the structural nature of the Bulli Seam in the NRE No.1 Wonga East Study Area. The Bulli Seam across this area dips to the west-nor-west from 1 in 25 to 1 in 30 and reflects the eastern section of a broad synclinal structure (South Bulli Syncline) and minor anticline structure toward the north of the Study Area.

Figure 14 details the known structures in the Bulli Seam for the Wonga East Study Area. These structures have been derived from detailed examination of available mine plans. Each structure is annotated for easy reference and discussed in the following sections on faulting and igneous intrusions.

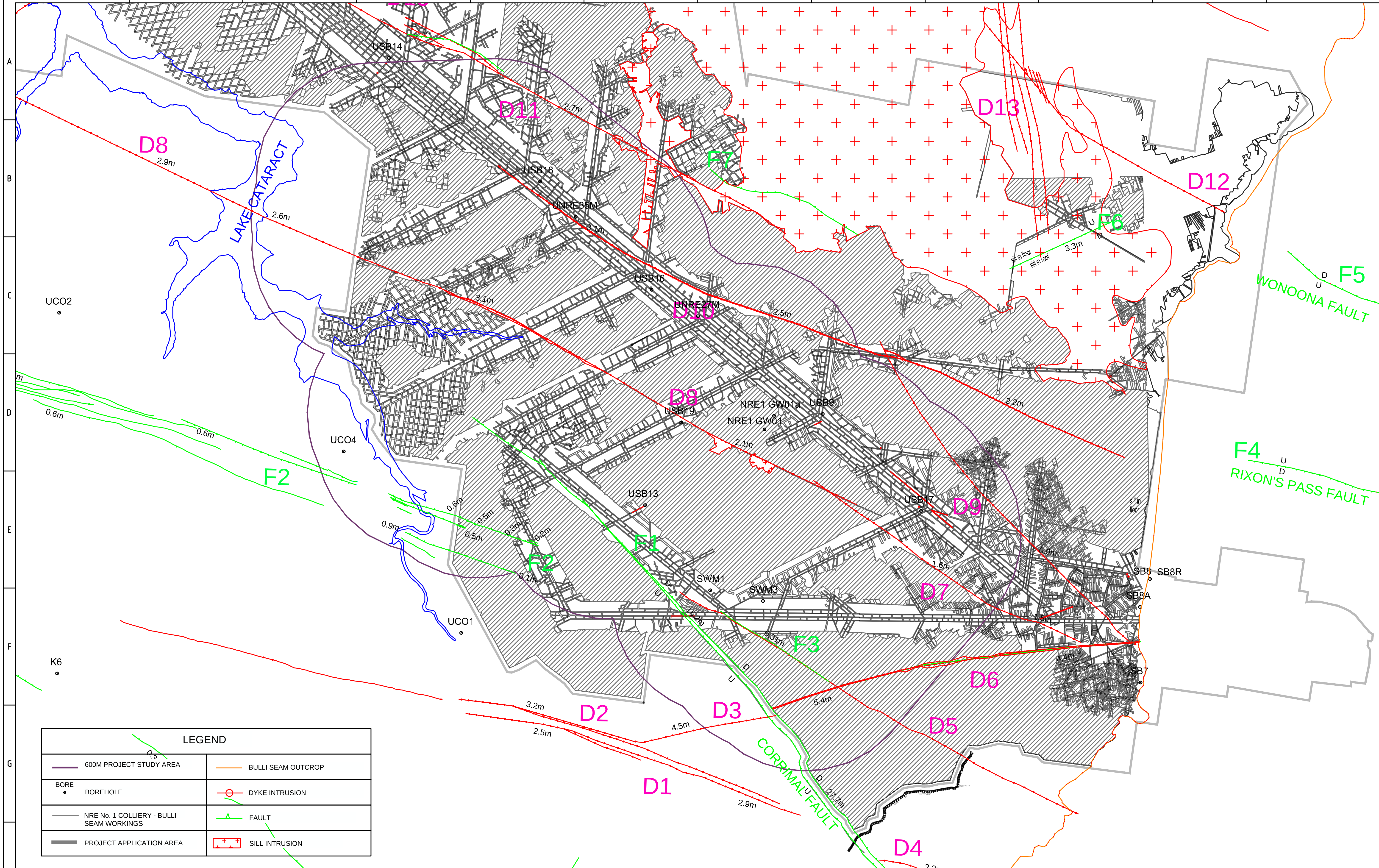
2.5.1 Faulting

Fault F1, commonly known as the Corrimal Fault, occurs from outcrop and extends approximately 3000m to the northwest (bearing 320 degrees) before dying out. Maximum recorded displacement has been measured at 28.7m with a fault width of approximately 20m. There are no records or documentation indicating moisture ingress being associated with the fault.

Fault F2 is a fault zone, some 170m wide, prominent in Corrimal Colliery and extending approximately 400m into the workings of South Bulli Colliery before dying out. Maximum displacement within the zone is 0.9m with the majority of the faults 0.6m or less and with a range in displacements from 0.1m to 0.9m. Strike of the fault zone is 110 degrees.

Fault F3 is a short strike length feature (approximately 610m long) bearing 300 degrees and is associated with dyke D5. It has a recorded displacement of 0.31m downthrown to the north. It is probable the fault formed as a result of the forces occurring during the injection of the dyke due to its concurrence with the dyke and its short strike length.

Fault F4 is recognized as the Rixon's Pass Fault and is believed to have been intersected, possibly in the Tongarra Seam, in a clay quarry east of the escarpment (Illawarra Brick Company quarry). The fault is annotated as being downthrown to the south and bears 285 degrees. No record of displacement of the fault has been found. Detailed examination of the South Bulli mine plans indicate the fault does not project to the west into the workings. There is a possible correlation with a thin, soft dyke (dyke D10) within the South Bulli Colliery workings but there is no record of this dyke being associated with faulting.



REV	DESCRIPTION	DATE	DRN	CKD	REV	DESCRIPTION	DATE	DRN	CKD

NRE No. 1 Colliery

GUJARAT NRE Coking Coal Pty Ltd

Princess Highway & Bellmabi Lane, Russell Vale, NSW. 2517

ABN 28 111 244 896

	Name	Date
DRN	RC	10.07.13
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APP	BC	
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Title

NRE No. 1 COLLIERY - PART 3A APPLICATION PPR
BULLI SEAM GEOLOGICAL PLAN
AREA - WONGA EAST

DRAWING NUMBER: FIGURE 14

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Fault F5 is recognized as the Woonona Fault and occurs west of the escarpment. The fault is annotated as being downthrown to the north, arcuate (curved) in nature and bearing approximately 290 degrees. No recorded displacement of the fault has been sighted. The origin of the Woonona Fault is unknown. There is no record of the fault appearing in the South Bulli Colliery workings. It correlates closely with a thin, soft dyke (dyke D12) but again there is no record of faulting associated with the dyke.

Fault F6 is known from South Bulli Colliery workings with a recorded displacement of 3.3m. The fault has a strike length of approximately 500m and bears 60 degrees and may have an association with the major intrusion in the Bulli seam, the Bulli Sill Complex, as the sill is in the roof to the southeast of the fault and in the floor to the northwest.

Fault F7 is known from South Bulli Colliery workings with a strike length of about 830m, bearing 290 degrees and has no recorded displacement but from the mine plans it did not appear to cause disruption to the workings. The inference from this is the fault was of a small displacement allowing workings to be developed through the fault.

2.5.2 Igneous Intrusions

2.5.2.1 Dykes

Within the South Bulli Colliery mine workings of NRE No.1 Wonga East Study Area and surrounding collieries igneous intrusions of dykes and sills have been intersected within the Bulli seam. Dykes are the most common form of igneous intrusion and are generally oriented in a northeast – southwest direction, within the Study Area trending about 120 degrees. Igneous intrusions discussed here are shown and annotated in Figure 14.

Dykes D1 and D2 was intersected in Corrimal Colliery with thickness up to 3.2m, strike of 110 degrees and extent of over 3500m.

Dyke D3 is most likely a continuation of dyke D6, being offset across the Corrimal Fault. Thickness is 4.5m, strikes at 150 degrees and is 650m long.

Dyke D4 is also most likely a continuation of either dykes D1 or D2 and again is offset across the Corrimal Fault. Thickness is 3.3m, strike of 110 degrees and extent of 650m to outcrop.

Dyke D5 extends from outcrop for approximately 2300m before dying out near the Corrimal Fault. Thickness has been estimated from mine plans at about 1.5 to 1.6m. The dyke, striking 300 degrees, appeared to cause no disruption to mining based on the mine workings and is assumed to be a soft clay dyke.

Dyke D6 strikes at 80 degrees, strike length of 1890m and has a measured thickness of 4.4m and where it has silled into the Bulli seam appears to be about 10m which is likely to include the cinder zone and hardened coal. Mine workings skirted the dyke implying some degree of hardness.

Dyke D7 is estimated from mine plans to be about 1.6m thick and appears thin and soft from mine plan details. The dyke has a strike length of 1500m and strike direction of 300 degrees.

Dyke D8 is the most prominent in the Bulli Seam workings in the Wonga East area and extends for over 7.0km to the northwest (bearing 300 degrees) before dying out. It has a recorded thickness range of 2.1m to 3.1m and is associated with seam silling and cindering. The dyke is hard and possibly syenitic in nature.

Dyke D9 has a measured thickness of 0.9m and is soft clay. It has a strike length of 1900m and bears 325 degrees.

Dyke D10 has a recorded thickness of up to 3.1m and is noted as soft. The dyke has a strike length of 3700m and bears 290 degrees. The dyke is associated with silling in the seam floor near the escarpment and dies out within the Wonga East Study Area.

Dyke D11 has a recorded thickness of 2.7m near its convergence with the Bulli Sill Complex. The dyke is soft and becomes thin and intermittent on its projection to the west-nor-west (bearing 300 degrees). Overall length is 2750m.

Dyke D12 has no recorded thickness but appears to be soft and did not hinder mine development to any major extent. The dyke has a strike length of 1650m before it loses its identity within the Bulli Sill Complex. The dyke may be correlated with the Woonona Fault but there is no indication the dyke has a fault component.

Dyke D13 is a swarm of thin and intermittent soft clay dykes that bear almost north south. The swarm is likely to be related to the Bulli Sill Complex. The dykes had minimal impact on mine development.

Dyke D14 has an east west strike and length of 1400m and is coincident with the northern colliery boundary between Old Bulli Colliery and NRE No.1. No information on the dyke has been sighted and the dyke dies out to the west within the South Bulli mine workings, being soft and thin.

Dyke D15 has a recorded thickness of 1.2m, striking parallel to dyke D11 for approximately 1400m and tapers out to the west-nor-west. The dyke appears to be soft and had no impact on mine development.

2.5.2.2 Silling

Sills have a far greater impact on mine development than dykes. Their lateral intrusive nature often means that large areas of coal seams (often hectares) can be rendered uneconomic due to complete replacement (ingestion) of the coal or cindering, alteration and/or loss of coking properties. Sills are erratic and the larger sills are often transgressive in nature (intrude across several seams) and historically their definition other than in a general way has been difficult to define prior to mining. Within the Wonga East Study Area there is a significant sill event, the Bulli Sill Complex which has an areal extent of over 13km^2. The sill complex is transgressive in nature, known to intrude the Bulli, Balgownie and Wongawilli seams in NRE No.1 and affecting other collieries to the north. Mine workings within the Bulli seam at various collieries have enabled an accurate boundary definition of the Sill complex to be established and this is shown in Figure 14.

2.6 BALGOWNIE SEAM STRUCTURE

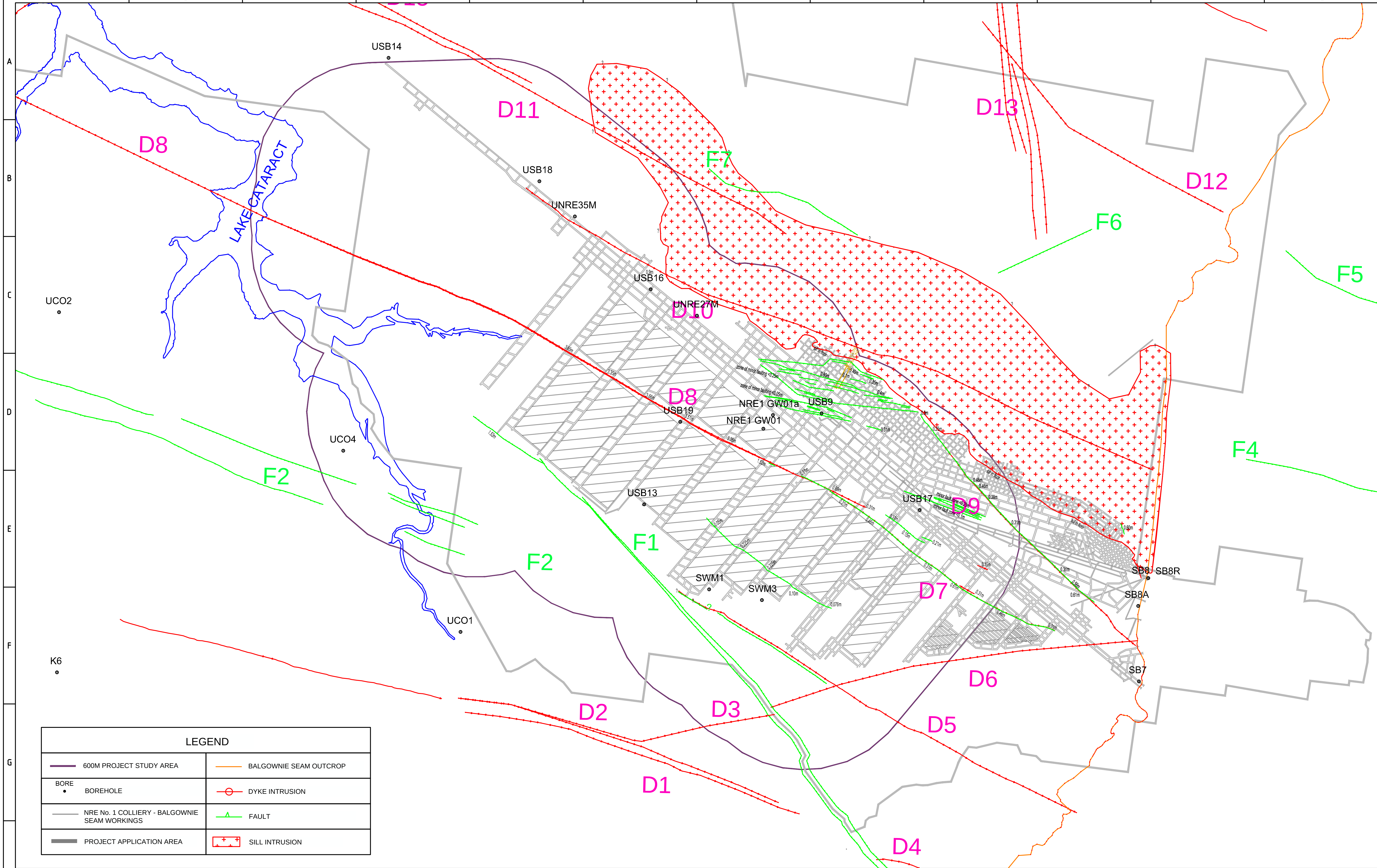
Mining within the Balgownie Seam in the Wonga East Study Area was undertaken between 1968 and 1982 (longwall method) and again in 2001 to 2003 (pillar driveage). Figure 15 details the mine workings and the known and interpreted geological structures within the seam.

2.6.1 Faulting

Faulting intersected by the Balgownie workings displays some correlation with known faulting in the overlying Bulli Seam.

Fault F1 in the Bulli Seam (Corrimal Fault) was intersected in a heading of gate road driveage and had a displacement of 1.53m and was offset 7.0m to the north from the fault position in the Bulli seam.

Fault F3 in the Bulli seam was associated with dyke D5. Intersected in an overdrive heading the fault and dyke still appear together in a very similar location to the location in the Bulli Seam. This gives weight to the fault being formed during injection of the dyke as the fault has no offset to its position in the Bulli seam.



REV	DESCRIPTION	DATE	DRN	CKD	REV	DESCRIPTION	DATE	DRN	CKD

NRE No. 1 Colliery

GUJARAT NRE Coking Coal Pty Ltd

Princess Highway & Bellmabi Lane, Russell Vale, NSW. 2517
ABN 28 111 244 896

	Name	Date
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APP	BC	
SCALE	1:15000	

Title: NRE No. 1 COLLIERY - PART 3A APPLICATION PPR
BALGOWNIE SEAM GEOLOGICAL PLAN
AREA - WONGA EAST

DRAWING NUMBER: FIGURE 15

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Additional faulting intersected in the Balgownie workings have no expression in the overlying Bulli Seam. This faulting, consisting of very small scale displacements, is generally less than 0.3m and primarily confined to the more recent 2001 to 2003 workings. It is suggested here that the faulting to be a result of tensional deformation of the Balgownie seam due to increased stress levels from to goaf formation from longwall extraction in the Balgownie seam and the interaction from overlying Bulli seam pillars and goaf. The minor fault zones have a very limited strike length.

2.6.2 Igneous Intrusions

2.6.2.1 Dykes

Balgownie seam workings intersected 5 dykes. These dykes project through to the overlying Bulli Seam workings in almost the exact location indicating the dykes have been injected in a near vertical plane through the Coal Measure strata. The following dykes, annotated with the Bulli seam nomenclature in Figure 15, were intersected in the Balgownie workings.

Dyke D5 was intersected by an overdrive heading. No indication of thickness or strike length is known from the Balgownie Seam workings.

Dyke D6 was intersected in initial Balgownie Seam workings. No indication of dyke thickness has been sighted. Dyke strike direction is the same as the dyke intersected in the overlying Bulli Seam workings.

Dyke D7 was intersected in many roadways and varied in thickness from about 0.31m to 0.61m and from the Balgownie mine plan appears to be a soft clay dyke. Thickness on this dyke from the Bulli Seam workings indicated 1.5m to 1.6m. Strike length and direction are similar to the Bulli Seam dyke position.

Dyke D8, prominent in the Bulli Seam workings, is also prominent in the Balgownie Seam workings. The dyke varies from about 0.31m thick where first intersected to 3.65m at its last measured intersection. In a similar location in the overlying Bulli Seam to its last measured thickness in the Balgownie Seam the dyke was 3.7m thick. The dyke is hard and as it thickened the Balgownie seam longwall was recovered and reinstalled on a new install heading avoiding mining through the dyke.

Dyke D9 was intersected by numerous roadways. Dyke thickness has a maximum of 0.56m and dies out to the west-nor-west as it does in the Bulli Seam where it has a thickness of 0.9m.

Dyke D10 was intersected over several roadways and measured at 0.9m thick. Its thickness in the Bulli seam at a similar location was estimated at 3.1m.

2.6.2.2 Silling

Silling within the Balgownie seam was intersected by workings driven during 2001 to 2003. The silling initially appeared in the floor of the seam and has affected the quality of the coal. The extent of the sill where intersected by workings can be seen in Figure 15. The northern extent of the silling is unknown due to a lack of data but it is believed that initial workings into the Balgownie Seam by Bulli Colliery intersected igneous material.

The complexity and multiple intrusions of the silling can be seen from the location of the sill in the Balgownie seam when compared to the Bulli Seam. In the Balgownie seam the edge of the silling as defined by the workings varies between 450m to 750m further south than the edge of the silling in the Bulli Seam.

Based on the above discussion and comparison of structures intersected in both the Bulli and Balgownie seams it is justifiable to assume dykes intersected in Bulli Seam workings will be in the Balgownie seam at similar locations. Dyke thickness generally appears to be thinner in the Balgownie Seam than the Bulli Seam and may be a result of the thinner Balgownie Seam being more confined thus restricting expansion of the igneous material during injection when compared to the thicker Bulli Seam.

Projection of faulting is not as clear from the Bulli to Balgownie Seams. Based on the above analysis and previous experience of multiple seam mining in Cordeaux and Kemira Collieries minor faulting in one seam will not necessarily project through to other seams. Based on this generalization, faulting of less than approximately 0.4m occurring in one seam is not projected through to other seams. Faulting of greater than 0.4m is projected to other seams, the projection requiring an understanding of the angle of dip (hade) of the faulting to improve accuracy. Where the hade is unknown projection at an angle of 80 degrees, dependent upon its sense of throw, is used as a “best” estimate of location in other seams. Figure 15 details the known and predicted structural geology of the Balgownie seam based on the above synopsis.

2.7 WONGAWILLI SEAM STRUCTURE

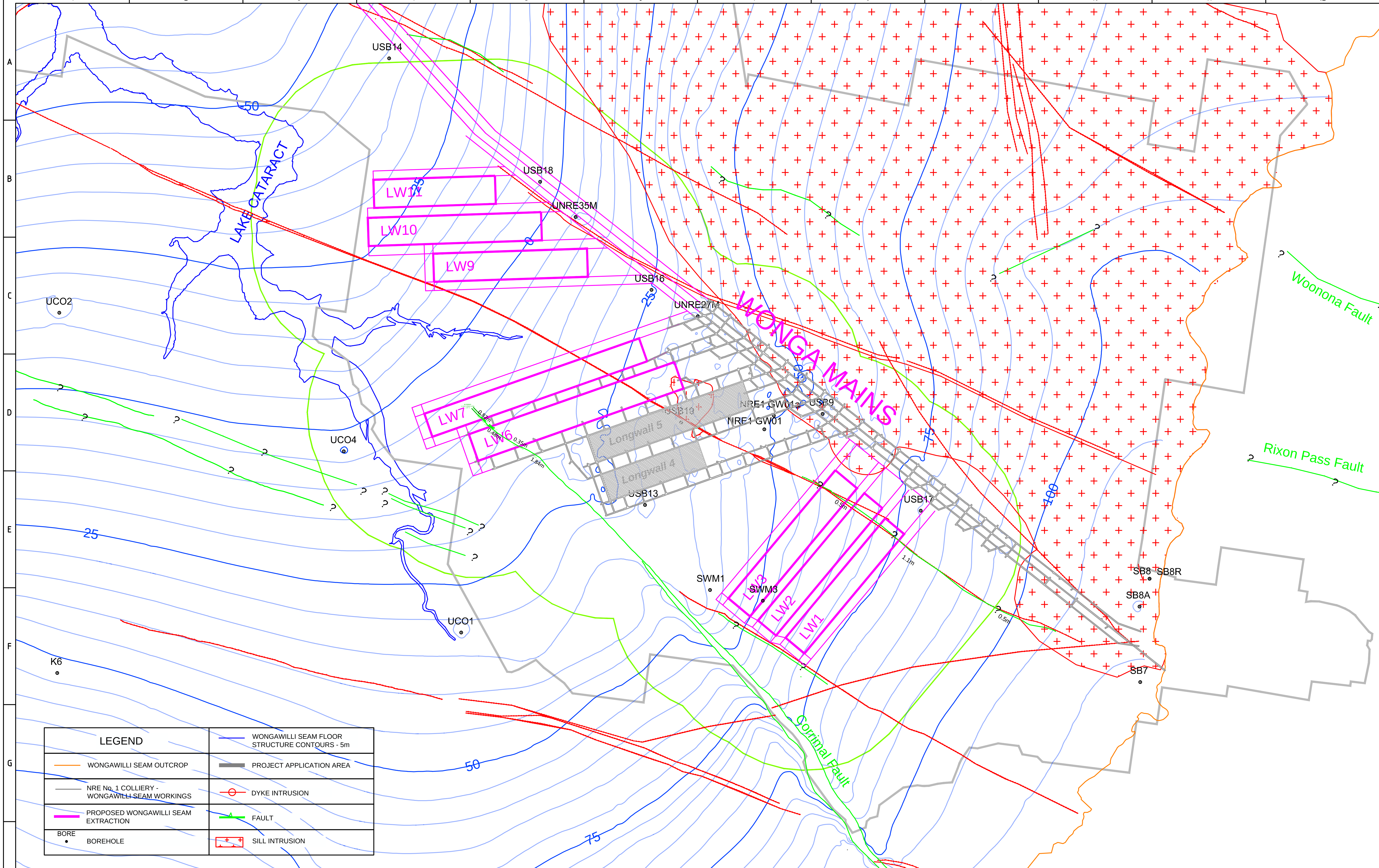
Development within the Wongawilli Seam in the Wonga East Study Area consists of mains roadways, currently reaching 2.9km from outcrop, and gate road driveage for longwall extraction with one longwall extracted (LW4) and another (LW5) currently being extracted.

The contours of the floor level of the Wongawilli Seam are based on surface drilling and mine working levels and known floor data from the overlying Bulli and Balgownie Seams and are shown in Figure 16. The Wongawilli Seam across this area dips to the west-nor-west from 1 in 25 to 1 in 30 and generally reflects the Bulli Seam floor structure. Current and proposed mine workings are also shown in Figure 16.

2.7.1 Faulting

Within the mine workings of the Wongawilli Seam the Corrimal Fault (Fault F1 in the Bulli Seam) has been intersected. No other faulting of significance has been intersected. The Corrimal Fault was first intersected in Maingate 5 development and had displacement of 1.84m to 0.35m (displacement was reassessed in MG5 B heading from 1.50m displacement to 0.35m after mining had progressed past the fault intersection) across the two headings, decreasing in displacement along its projected strike to the northwest. Characteristics of the fault are similar to those known from the Bulli and Balgownie Seams, being a normal fault down thrown to the north. Where intersected the fault had a measured dip of 35 degrees. The fault plane is offset approximately 24m to the north from its position in the Bulli Seam.

Further mine development in Maingate 6 has also intersected the Corrimal Fault. First intersected in the A Heading the fault has developed into a structural zone consisting of a set of three faults. The first fault is upthrown 0.93m followed by a downthrown fault of 0.55m and then another downthrown fault of 0.48m which decreases to 0.33m across the mined heading. This third fault is on the actual projection of the Corrimal Fault from Maingate 5. Also intersected in the B Heading the structural zone has the first fault downthrown 0.17m with the second fault downthrown 0.23m and the third fault plane downthrown 0.82m in the A heading and increasing to 0.98m across to the B heading.



REV	DESCRIPTION	DATE	DRN	CKD
1	UPDATED GEOLOGY & WORKINGS	22.05.14	RC	

NRE No. 1 Colliery

GUJARAT NRE Coking Coal Pty Ltd

Princess Highway & Bellmabi Lane, Russell Vale, NSW, 2517
ABN 28 111 244 896

	Name	Date
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APP	BC	
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Title
NRE No. 1 COLLIERY - PART 3A APPLICATION PPR
WONGAWILLI SEAM - SEAM STRUCTURE
AREA - WONGA EAST

DRAWING NUMBER
FIGURE 16

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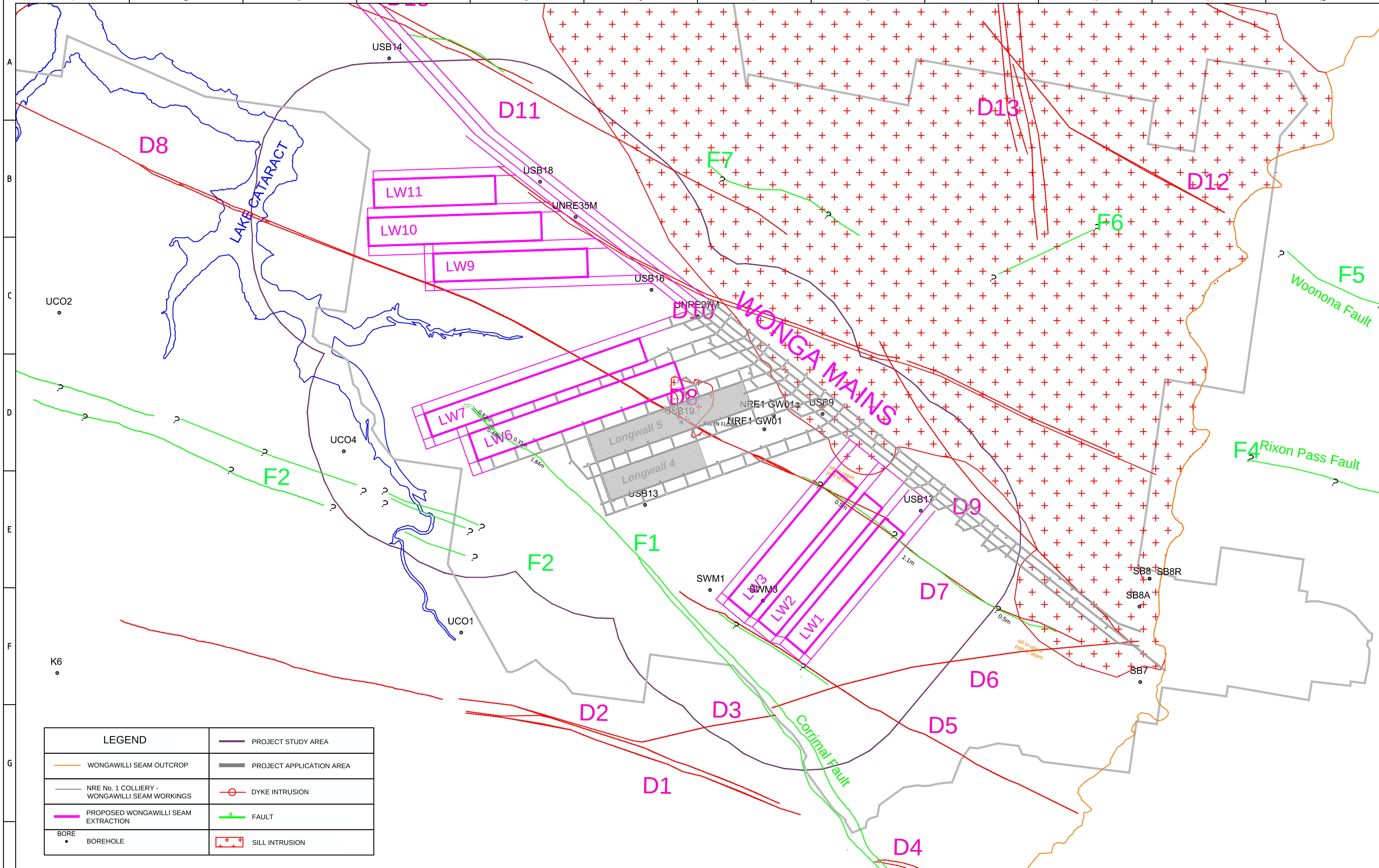
MAY 2014



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NRE No. 1 Colliery

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CKD		
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SCALE	1:15000	

Title
NRE No. 1 COLLIERY - PART 3A APPLICATION PPR
WONGAWILLI SEAM GEOLOGICAL PLAN
AREA - WONGA EAST

DRAWING NUMBER
FIGURE 17

REV
MAY 2014

The Corrimal Fault has become erratic in nature and is displaying typical characteristics of terminating as it fragments into a series of small non-correlated faults of inconsistent displacement and sense of dip.

Based on the erratic nature of the structural zone it is predicted to decrease in severity and die out within a distance of less than 500m as shown in Figure 17 with the likelihood of further fragmentation resulting in small scale faulting disrupting mine development in the immediate location of the structures.

2.7.2 Igneous Intrusions

2.7.2.1 Dykes

Only one dyke known from the Bulli Seam workings has been intersected by current Wongawilli Seam mine development. The dyke is D8 and has been intersected in four sets of longwall gate road driveage (LW's 4, 5 and 6). The dyke has a maximum measured thickness of 4.1m and is hard and dry. It has been mined through in the current longwall 5 and was highly fractured and blocky in nature. No evidence of water ingress about the dyke was evident. Silling within the basal 2.0m of the Wongawilli Seam on the northern side of the dyke has also been intersected. The dyke continues to be consistent in its nature and remains dry.

Of the other potential dykes projected from the Bulli Seam dyke D6 was not recognized in early development and this is most likely due to silling occurring in the Wongawilli Seam at the expected location of the dyke.

Dyke D10 has not been intersected by mining but inseam drilling has detected the dyke approximately 75m ahead of current mine face location in C Heading, Wonga Mains. No details are available on its thickness but drilling indicated the dyke is soft.

2.7.2.2 Silling

Silling within the Wongawilli Seam was intersected early on in Wonga Mains driveage. The silling occurs in the roof on the northern most heading (C heading) and cuts across the seam to be in the floor in the southern most heading (A heading). The silling was intersected either in the mining section of the seam or determined to be above the mined roof by drilling with the sill extending over the first

745m of driveage. The sill was then not detected before reappearing again above the mining section in the roof at the 1600m mark and extended primarily above the mining horizon to the 2525m mark before no longer being detected.

A significant aspect of silling within the Wongawilli Seam, than in the Bulli and Balgownie Seams, is that due to the much thicker seam section the silling can, and does, occur in various sections within the seam. Thus the boundary of silling within the Wongawilli Seam as shown in Figure 17 represents a best estimate of silling within all sections of the seam. It is therefore not inconceivable that successful mining can take place within the boundary of silling where the sill is some distance above the mining section and does not impact coal quality or mining conditions.

The transgressive nature of the Bulli Sill Complex is again evident as the southern extent of the sill in the Wongawilli Seam is from between 800m to 1300m further south than the edge of the Sill Complex in the Bulli seam and between 500m to 720m south of the sill edge in the Balgownie seam.

3. DISCUSSION

A detailed review of the geological structure of the Wonga East Study Area has been undertaken as described in this report. Confidence has been established in the structural detail of the mine plans available of the workings of South Bulli Colliery through comparison and analysis of coincident structures in the workings of the Balgownie and Wongawilli seams.

The surface geology in the Wonga East Study Area has been reviewed through ground proofing traverses, detailed Lidar topographic data and aerial photography. Prominent structural features known from mine workings have been projected to the surface, either vertically for igneous dykes or at an angle for faulting determined by the hade of the fault. Figure 18 details the surface geology and any structural features that were identified as surface expressions.

In examination of the control on surface features by known geology there is some structural correlation but it is quite limited. The following section will review the projected structures and there implication on surface features.

2.8.1 Faulting

Of the prominent faults in the Study Area there is a correlation of the Corrimal Fault (Fault F1) projected to the surface with two small upper tributaries feeding the upper Cataract River approximately 840m nor-west of the escarpment. Field mapping could not identify the surface expression of the fault but a thickened section of Bald Hill Claystone on the southern side of the creek gully and apparent Hawkesbury Sandstone on the northern side imply evidence of the fault at this location.

Following the projected surface trace of the Corrimal Fault further to the northwest there is no other surface expression that is evident from ground proofing. As has been discussed in this report the validity of data on the old South Bulli mine plans has been confirmed as accurate thus confidence is high that the Corrimal Fault dies out within the Bulli seam workings and the decreasing throw of the fault in the Balgownie and Wongawilli workings support this. As such it is considered that any connection of the fault to surface waters of the Cataract Reservoir is not possible. Reactivation of the fault due to subsidence is considered remote with the main section of the fault well away from the main body of stored water. Subsidence lines along the middle of Longwall 4 and Longwall 5 have been traversed and no evidence of the fault trace or any movement that could be interpreted as a result of fault reactivation was found.

Small scale fault swarm F2 emanates from Corrimal Colliery and dies out in the old South Bulli workings. There appears to be a correlation with two bends in Cataract Reservoir / Cataract River. As no detail on the dip of the fault swarm is known an estimation of 80 degrees has been used. The surface expression of the projection of the fault swarm does not correspond with the river bends when projected to the surface. There is no surface feature that the projected fault swarm corresponds with hence there can be no connection with fault swarm F2 to the surface. It is more likely the surface expression of the reservoir is joint controlled within the Hawkesbury Sandstone outcrop.

There is no correlation of any surface feature with the Rixon's Pass Fault trace which, as discussed in the report, has no expression in any workings and as such is proposed not to exist west of the escarpment.

Within the Balgownie Seam there are several fault swarms with minor displacements. These fault swarms are confined to the Balgownie Seam and as previously discussed have no expression in either the Bulli or Wongawilli Seams. There is no justification in any attempt to correlate these minor fault swarms with any surface features or with any other structural feature such as the Rixon's Pass Fault.

There is no other faulting of any significance that could impact on any surface feature during extraction on the mine plan in the Study Area.

2.8.2 Dykes

Dykes D3 and D6 do correlate with stream directions near the escarpment. Dyke D6 correlates with a small tributary on the very upper drainage system for Cataract Creek. Along strike to the west-south-west dyke D6 and its equivalent across the Corrimal Fault, dyke D3 correlate with the upper most tributary of the Cataract River. As both these dykes were estimated to be hard and of reasonable thickness at coal seam level it is feasible to expect surface exposure. Field mapping has been undertaken and no evidence of the dykes at the surface was found.

Dyke D8 is exposed at the surface in an old bypassed section of Mt. Ousley Road at coordinate E303640, N6196780. The dyke was highly weathered to soft puggy clay. Dyke thickness was approximately 0.28m and had a strike of 320 degrees to the northwest. The projection of the dyke was traced along surface subsidence line 500 to location E303258 N6197006 where an open joint bearing 315 degrees to the northwest was located. No evidence of dyke D8 was found. The joint was approximately 0.3m wide. Across the Study Area there is no other surface evidence of the dyke and no apparent correlation with any surface feature. It is not until the dyke crosses into Corrimal Colliery that correlation with a notch on the western side of the Cataract Reservoir occurs. Workings of Corrimal Colliery have mined through the dyke about and under Cataract Reservoir with no apparent consequence to any form of water ingress. There is no indication on subsidence lines for longwall 4 and longwall 5 indicating any excessive movement on the projection of the dyke. Where the dyke has been mined through in workings, particularly recently by NRE No.1 in the Wongawilli Seam, the dyke does not show any water make at all.

3.3 Integrity of Structures

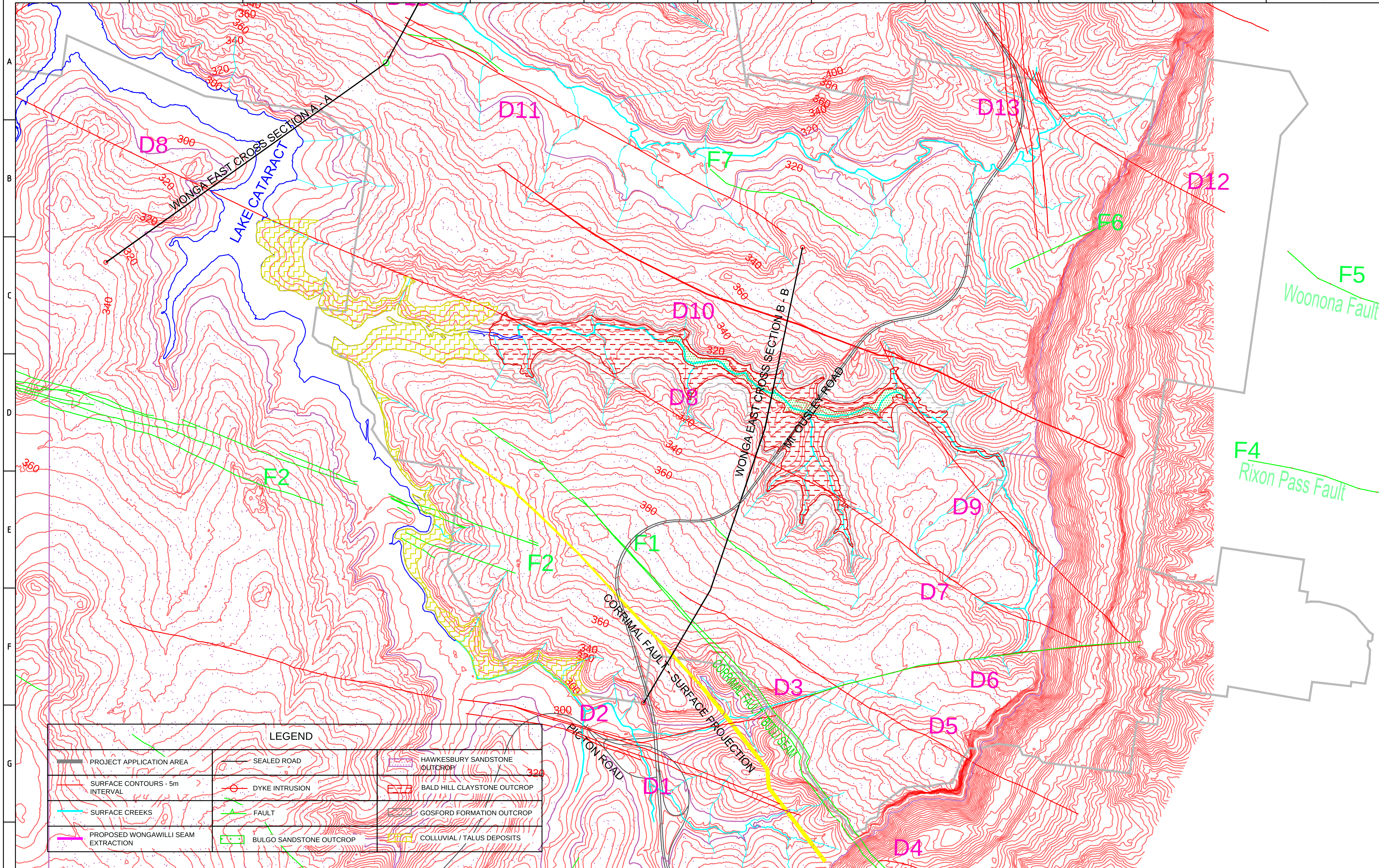
Within the study area there are only two main geological structures that could have an impact on, or influence, the potential hydraulic connectivity of surface or near surface groundwater into mine workings.

The Corrimal Fault (Fault F1) has been well documented and discussed in this report. It has been established the fault does not extend to the Cataract Reservoir. The only area where the fault has a surface relationship with surface features is with small upper tributaries of the Cataract River near the escarpment.

The Corrimal Fault has been intersected in the recent workings of NRE No.1 Colliery. The fault plane was a single, tight structure with a displacement of 1.8m to 0.35m decreasing to the northwest in MG5 development. Further mine development in MG6 has shown the fault to fragment into several small scale faults of an erratic character. The main fault plane is still evident but the Corrimal Fault has become a structurally disturbed zone and is displaying characteristics typical of a terminating structure. The fault is also intersected in the overlying Bulli and Balgownie Seams and there is obviously no water make occurring on the fault plane from these overlying workings or any potential migratory groundwater from overlying strata.

Reactivation along the fault plane by goaf formation appears to have very little substance. Longwall 4 and 5 have been extracted; the fault plane at seam level is approximately 140m away from the goafs. There is no evidence of reactivation on the surface. In fact there is no evidence the fault actually projects to the surface as its displacement decreases to the northwest.

The other main geological structure that intersects the surface is dyke D8. The dyke is prominent in the workings of all three coal seams and has an extensive strike length of over 7.0km. Ground proofing has noted the dyke at the surface near Mt Ousley Road where it was 0.28m thick and soft clay. No other actual surface exposure of the dyke has been found. Where dykes are weathered to soft, puggy clays they tend to act as seals to the movement of groundwater along their projections. As the dyke is prominent in all three coal seams no water ingress has been detected at any of the recent intersections in the workings of NRE No.1 Colliery. This could be taken to imply the dyke is not a conduit to water ingress from the coal seams above or the overlying strata intersected by the dyke.



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NRE No. 1 Colliery

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SCALE	1:15000	

Title
NRE No. 1 COLLIERY - PART 3A APPLICATION PPR
TOPOGRAPHIC DETAILS, SURFACE FEATURES & GEOLOGY AREA - WONGA EAST

DRAWING NUMBER: FIGURE 18

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RUSSELL VALE COLLIERY - MG6 CORRIMAL FAULT INSPECTION

Memo: MG6 Panel

Date: 27.05.2014

Inspected: R. Cartwright

Scope: An inspection of MG6 B heading inbye 12 c/t was undertaken on 22.05.2014 to define the characteristics of the geological structures inferred as the projection of the Corrimal Fault.

Technical Notes:

- As experienced in MG6 A HGD, a structured zone consisting of three (3) distinct faults has been identified approximately 40m inbye of B12 intersection. The structured zone is summarized as the following geological features:

Fault 1 – A normal fault located 38m on the RHR inbye of B12 intersection. Measured displacement was 0.17m down-throw with an observed hade of 70 degrees towards the south-west.

Fault 2 – A normal fault located 40m on the RHR inbye B12 intersection. Measured displacement was 0.23m down-throw with an observed hade of 60 degrees towards the south-west.

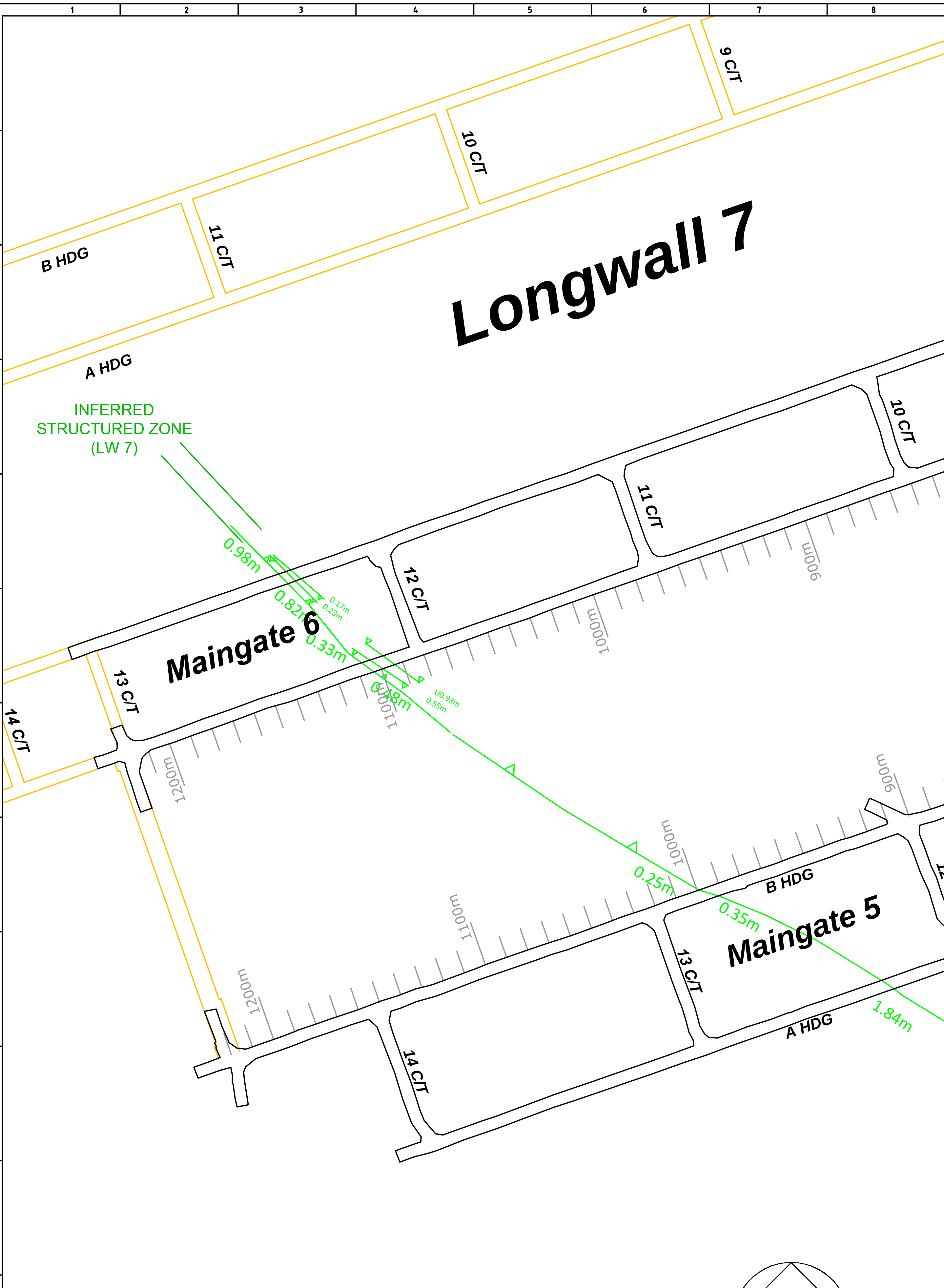
Fault 3 – A normal fault located 44m on the RHR inbye B12 intersection. Measured displacement was 0.82m up-throw with an observed hade of 70 degrees towards the north-east. Note – these characteristics are consistent with the projection of the Corrimal Fault through adjacent panels.

- A series of sub-parallel 'cutters' are associated with the faults. No significant displacement was noted on these minor structures. This zone of minor structures associated with the structured zone has caused significant 2.5m cavity in the roof (base of Wongawilli Sandstone) & slumping to approximately 1.0m on the right hand side rib looking inbye.

- No noticeable water-make was noted on the structure to date. No excessive corrosion was noted on any support hardware indicating that water-make had occurred outside the time of inspection.

Attachments:

- Figure 1 – Wongawilli Seam Geology – Area: LW6 – Corrimal Fault Projection – MAY 2014.
- Figure 2 – Wongawilli Seam Geology – Area: LW6 – Corrimal Fault Projection – MAY 2014. (Multi-Seam)
- Figure 3 – Seam Level Roof Conditions – Area: MG6 (12CT) – MAY 2014.
- Figure 4 – Typical Wongawilli Seam Section of Strata – Wonga East – MAY 2014.



Russell Vale Colliery

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ABN 28 111 244 896

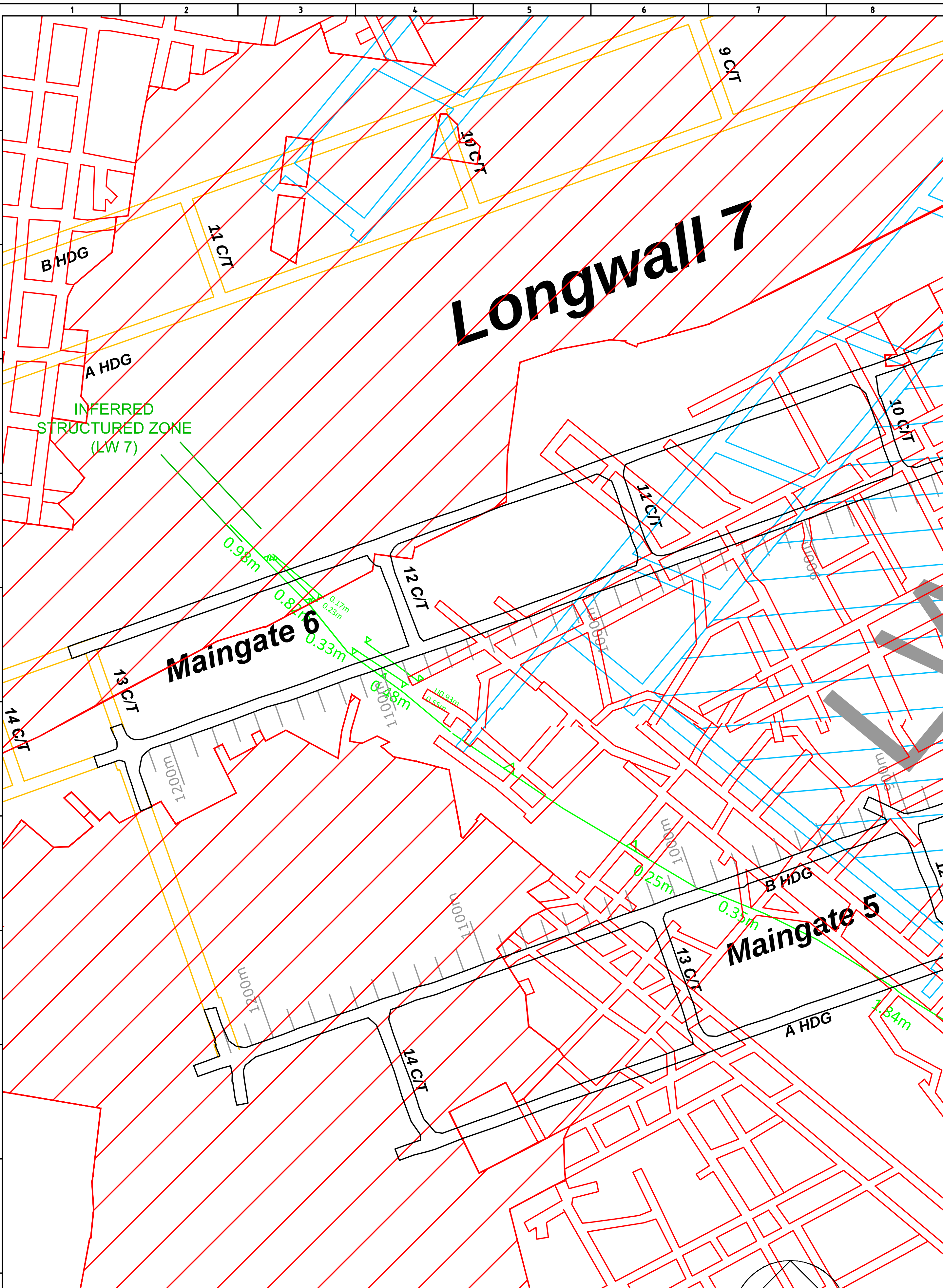
	Name	Date
DRN	RC	23.05.14
CKD		
APP		
SCALE	1:400	

Title

RUSSELL VALE COLLIERY
WONGAWILLI SEAM GEOLOGY PLAN
AREA: MG6 (CORRIMAL FAULT)

DRAWING NUMBER: MAY 2014

REV: 0



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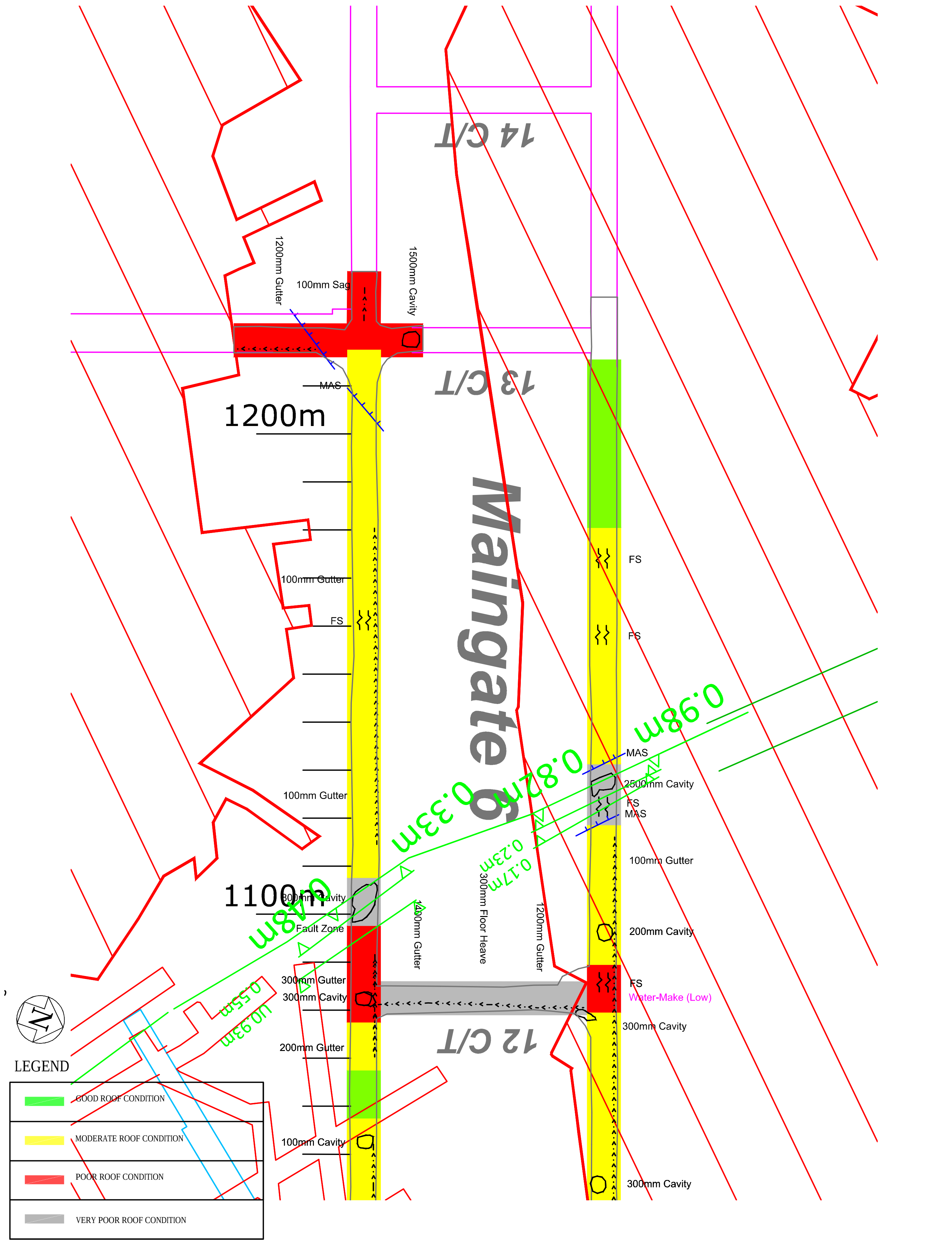
REV: 0



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	Name	Date
DRN	RC	23.05.14
CKD		
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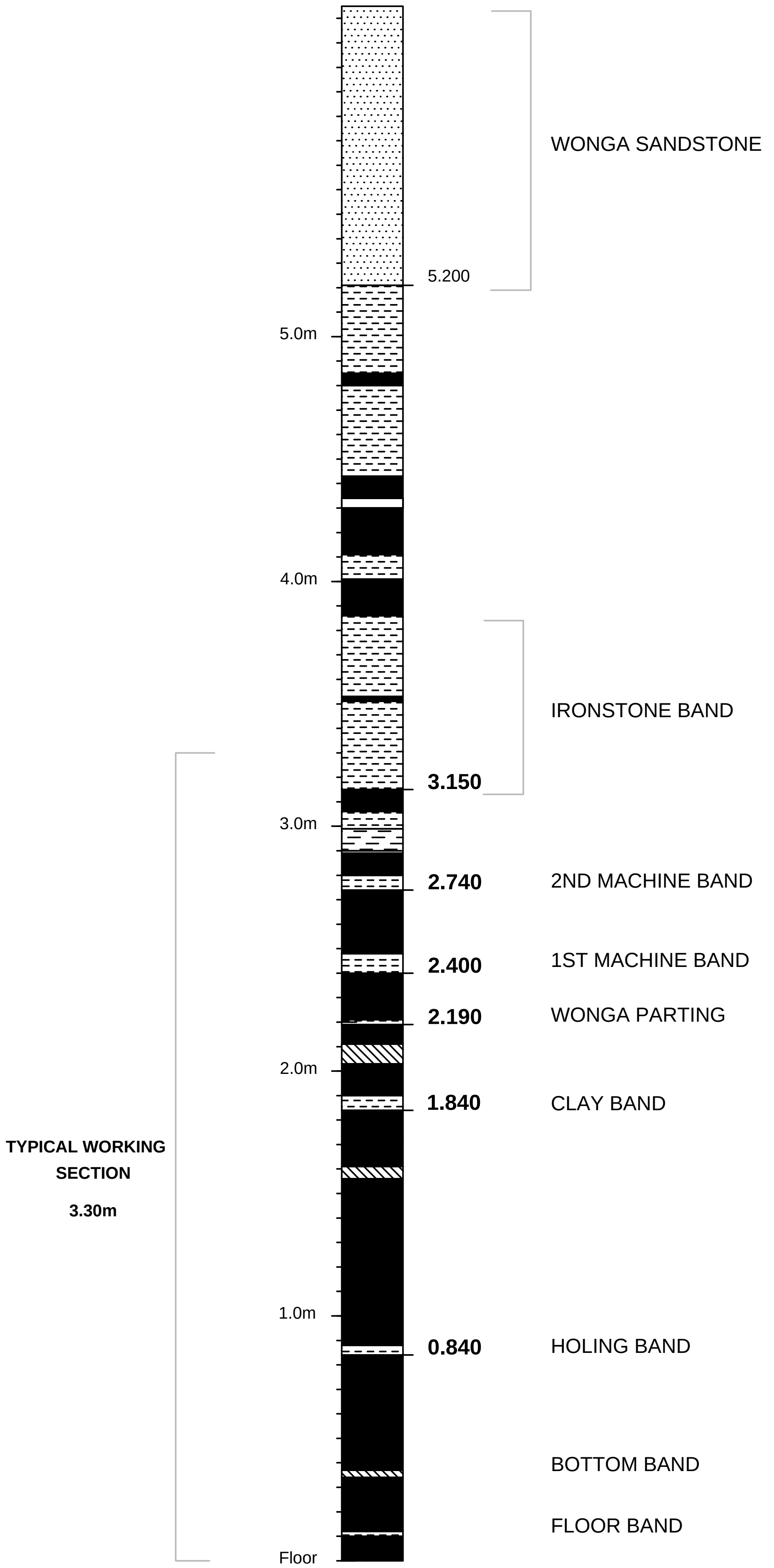
SCALE	1:400	

Title

RUSSELL VALE COLLIERY
SEAM LEVEL ROOF CONDITIONS PLAN
AREA: MG6 (12CT)

DRAWING NUMBER: MAY 2014

REV: 0



Russell Vale Colliery
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	Name	Date
DRN	RC	06.05.14
CKD		
APP		
SCALE	SHOWN	

Title
RUSSELL VALE COLLIERY
TYPICAL WONGAWILL SEAM SECTION OF STRATA
AREA: WONGA EAST LONGWALL DOMAIN

DRAWING NUMBER: MAY 2014

REV: 0

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WOLLONGONG COAL RUSSELL VALE COLLIERY

GEOLOGICAL REPORT ON THE CORRIMAL FAULT

WOLLONGONG COAL LIMITED

Date – 30TH June 2014

Wollongong Coal Ltd

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1. INTRODUCTION

This report has been compiled to document the current level of knowledge and understanding of the Corrimal Fault within the Russell Vale Colliery Wonga East Study Area of Wollongong Coal.

2. SURFACE GEOLOGY

Surface geology in the Wonga East Study Area has been reviewed through ground proofing traverses, detailed Lidar topographic data at 1.0m contour intervals and aerial photography. The surface traversing (eastern bank Cataract Reservoir) was undertaken in July and August 2013 for the compilation of the report on the geology of the Wonga East area and also on the 27th June 2014 (western bank Cataract Reservoir). Figure 1 details the areas that have been traversed and projections of major geological structures to their approximate surface location.

No surface expression of the Corrimal Fault has been found during the ground proofing traverses. Dominant over the plateaux and ridges on both sides of the Cataract Reservoir is the Hawkesbury Sandstone forming prominent cliff lines in most areas inspected. Prominent jointing within the Hawkesbury Sandstone is generally striking 055^0 to the northeast / southwest with a less prominent conjugate set at 155^0 to the southeast / northwest. These joint directions tend to control many of the prominent topographic features particularly the cliff lines within the Hawkesbury Sandstone which are commonly formed by block failure along the prominent 055^0 joint direction as shown in Figure 2. The Corrimal Fault projects at approximately 125^0 to the southeast / northwest. Minor jointing with a similar strike was measured within the proximity of the projected strike of the fault on the western edge of the Cataract Reservoir but no evidence of movement along this jointing was found.

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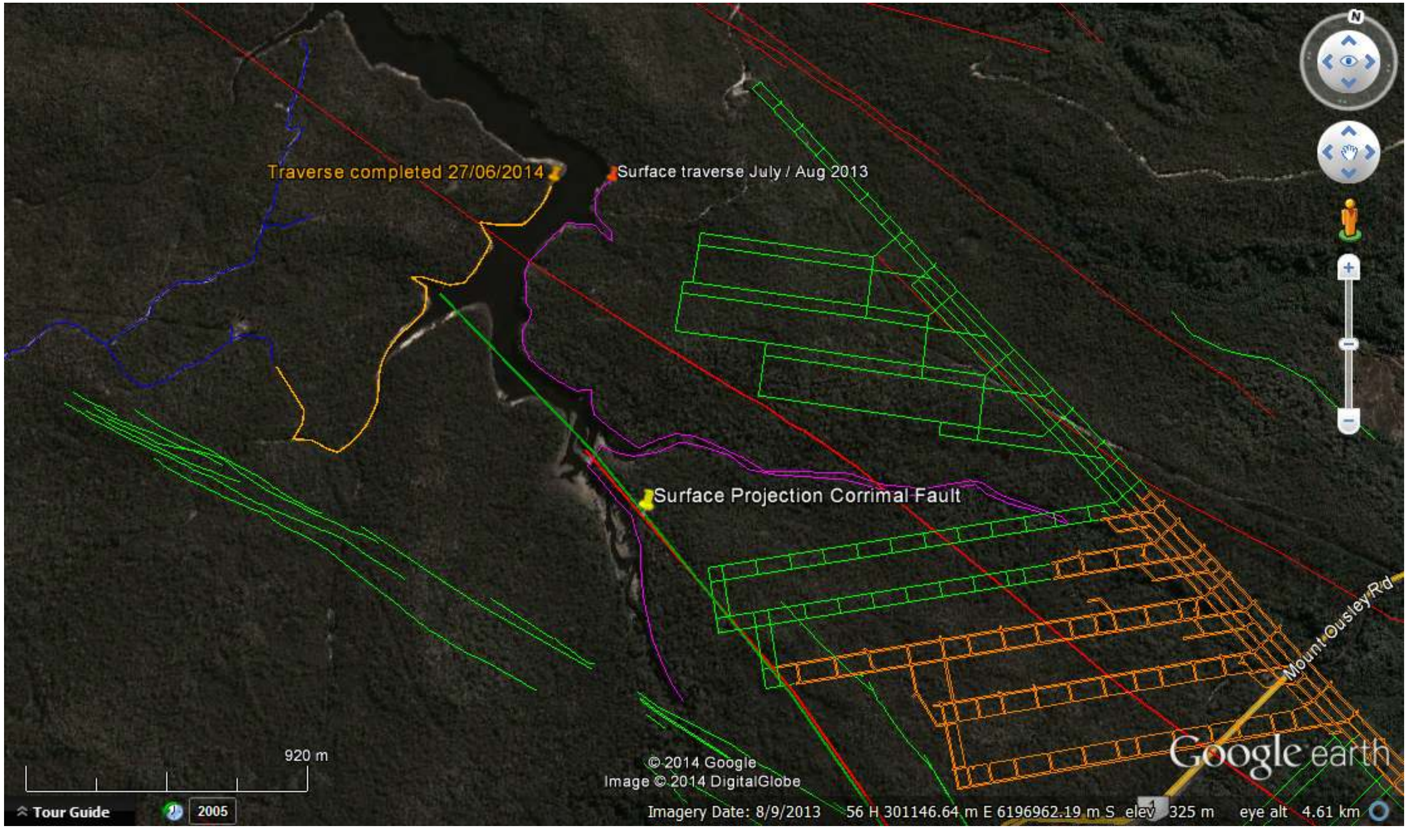

Figure 1 Surface traverse paths and projected geological structures

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Figure2 Prominent 055 jointing and cliff formation of the Hawkesbury Sandstone

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Figure 3 (Figure 11 from the Geology of the Wonga East Area Report) details the surface geology as currently understood from surface mapping and interrogation of the detailed Lidar data.

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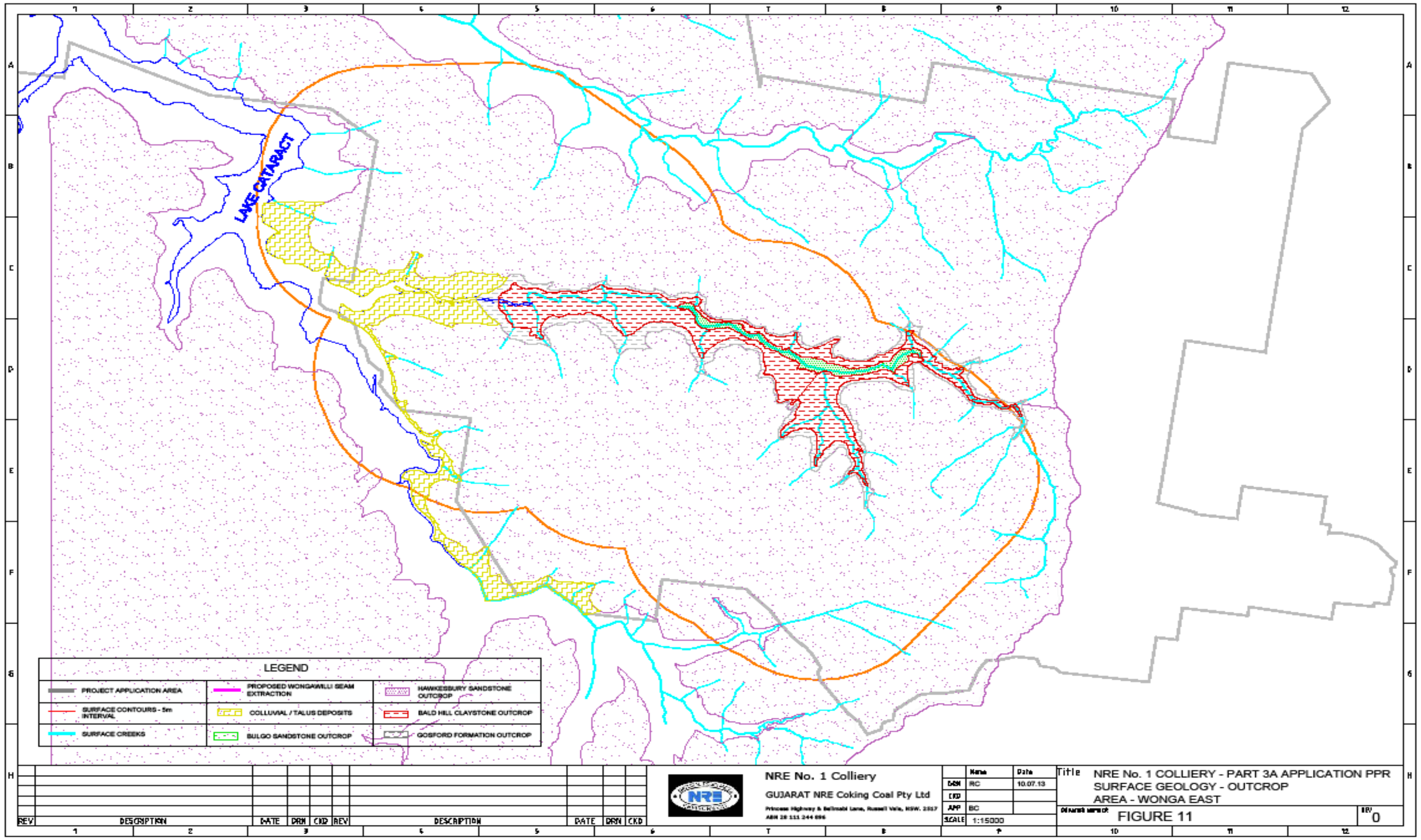

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3. DETAILS OF CORRIMAL FAULT FROM MINE WORKINGS

3.1 BULLI MINE WORKINGS

Within the Bulli Seam mine workings the Corrimal Fault occurs from outcrop and extends approximately 3000m to the northwest (bearing 320 degrees) before dying out within the mine workings. Maximum recorded displacement has been measured at 28.7m with a fault width of approximately 20m. There are no records or documentation indicating moisture ingress being associated with the fault.

The following photographs from mine working plans (Figures 4, 5 and 6) detail the extent of the Corrimal Fault and its termination within the workings.

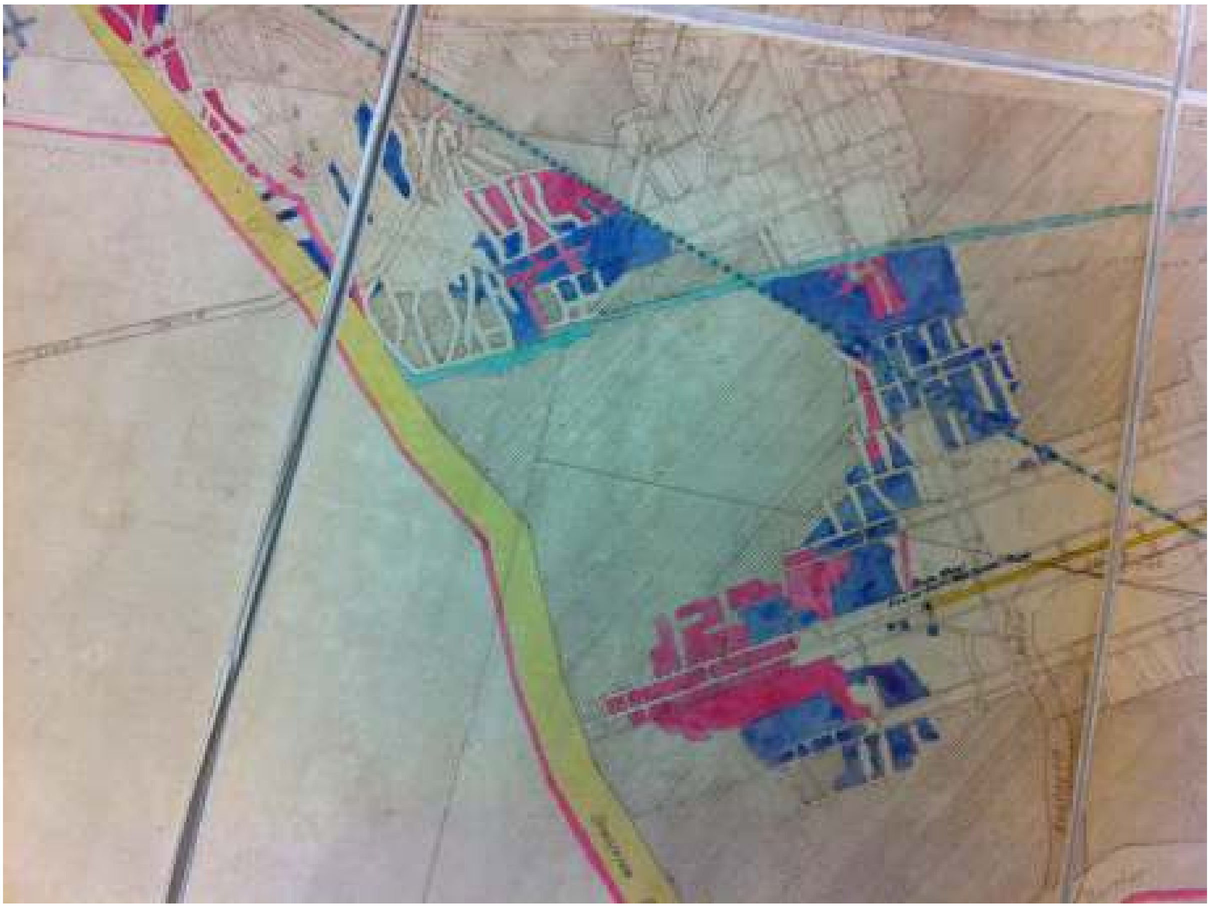

Figure 4 Corrimal Fault near outcrop

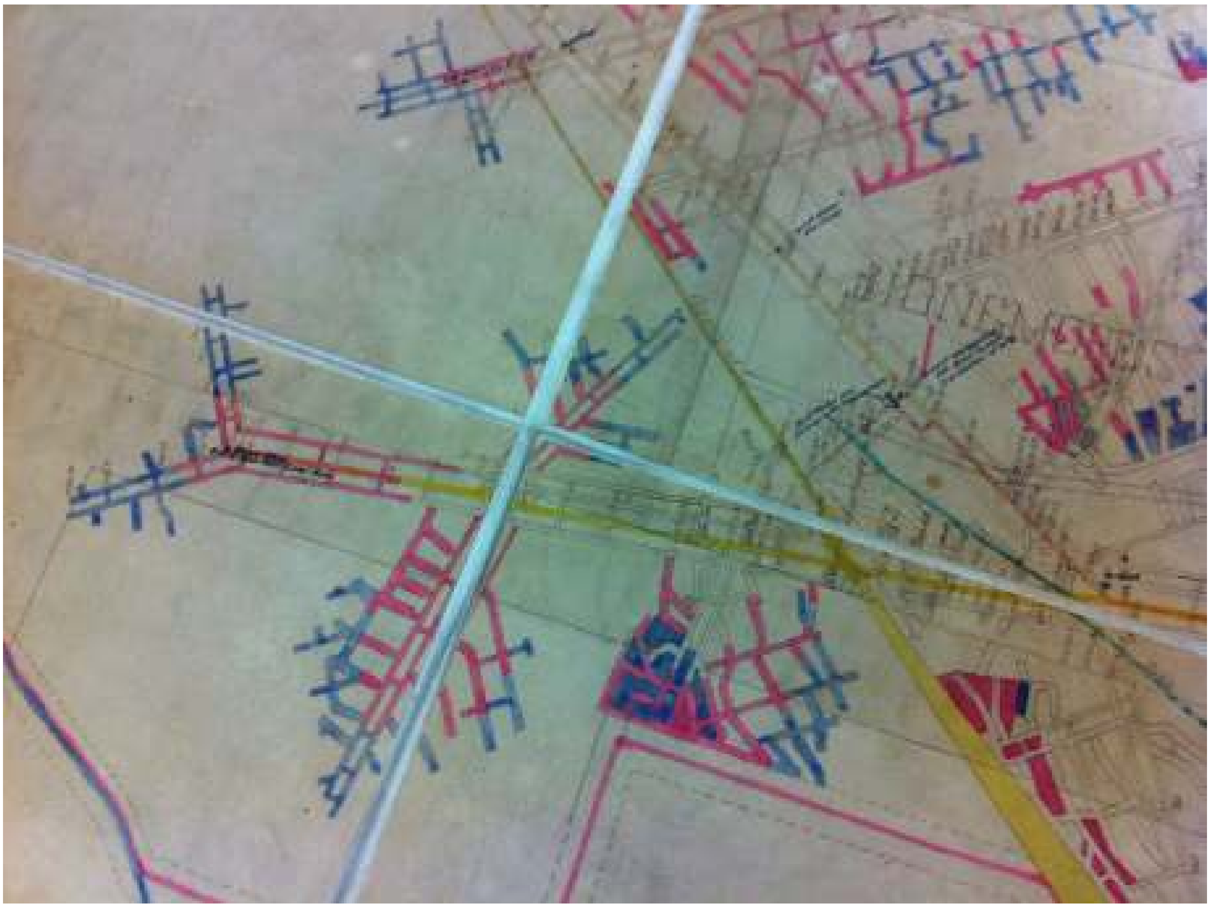

Figure 5 Corrimal Fault as defined from mine workings

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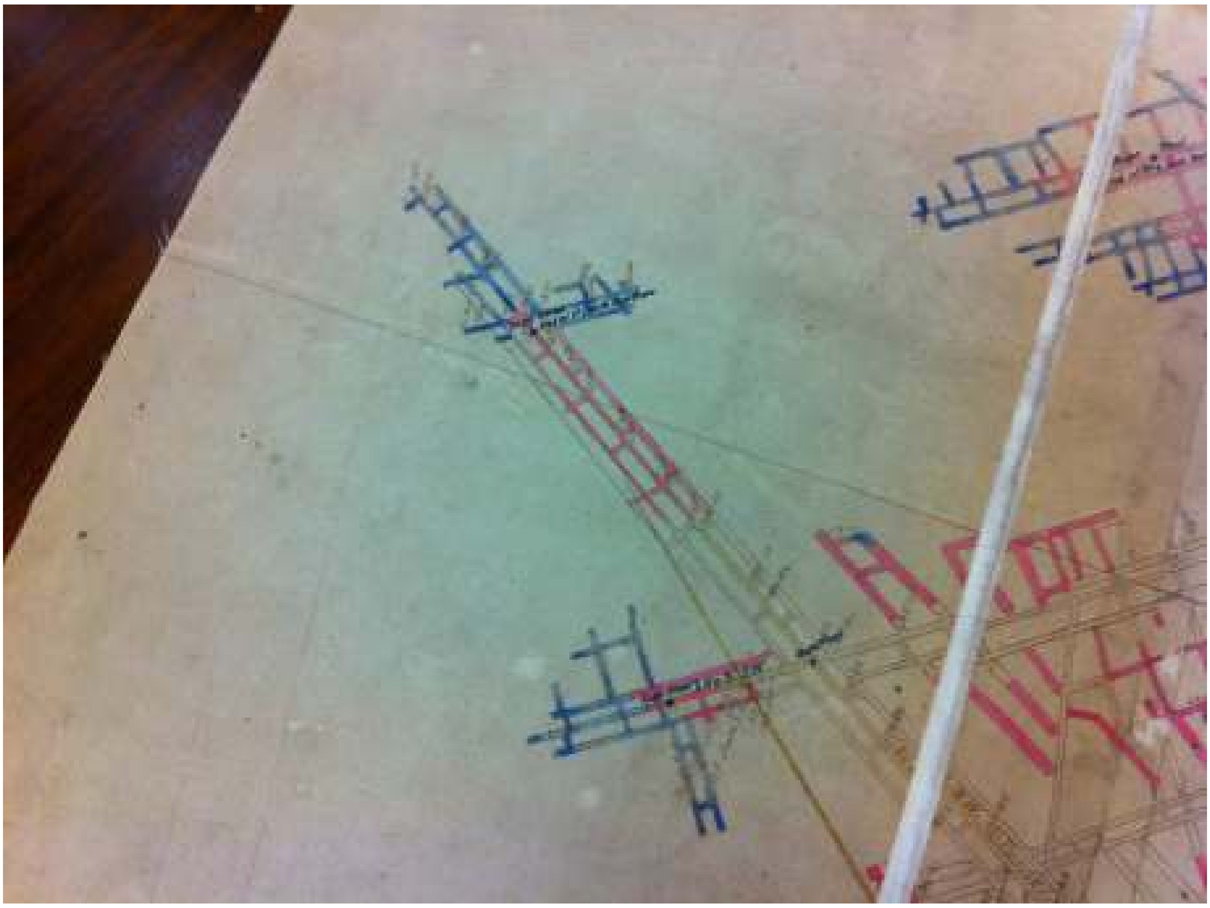

Figure 6 Termination of Corrimal Fault within the Bulli seam workings

3.2 BALGOWNIE MINE WORKINGS

Faulting intersected by the Balgownie workings displays some correlation with known faulting in the overlying Bulli Seam. The Corrimal Fault was intersected in a heading of gate road driveage and had a displacement of 1.53m and was offset 7.0m to the north from the fault position in the Bulli seam.

3.3 WONGAWILLI MINE WORKINGS

Within the mine workings of the Wongawilli Seam the Corrimal Fault was first intersected in Maingate 5 development and had displacements of 1.84m to 0.35m (displacement was reassessed in MG5 B heading from 1.50m displacement to 0.35m after mining had progressed past the fault intersection) across the two headings, decreasing in displacement along its projected strike to the northwest.

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Characteristics of the fault are similar to those known from the Bulli and Balgownie Seams, being a normal fault down thrown to the north. Where intersected the fault had a measured dip of 35 degrees. The fault plane is offset approximately 24m to the north from its position in the Bulli Seam.

Further mine development in Maingate 6 has also intersected the Corrimal Fault. First intersected in the A Heading the fault has developed into a structural zone consisting of a set of three faults. The first fault is upthrown 0.93m followed by a downthrown fault of 0.55m and then another downthrown fault of 0.48m which decreases to 0.33m across the mined heading. This third fault is on the actual projection of the Corrimal Fault from Maingate 5. Also intersected in the B Heading the structural zone has the first fault downthrown 0.17m with the second fault downthrown 0.23m and the third fault plane downthrown 0.82m in the A heading and increasing to 0.98m across to the B heading. Details of the structural nature of the Corrimal Fault in this area are given in Figure 7.

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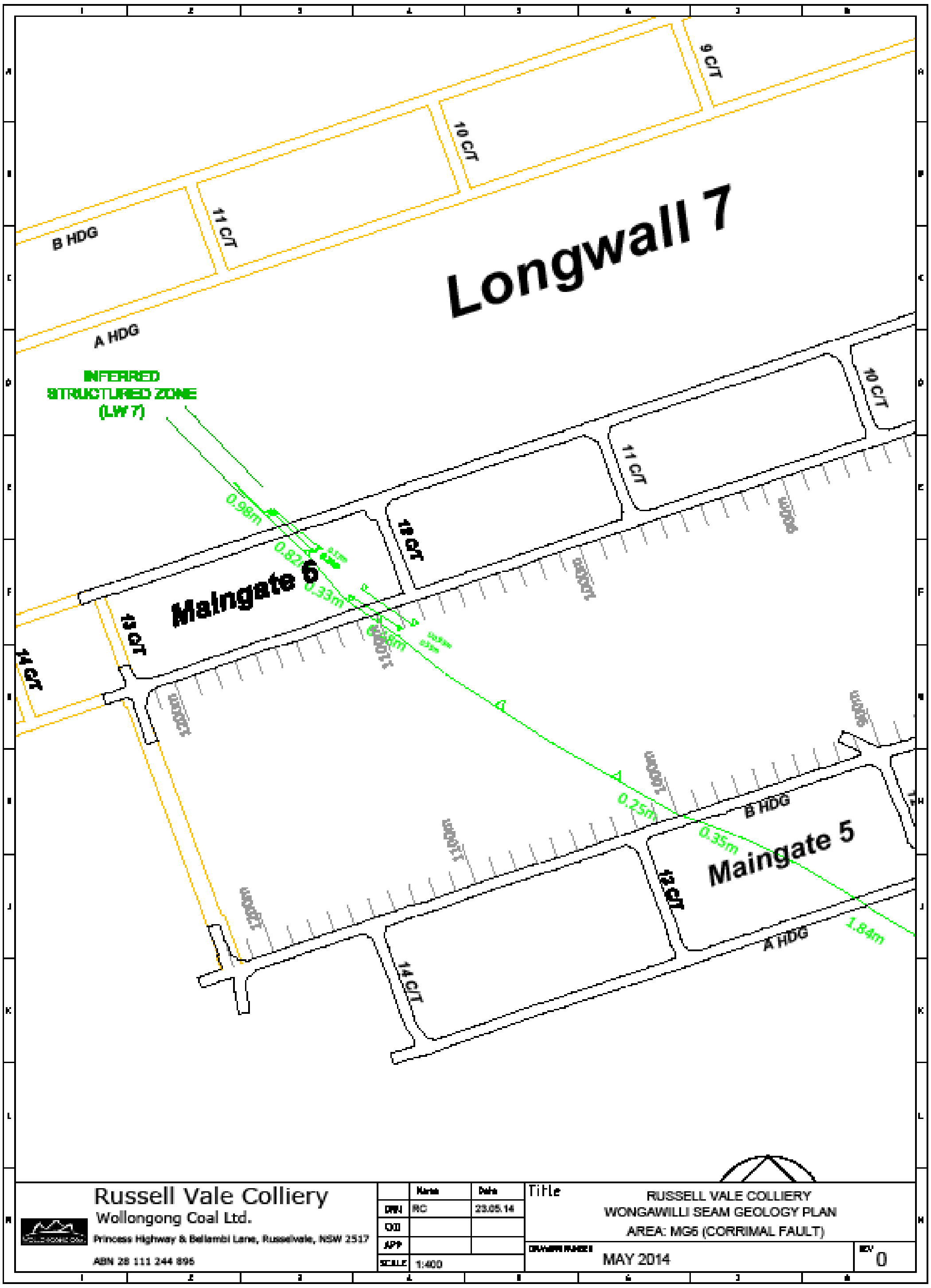

Figure 7 Details on the Corrimal Fault in the Wongawilli seam mine workings

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The Corrimal Fault has become erratic in nature and is displaying typical characteristics of terminating as it fragments into a series of small non-correlated faults of inconsistent displacement and sense of dip.

Based on this erratic nature of the structural zone it is predicted to decrease in severity and die out within a distance of less than 500m with the likelihood of further fragmentation resulting in small scale faulting disrupting mine development in the immediate location of the structures.

4. DISCUSSION

A detailed review of the geological structure of the Corrimal Fault has been undertaken as described in this report. Confidence has been established in the relationship of the fault structure and location through details of the mine plans available of the workings of South Bulli Colliery through comparison and analysis of the workings of the Balgownie and Wongawilli seams.

The surface geology in the Wonga East Study Area has been reviewed through ground proofing traverses, detailed Lidar topographic data and aerial photography. Prominent structural features known from mine workings have been projected to the surface, either vertically for igneous dykes or at an angle for faulting determined by the hade of the fault.

In examination of the control on surface features by known geology there is some structural correlation but it is quite limited. The following section will review the projected Corrimal Fault and its implication from surface features.

Of the prominent faults in the Study Area there is a correlation of the Corrimal Fault (Fault F1) projected to the surface with two small upper tributaries feeding the upper Cataract River approximately 840m nor-west of the escarpment. Field mapping could not identify the surface expression of the fault but a thickened section of Bald Hill Claystone on the southern side of the creek gully and apparent Hawkesbury Sandstone on the northern side imply evidence of the fault at this location.

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Following the projected surface trace of the Corrimal Fault further to the northwest there is no other surface expression that is evident from ground proofing. As has been discussed in this report the validity of data on the old South Bulli mine plans has been confirmed as accurate thus confidence is high that the Corrimal Fault dies out within the Bulli seam workings and the decreasing throw of the fault in the Balgownie and particularly in recent Wongawilli workings support this. As such it is considered that any connection of the fault to surface waters of the Cataract Reservoir is not possible. Reactivation of the fault due to subsidence is considered remote with the main section of the fault well away from the main body of stored water. Subsidence lines along the centre of Longwall 4 and Longwall 5 have been traversed and no evidence of the fault trace or any movement that could be interpreted as a result of fault reactivation was found.

The Corrimal Fault has been intersected in the recent workings of Wollongong Coal's Russell Vale Colliery. The fault plane was a single, tight structure with a displacement of 1.8m to 0.35m decreasing to the northwest in MG5 development. Further mine development in MG6 has shown the fault to fragment into several small scale faults of an erratic character. The main fault plane is still evident but the Corrimal Fault has become a structurally disturbed zone and is displaying characteristics typical of a terminating structure. The fault is also intersected in the overlying Bulli and Balgownie Seams and there is obviously no water make occurring on the fault plane from these overlying workings or any potential migratory groundwater from overlying strata.

Reactivation along the fault plane by goaf formation appears to have very little substance. Longwall 4 and 5 have been extracted; the fault plane at seam level is approximately 140m away from the goafs. There is no evidence of reactivation on the surface. In fact there is no evidence the fault actually projects to the surface as its displacement decreases to the northwest.

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