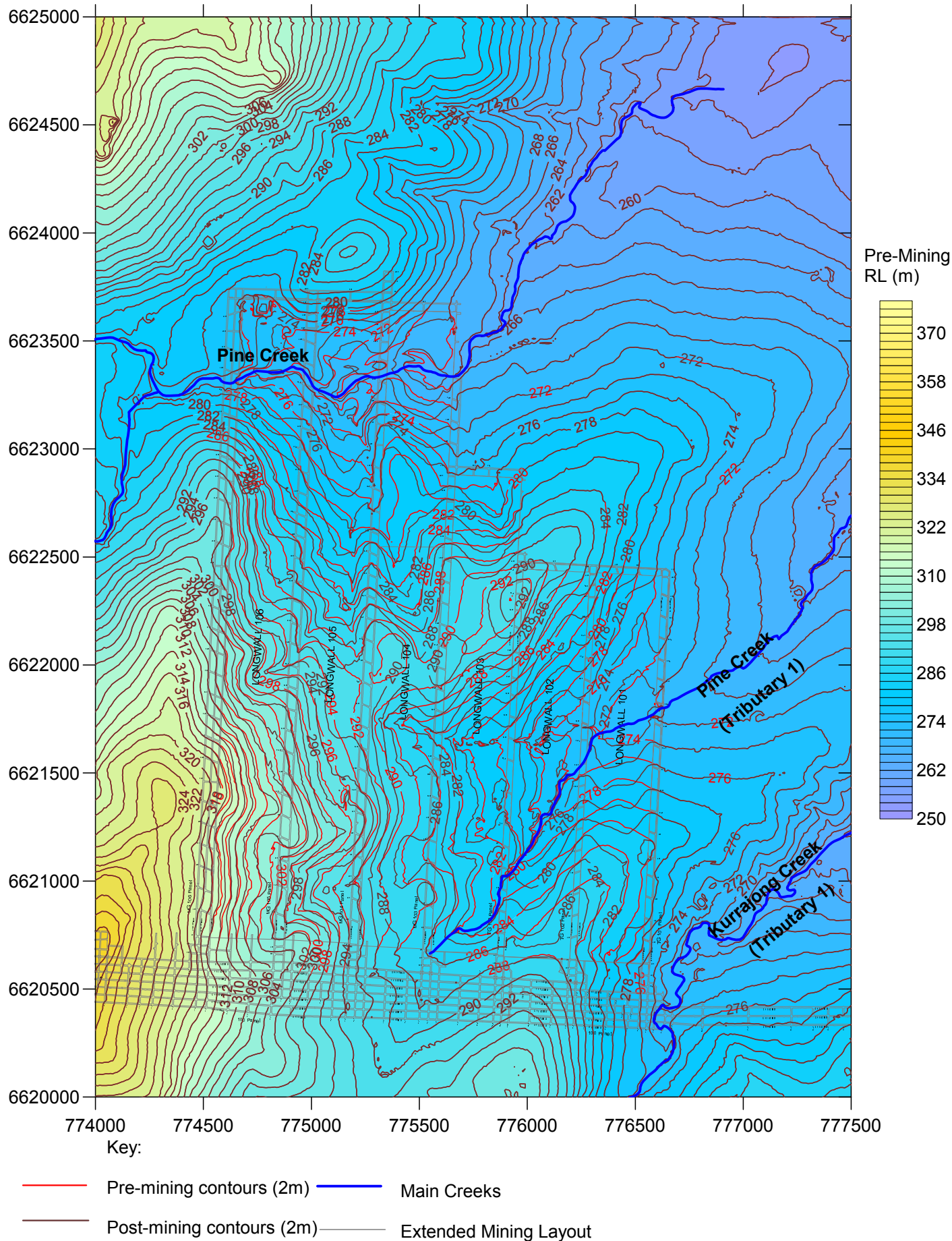




DgS

Engineer: S.Ditton

Drawn: S.Ditton

Date: 01.05.15

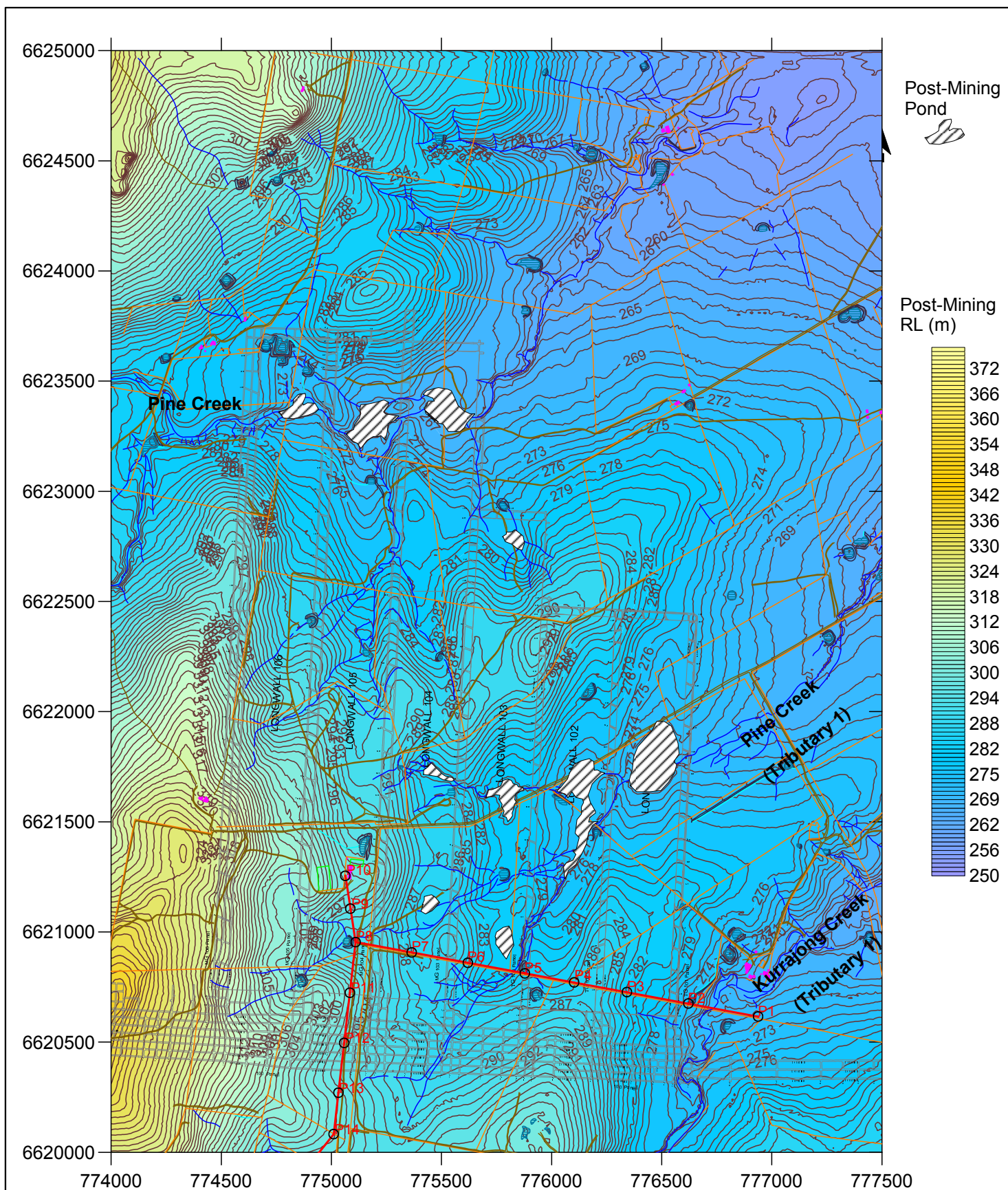
**Ditton Geotechnical
Services Pty Ltd**

Client: **Narrabri Coal Mine (Stage 2)**
NAR-002/2

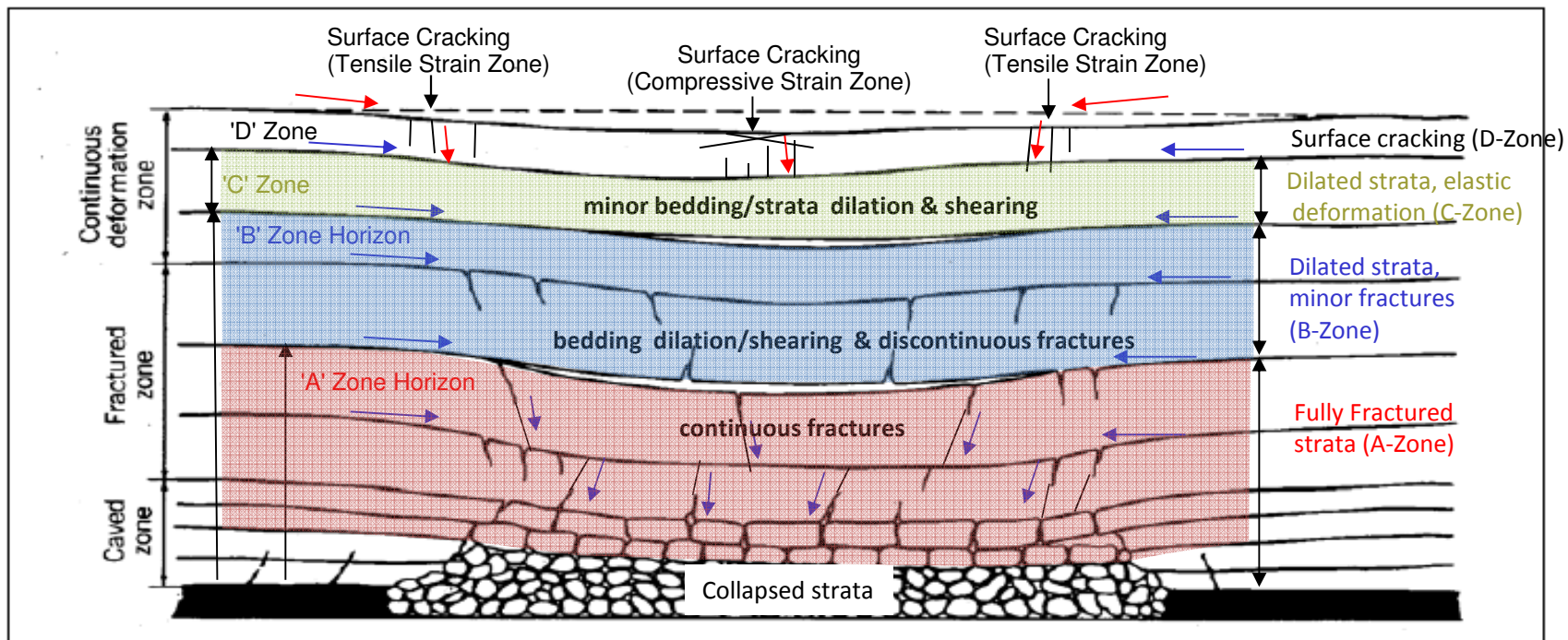
Title: **Pre-mining and Predicted Post-Mining Surface Level Contours
above Longwalls 101-106 with Natural Surface Features**

Scale: 1:25,000

Figure No: 13a



 DgS	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)		
	Drawn:	S.Ditton		NAR-002/2		
	Date:	01.05.15	Title:	Predicted Post-Mining Surface Level Contours above Longwalls 101-106 with Built Surface Features		
	Ditton Geotechnical Services Pty Ltd			Scale:	1:25,000	Figure No:



Zones in the Overburden According to Peng and Chiang (1984)

Key

'A' Horizon - Zone of Continuous Crack Connection to Workings (**Whittaker and Reddish, 1989**)

'B' Horizon - Zone Of Discontinuous Crack Connection to Workings (**Whittaker and Reddish, 1989**)

→ Surface water flow path

→ Sub-surface water flow path

DgS



Engineer: S.Ditton

Drawn: S.Ditton

Date: 20.03.15

Ditton Geotechnical

Services Pty Ltd

Client:

Narrabri Coal Mine (Stage 2)

NAR-002/2

Title:

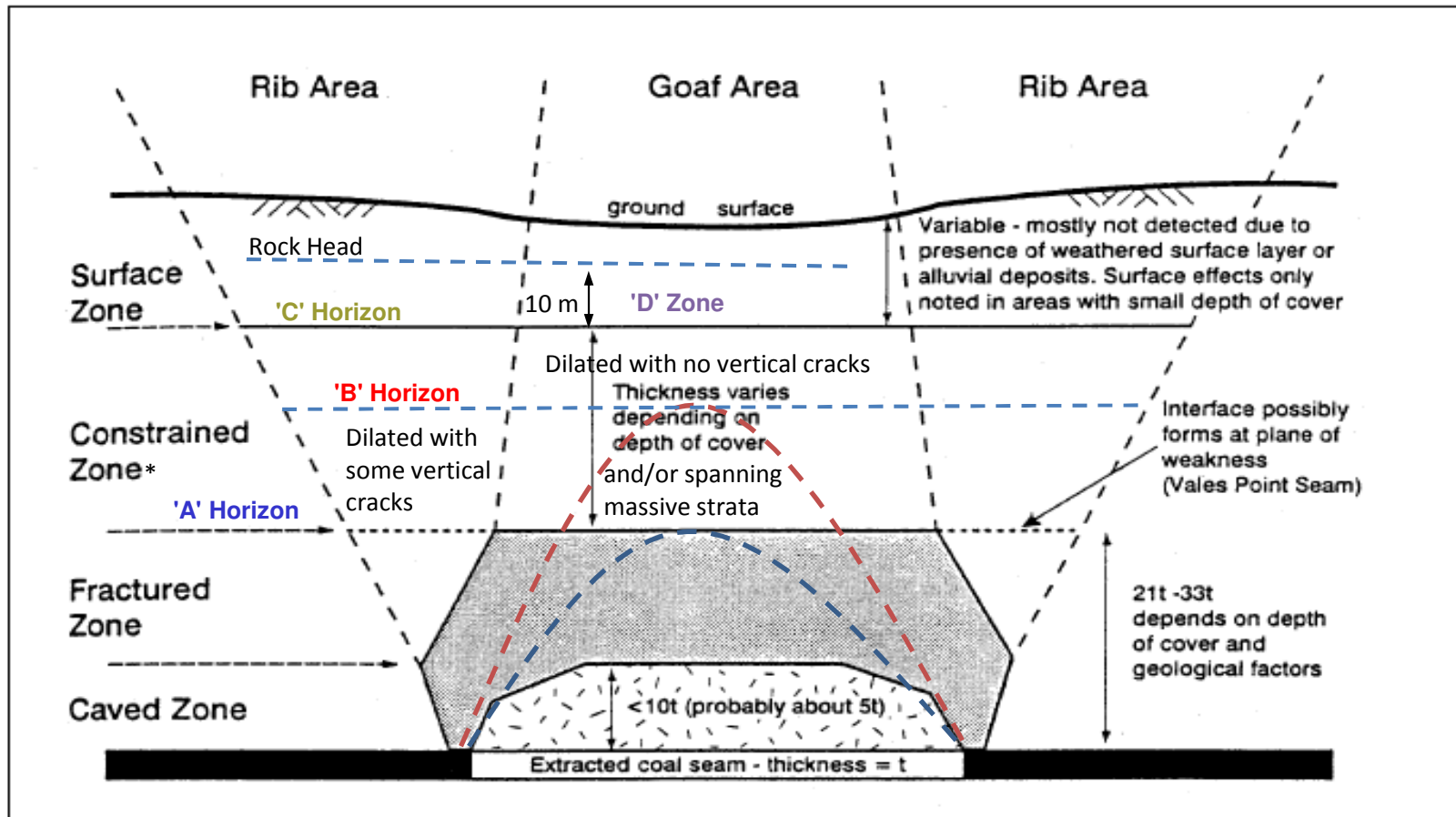
Schematic Model of Overburden Fracture Zones Above Longwall Panels

Scale:

NTS

Figure No:

14a



Zones in the Overburden according to Forster (1995)

* - Constrained Zone generally means B-Zone, but may include C-Zone, depending on W/H ratio and geology

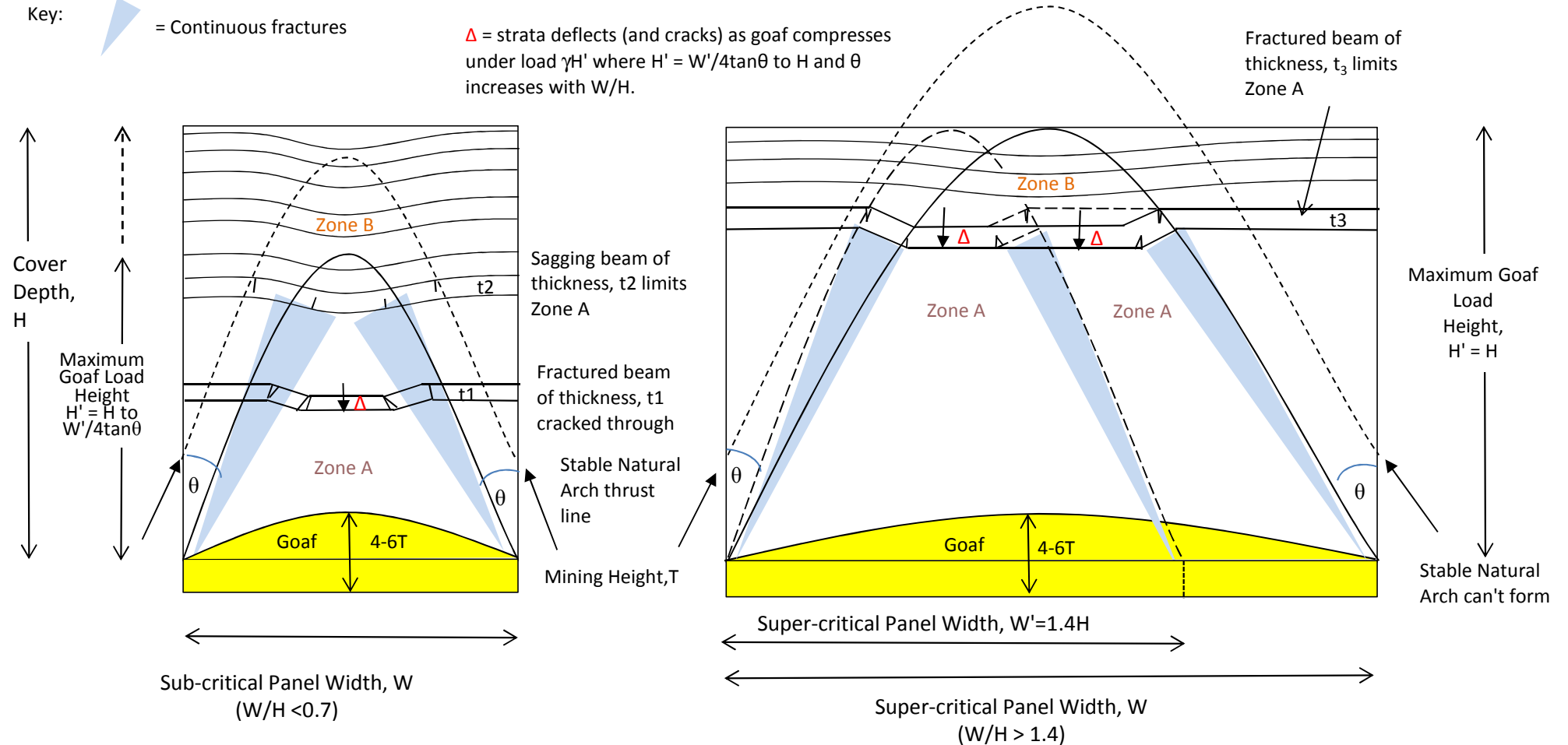
	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)
	Drawn:	S.Ditton		NAR-002/2
	Date:	20.03.15	Title:	Schematic Model of Overburden Fracture Zones in Forster, 1995 Model
	Ditton Geotechnical Services Pty Ltd			(based on Piezometric Data Above High Extraction Panels in the Newcastle Coalfield)
			Scale:	NTS
				Figure No: 14b

Key:



= Continuous fractures

Δ = strata deflects (and cracks) as goaf compresses under load $\gamma H'$ where $H' = W'/4\tan\theta$ to H and θ increases with W/H .



DgS



Engineer: S.Ditton

Drawn: S.Ditton

Date: 20.03.15

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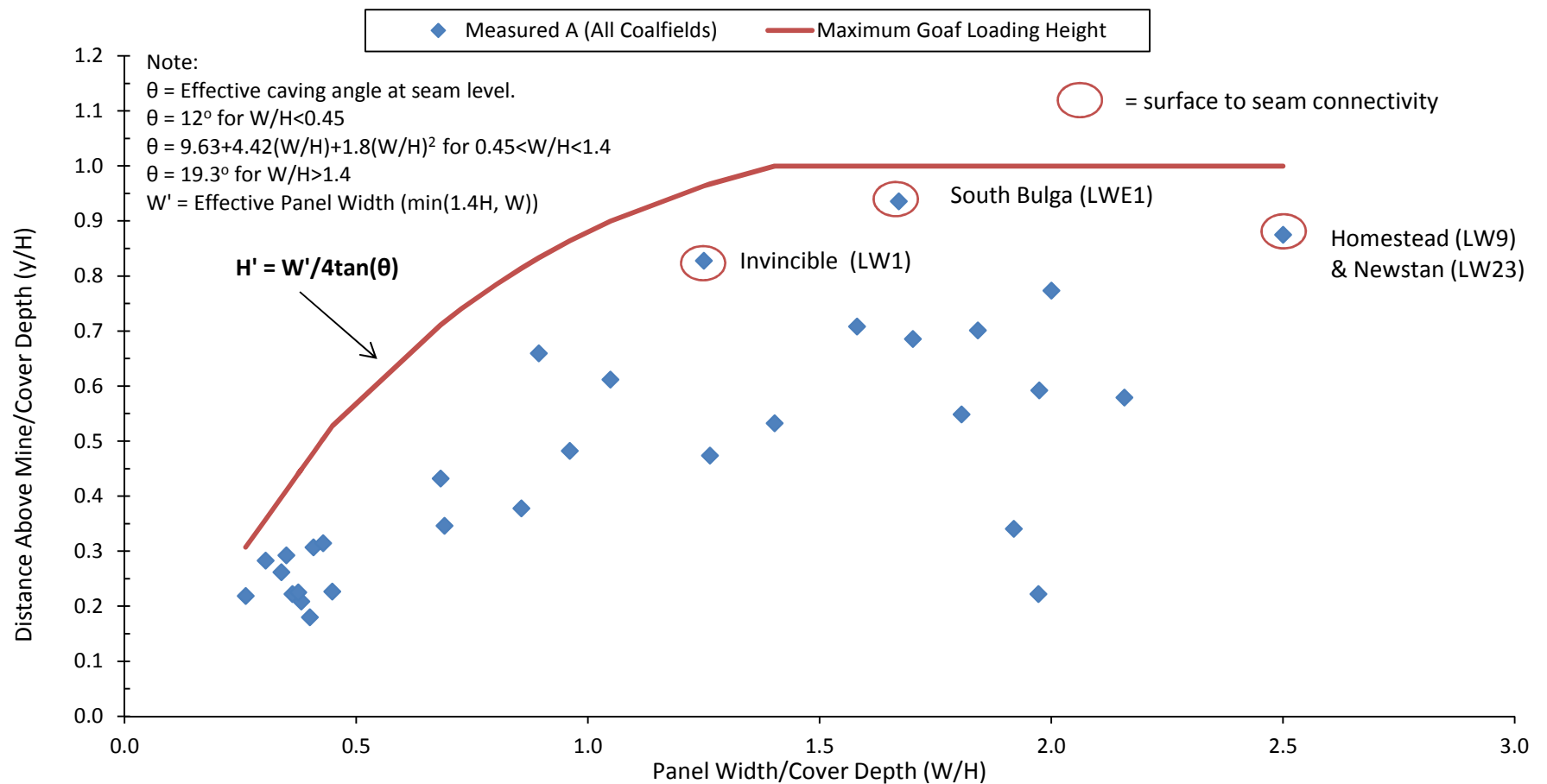
Client: Narrabri Coal Mine (Stage 2)

NAR-002/2

Title: Conceptual Model for Development of Height of Continuous Fracturing Zone for a range of Longwall Panel Geometries

Scale: NTS

Figure No: 14c



DgS



Engineer: S.Ditton

Drawn: S.Ditton

Date: 20.03.15

Ditton Geotechnical
Services Pty Ltd

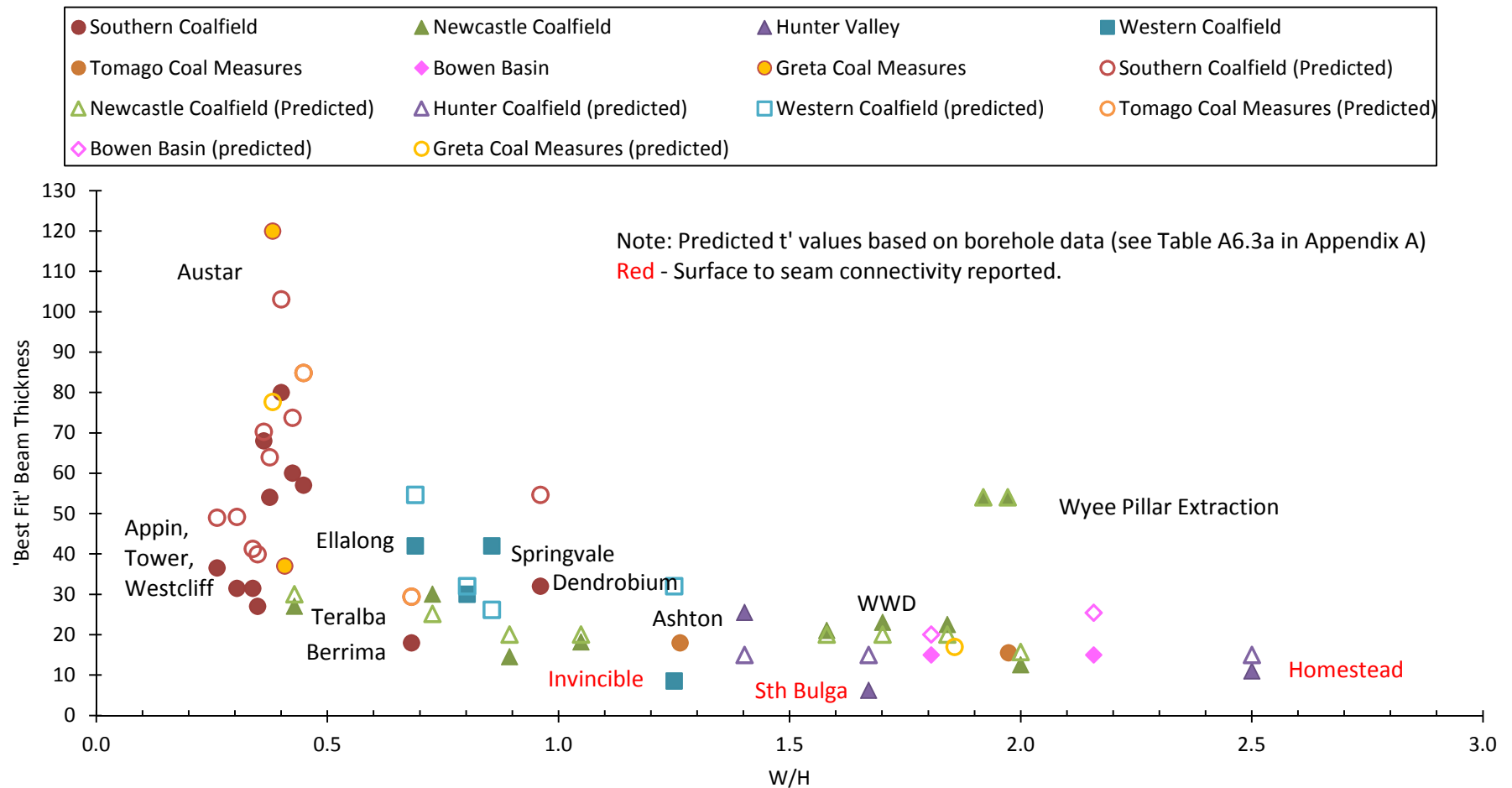
Client: Narrabri Coal Mine (Stage 2)

NAR-002/2

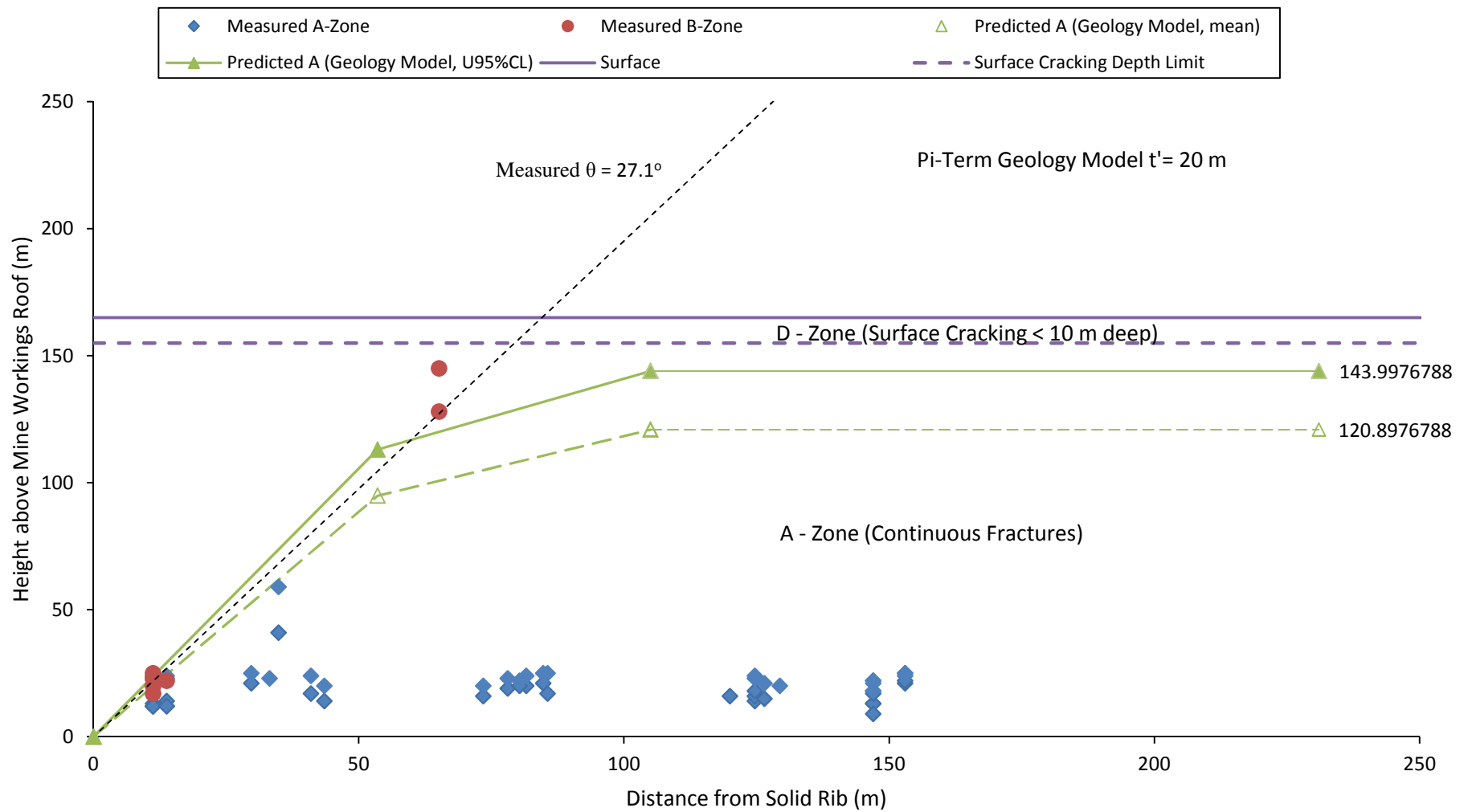
Title: Measured Heights of Continuous Fracturing in NSW and QLD Coalfields with Reported
Surface to Seam Connectivity Cases, caving angles and theoretical Goaf Loading Height

Scale: NTS

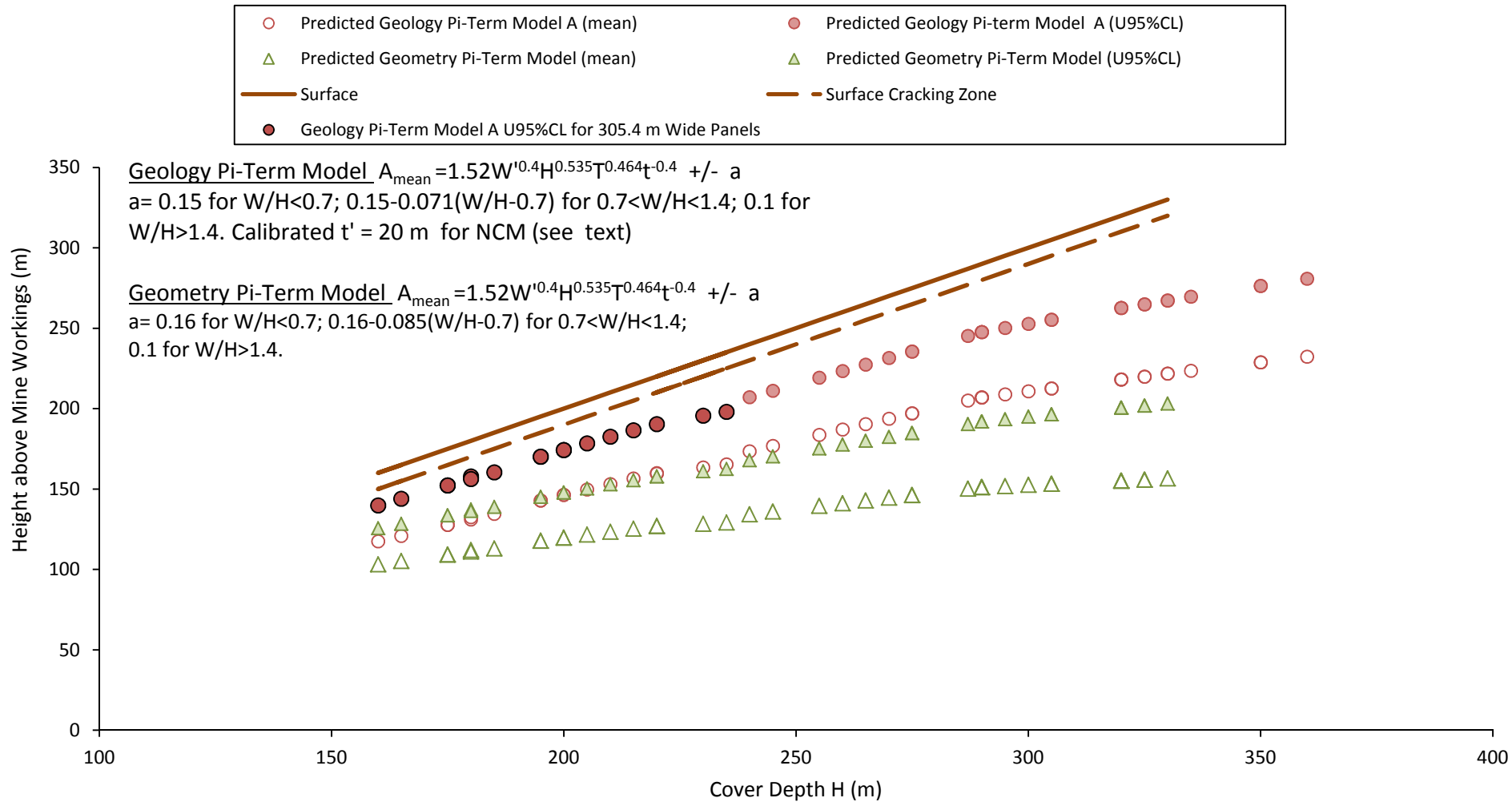
Figure No: 14d



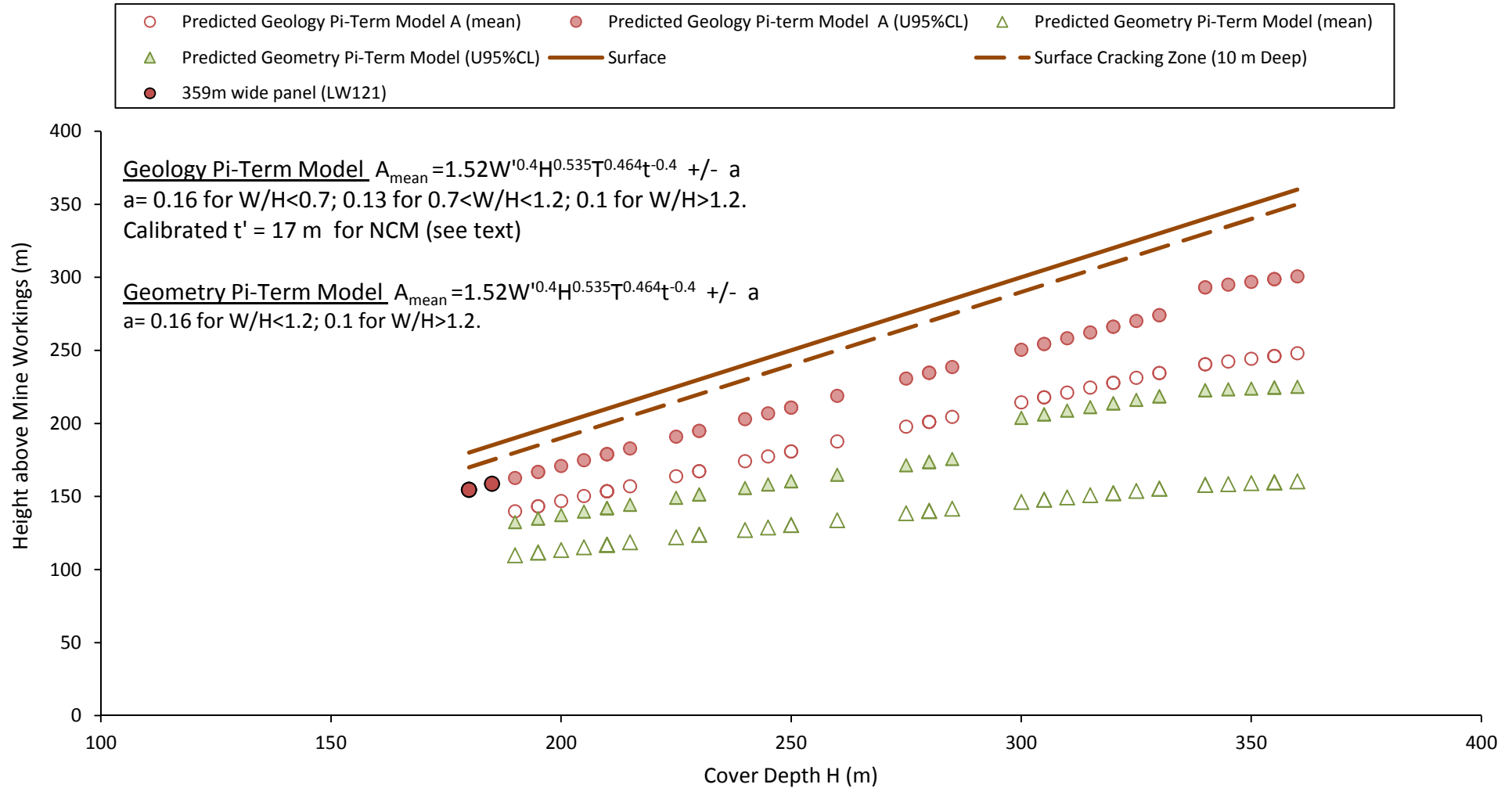
	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)		
	Drawn:	S.Ditton		NAR-002/2		
	Date:	20.03.15	Title:	Results of Back-analysis of Effective Strata Units required to Match the Observed		
	Ditton Geotechnical			A-Zone Heights above Longwall Panel Goafs using the Geology Pi-Term Model		
	Services Pty Ltd		Scale:	NTS		Figure No:



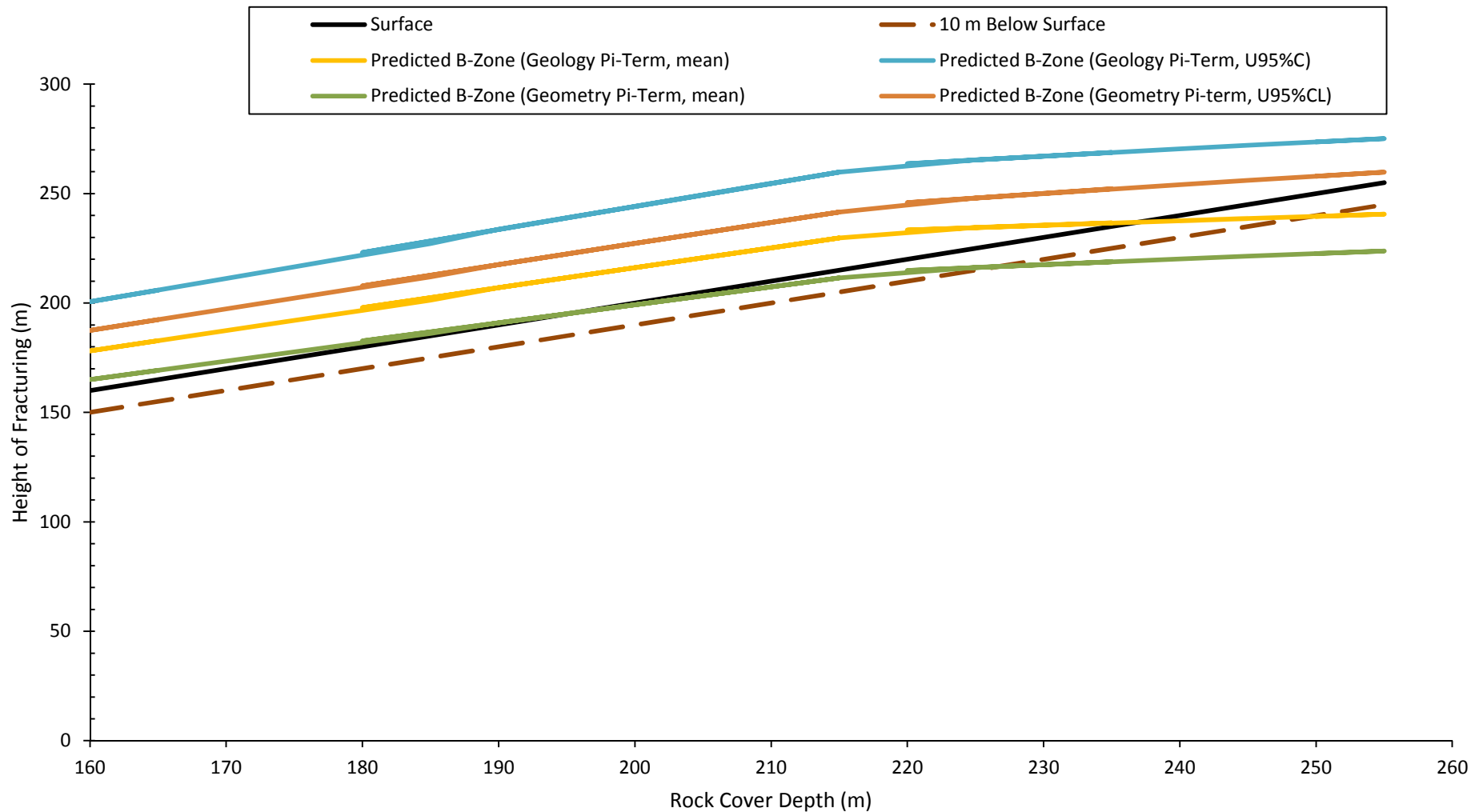
	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)			
	Drawn:	S.Ditton		NAR-002/2			
	Date:	02.06.14	Title:	Measured Subsurface Fracturing Above LW101 from Borehole Extensometers			
	Ditton Geotechnical						
	Services Pty Ltd		Scale:	NTS		Figure No:	15a



Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)
Drawn:	S.Ditton		NAR-002/2
Date:	02.06.14	Title:	Predicted Heights of Connective Cracking Above LWs 101 to 111 based on Pi-Term Models (ref DgS, 2014)
Ditton Geotechnical Services Pty Ltd		Scale:	NTS
		Figure No:	15b

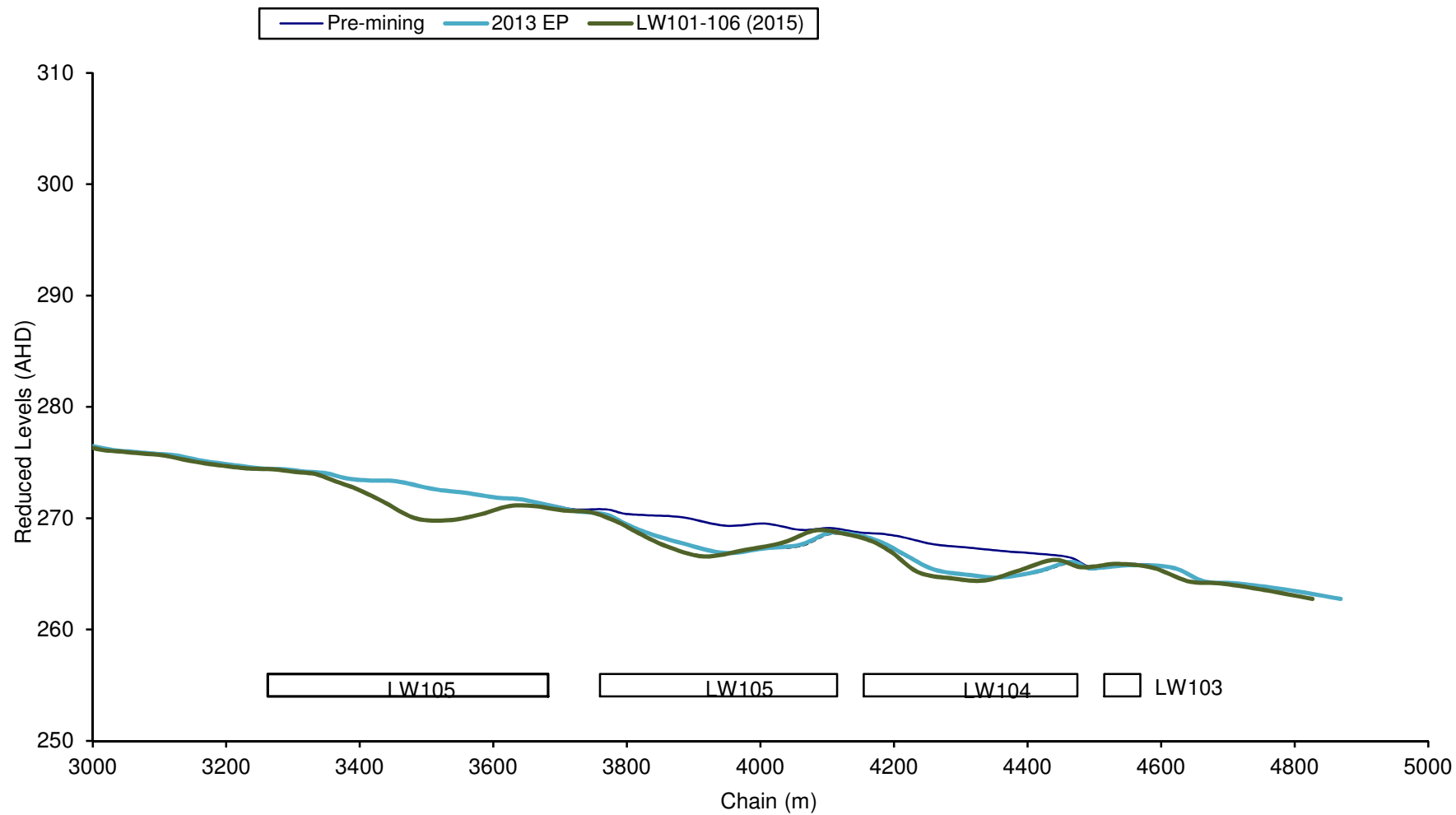


Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)
Drawn:	S.Ditton		NAR-002/2
Date:	02.06.14	Title:	Predicted Heights of Connective Cracking Above LWs 112 to 121 based on Pi-Term Models (ref DgS, 2014)
Ditton Geotechnical Services Pty Ltd		Scale:	NTS
		Figure No:	15c

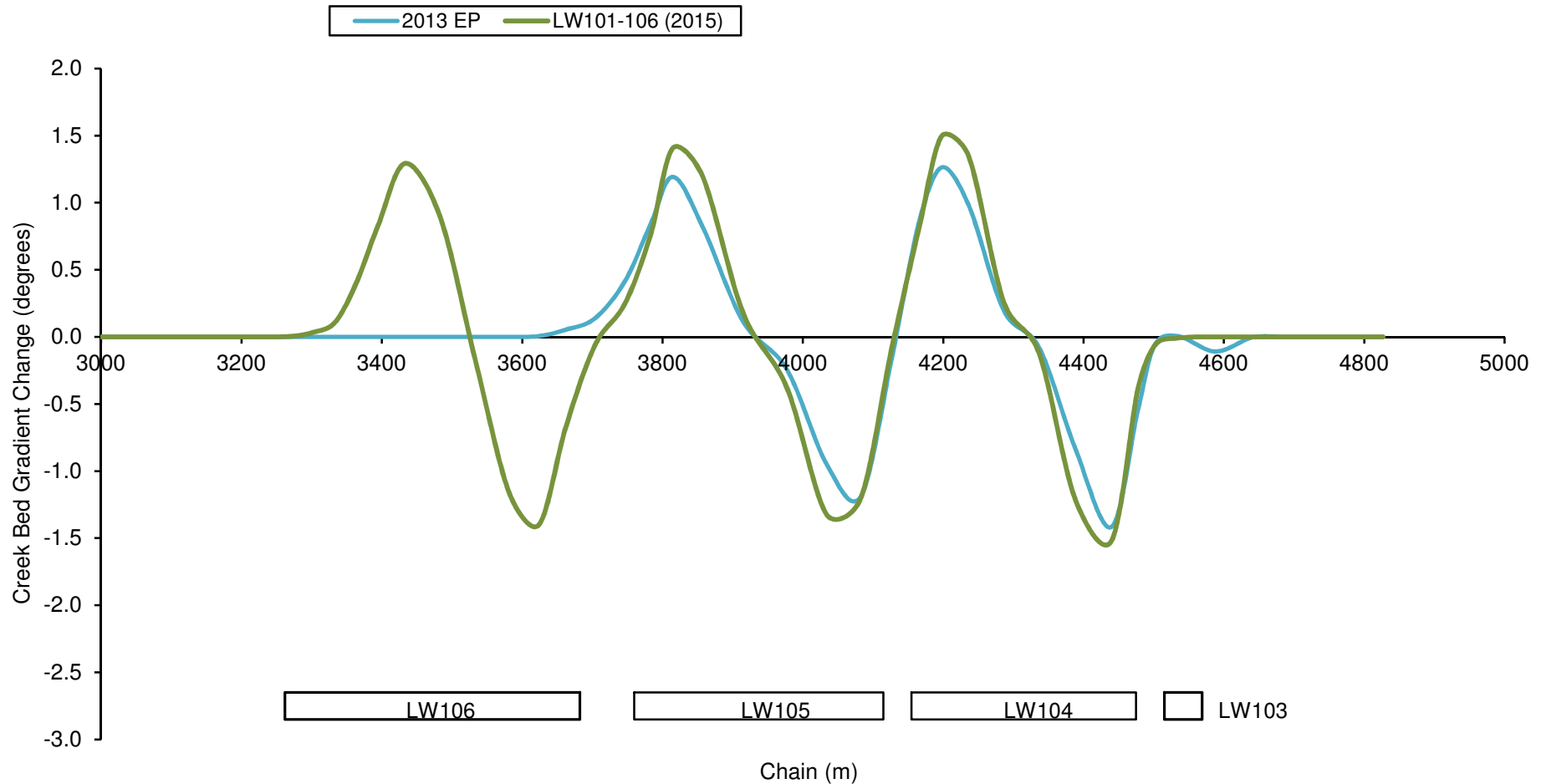


Reference: Ditton & Merrick, 2014 Sub-surface Fracture Model Outcomes

	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)		
	Drawn:	S.Ditton		NAR-002/2		
	Date:	15.05.15	Title:	Discontinuous (B-Zone) Sub-Surface Fracture Heights in Constrained Zone above the Proposed LWs 101 to 106		
	Ditton Geotechnical Services Pty Ltd		Scale:	NTS		Figure No: 15c



	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)		
	Drawn:	S.Ditton		NAR-002/1		
	Date:	01.03.11	Title:	Pre-mining and Predicted Post-Mining Surface Profiles Along Pine Creek above		
	Ditton Geotechnical			LWs 101-106		
	Services Pty Ltd		Scale:	NTS		Figure No:



DgS



Engineer: S.Ditton

Drawn: S.Ditton

Date: 15.05.15

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Services Pty Ltd

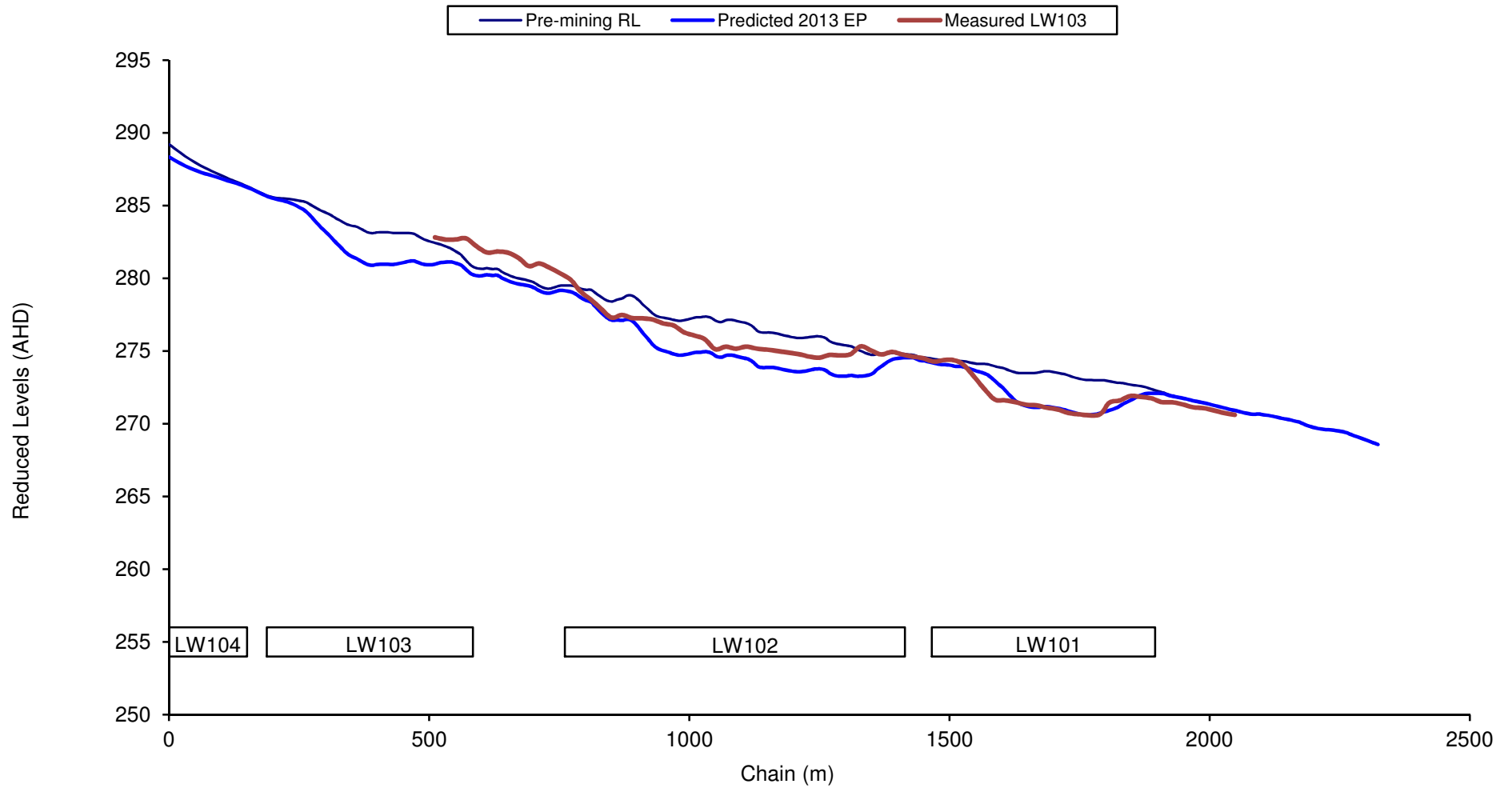
Client: Narrabri Coal Mine (Stage 2)

NAR-002/2

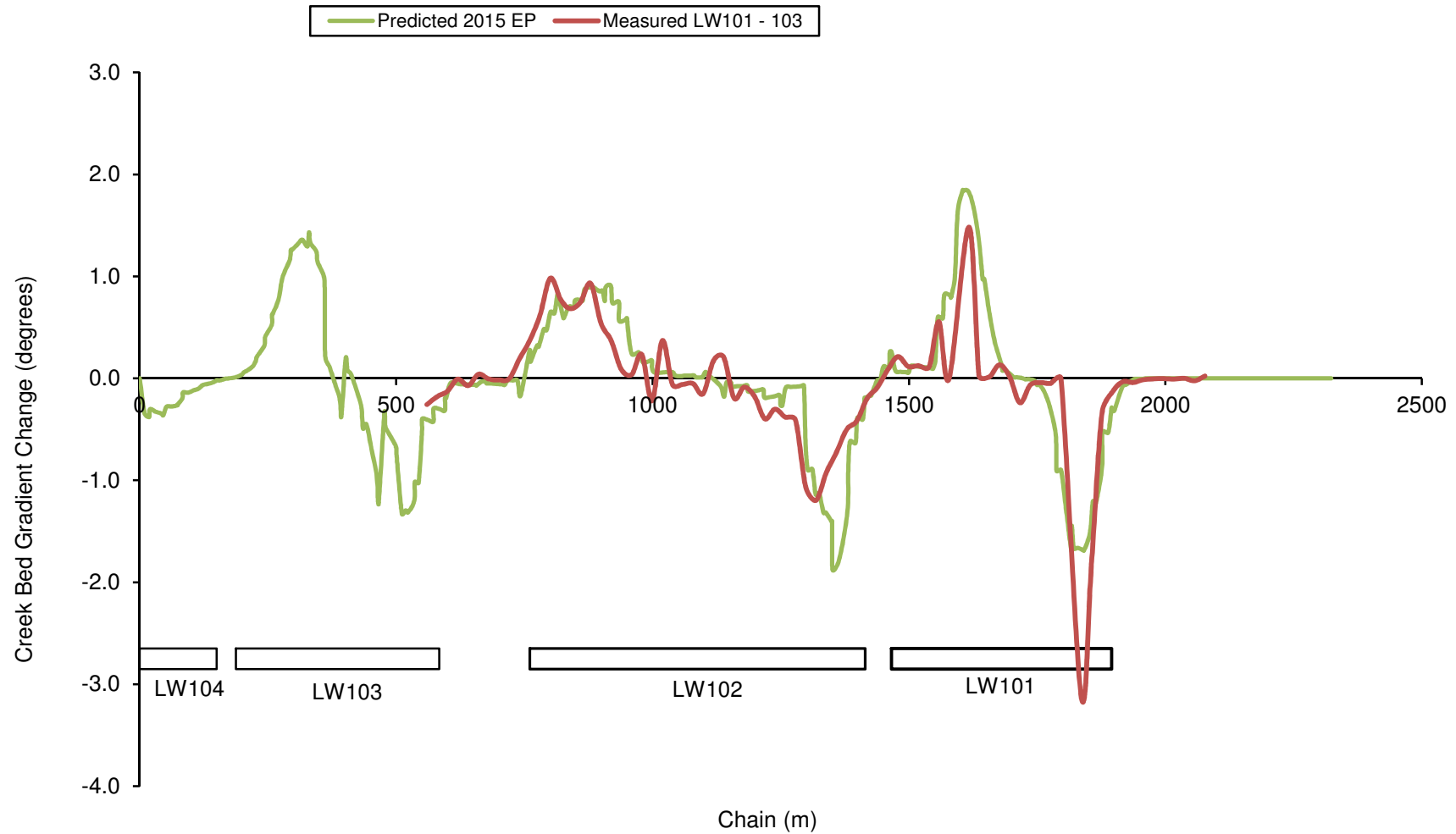
Title: Pre-mining and Predicted Post-Mining Surface Gradient Changes Along Pine Creek
above LWs 101-106

Scale: NTS

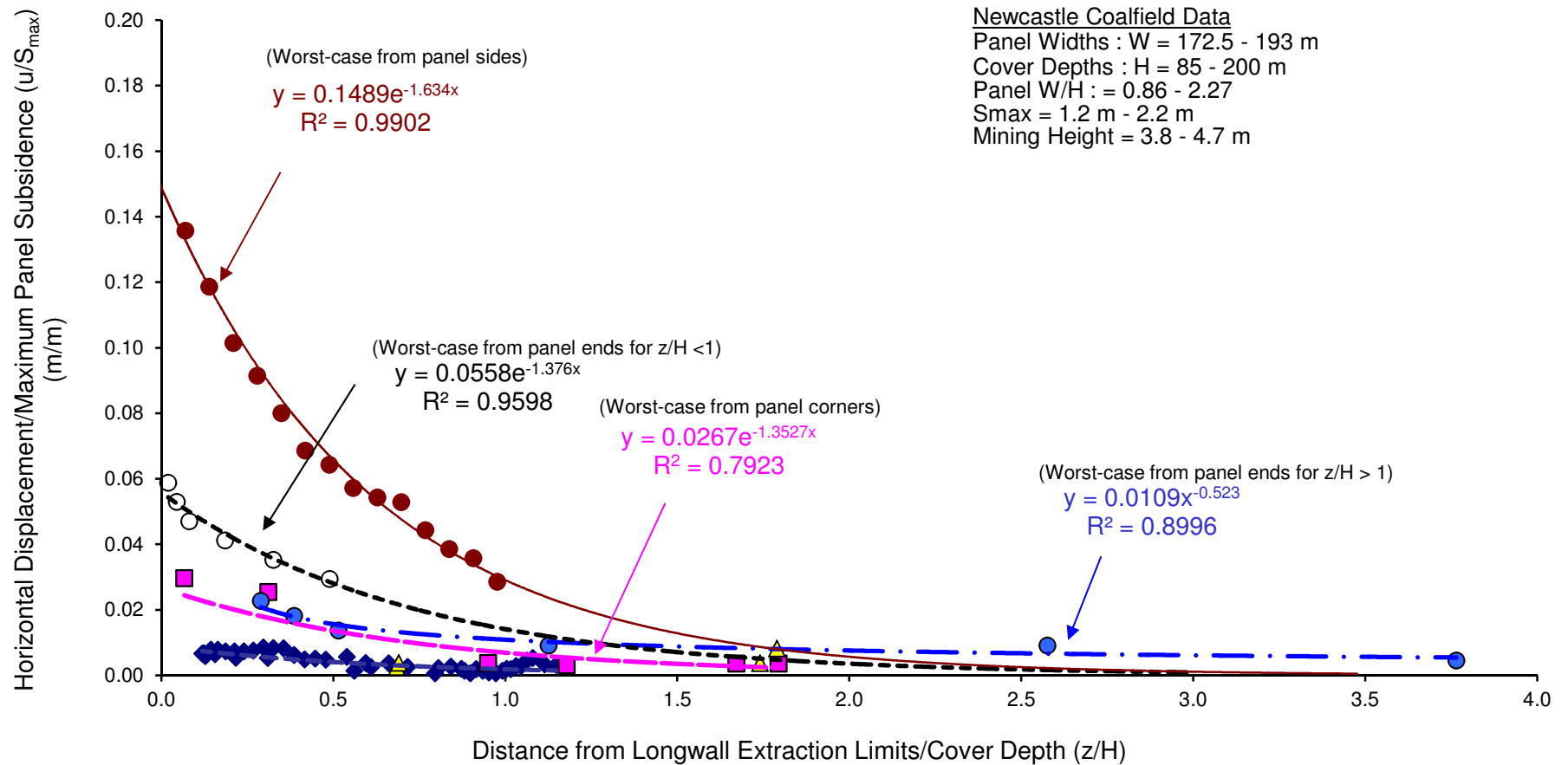
Figure No: 17b



	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)			
	Drawn:	S.Ditton		NAR-002/1			
	Date:	01.03.11	Title:	Pre-mining and Predicted Post-Mining Surface Profiles Along Pine Creek Tributary 1			
	Ditton Geotechnical Services Pty Ltd			above Longwall LWs 101-103 plus Measured Profile for LW103 (Line B)			
			Scale:	NTS		Figure No:	18a



	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)			
	Drawn:	S.Ditton		NAR-002/4			
	Date:	15.05.15	Title:	Pre-mining & Predicted Post-Mining Surface Gradient Changes Along Pine Creek			
	Ditton Geotechnical			Tributary 1 Above LWs 101-104 plus Measured Profile for LWs 101-103 (Line B)			
	Services Pty Ltd		Scale:	NTS			Figure No:



DgS



Engineer: S.Ditton

Drawn: S.Ditton

Date: 01.03.11

Ditton Geotechnical
Services Pty Ltd

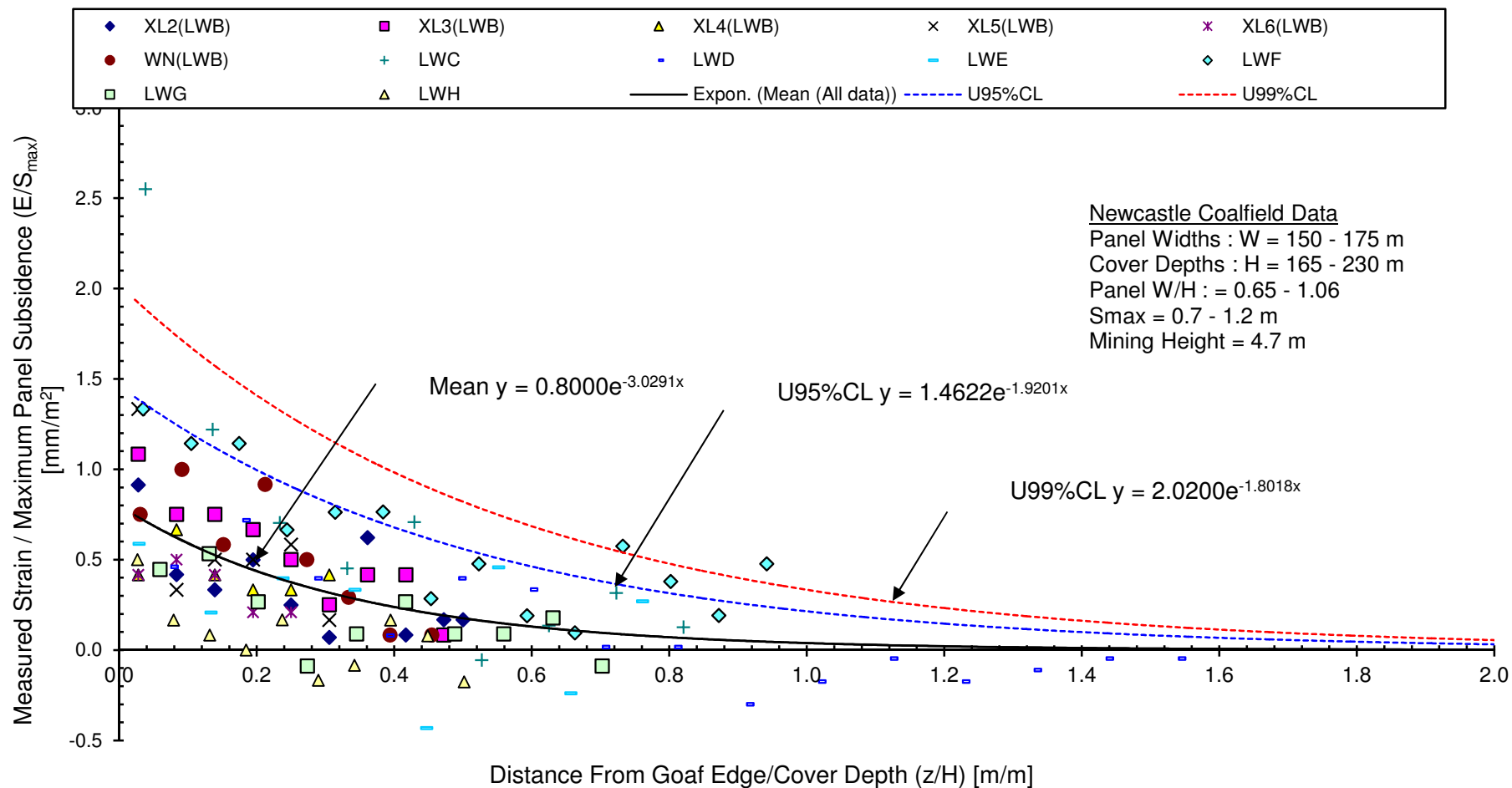
Client: Narrabri Coal Mine (Stage 2)

NAR-002/2

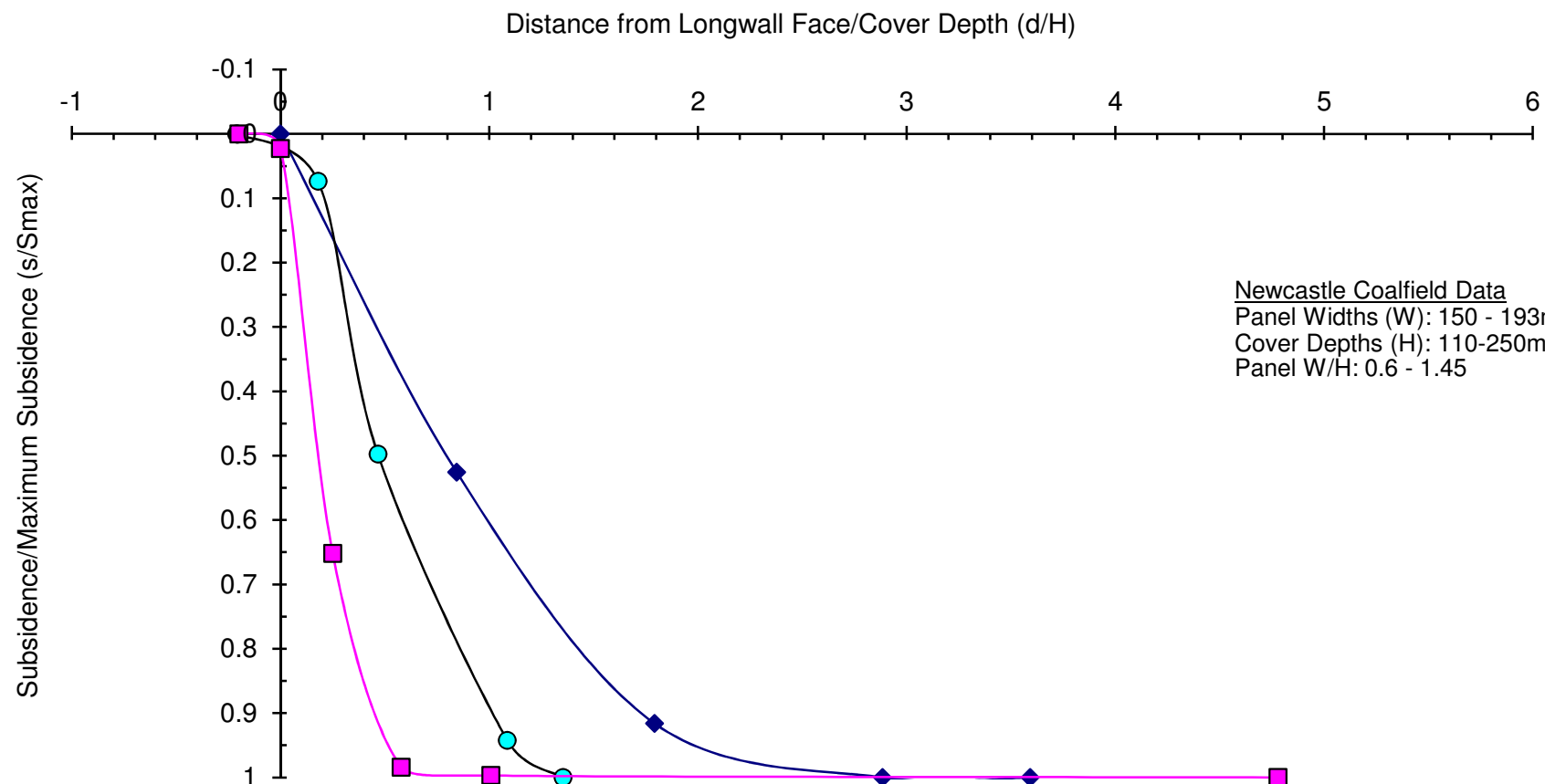
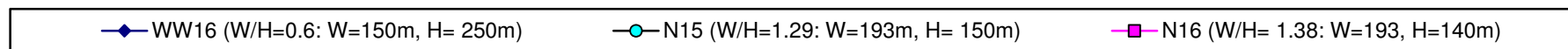
Title: Combined Empirical Far-Field Displacement Prediction Models for Longwall Panel Sides,
Ends and Corners.

Scale: NTS

Figure No: 19a



	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)		
	Drawn:	S.Ditton		NAR-002/2		
	Date:	01.03.11	Title:	Empirical Far-Field Strain Prediction Model Using Cummulative Steel Tape		
	Ditton Geotechnical			Measurements from Longwall Sides in the Newcastle Coalfield		
	Services Pty Ltd		Scale:	NTS		Figure No: 19b



	Engineer:	S.Ditton	Client:	Narrabri Coal Mine (Stage 2)			
	Drawn:	S.Ditton		NAR-002/2			
	Date:	15.05.15	Title:	Empirical Single Longwall Centreline Subsidence Development Prediction Model			
	Ditton Geotechnical Services Pty Ltd			(based on Newcastle Coalfield Measurements)			
			Scale:	NTS		Figure No:	20