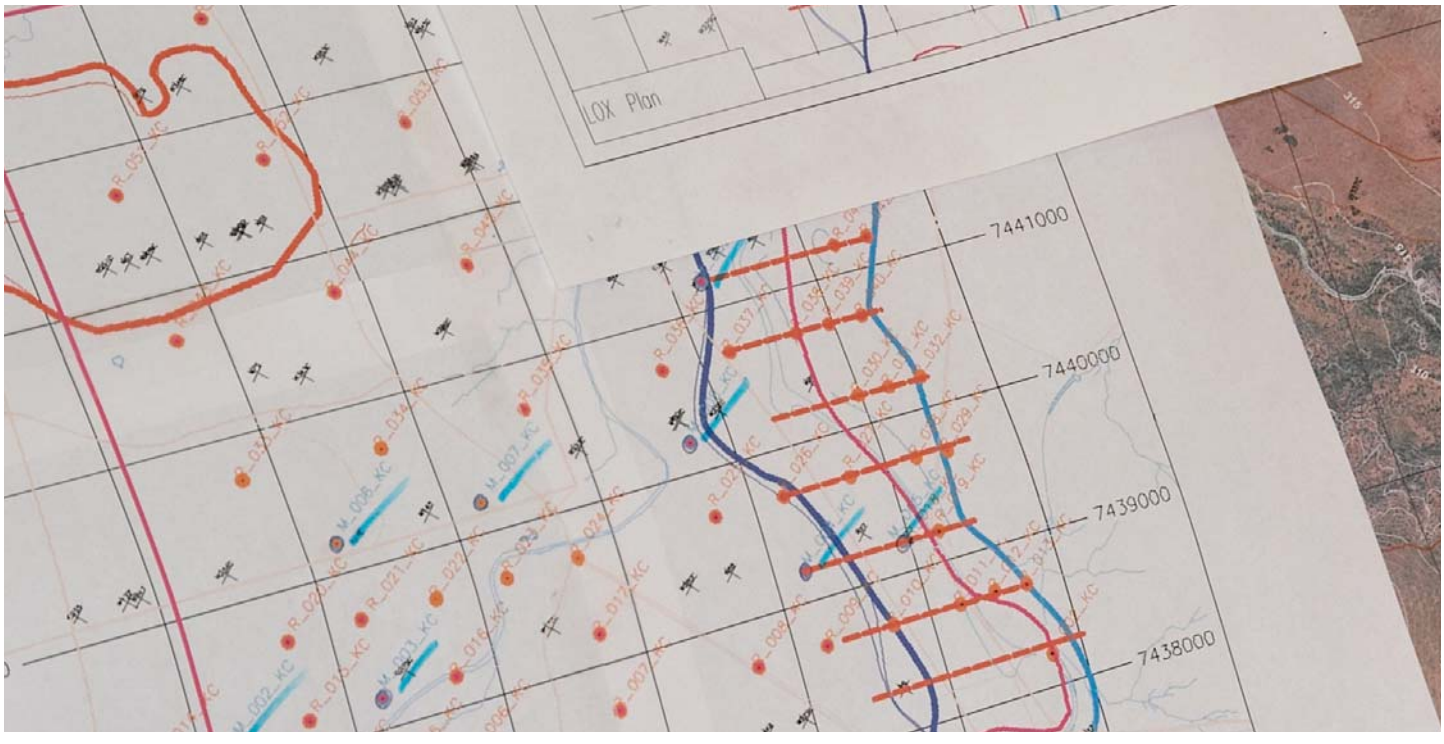
0 Interim Cumulative Impacts Assessment Report



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Appendix O Cumulative Impacts Assessment

1. Background

As a requirement of the Terms of Reference (TOR) as part of the Kevin's Corner Project Environmental Impact Statement (EIS), a cumulative impact assessment was undertaken. The report was prepared as part of the Kevin's Corner EIS (HGPL, 2011). This cumulative impact assessment was carried out using a broad and qualitative approach, outlining the potential local and regional cumulative impacts associated with known and planned projects, for all of the EIS environmental aspects. Following the submission of the EIS, it has been made possible to enhance the determination of the high risk cumulative impact components of the Project, therefore enabling the undertaking more qualitative assessments of these potential impacts as appropriate.

2. Introduction

As stated in the Kevin's Corner EIS, cumulative effects may occur due to the compounding and synergistic interactions arising from other developments occurring in the same geographical area or concurrently over similar time frames to the Project being assessed. Recognised environmental values may be impacted as a result of a geographic overlap of project areas, scheduling overlap, or using the same infrastructure, services and resources. Many of the cumulative effects associated with the Project are derived on a broader scale from transport, economic and social interactions between the Project and other existing or proposed projects within the Project vicinity. Closer to the Project site cumulative effects associated with the Project may include impacts on biophysical aspects, such as air quality (dust), groundwater, surface water, etc.

In considering the EIS responses and the Proponent's understanding of the Project and regional environmental aspects, this updated cumulative impacts assessment details, where appropriate, the quantitative cumulative impacts assessment (environmental and social impacts) for the Kevin's Corner and Alpha Coal Projects. In addition, the cumulative impacts are qualitatively assessed for applicable proposed developments in the region of Kevin's Corner.

1 Air Quality;
2 Groundwater;
3 Surface Water Hydrology;
4 Geomorphology;
5 Traffic;
6 Significant Vegetation Communities and Habitats; and
7 Social Impacts.

This interim report details the quantitative assessment, where appropriate, of the cumulative impacts for the above identified environmental and social impacts for the Kevin's Corner and Alpha Coal Projects.

This cumulative impact report in assessing the cumulative impacts of the development of the proposed Project is based on the best information publicly available when this report was prepared.

3. Methodology

3.1. Kevin's Corner and Alpha Coal

This interim cumulative impact assessment report presents the work undertaken to date for the quantitative assessment of the combined Kevin's Corner and Alpha Coal mine Projects. This information is primarily a result of the cumulative assessments undertaken as part of the Kevin's Corner and Alpha Coal EIS's and will be supplemented using the proposed methodology below for the remaining applicable projects in line with the assessment timeline proposed in Section 5.

3.2. Local and Regional Assessment

The methodology used to assess the Project's cumulative impacts consisted of the following tasks:

- identify appropriate geographic boundaries for the analysis of cumulative impacts. Where potentially interacting projects are not located close enough for the relevant impacts to overlap, cumulative impacts are less likely. The extent of the assessment boundaries will vary according to the nature of the impact being assessed. The impacts identified within the EIS and this study have fallen within three considered geographical areas of influence:
  - **Local**: includes the area containing the Project and immediately adjacent projects;
  - **Regional**: where the impacts extend beyond the immediate local Project area, and include the local township of Alpha, and extend radially some 100 km from the Project; and
  - **State/National**: provides for more extensive impacts at the state or Commonwealth level.
- identify the impacts of the Project in isolation considering the proposed mining operations and activities and the possible impacts on existing baseline conditions and identified environmental values. These impacts have been described in detail in the relevant sections of the Volume 1 of the EIS;
- identify relevant projects within the areas of influence of the Project that are either proposed or approved but not yet operational that could generate impacts that could potentially interact with similar impacts from the Project. These projects have been described in detail in Cumulative Impacts appendix of the EIS (Volume 2, Appendix X);
- identify appropriate temporal boundaries for the analysis of cumulative impacts. Where the schedules of potentially interacting projects do not overlap (primarily during construction activities), cumulative impacts are less likely; and
- assess the significance of the cumulative impacts with respect to beneficial or detrimental environmental or social effects.

In assessing the significance of potential cumulative impacts, the extent of compliance with established standards or guidelines was used where the impacts could be expressed quantitatively.

Where the impacts were expressed qualitatively, the probability, duration, and magnitude/intensity of the impacts were considered as well as the sensitivity and value of the receiving environmental conditions.

The significance of each impact was then determined for each geographical area according to the assessment matrix given in Table O-1.

For each potential cumulative impact identified in Section 4, a mitigation strategy is proposed to limit the potential adverse effect of this impact. The finalisation and implementation of these mitigation measures will be an iterative process dependant on the cumulative progression of the identified projects.

Table O-1 Assessment Matrix

Aspect	Relevance Factors			
Environmental Value	Nil	Low	Medium	High
Probability of impact	0	1	2	3
Duration of impact	0	1	2	3
Magnitude / Intensity of impact	0	1	2	3
Sensitivity of receiving environment	0	1	2	3

It should be noted that the numerical output from the Assessment Matrix has not been presented in this document, but was used purely as a means of including or excluding further assessment within a geographic area.

Using the methodology outlined above, the cumulative impact assessment was completed for each environmental value relevant to the development of the Project.

3.3. Relevant Projects

Based on the relevant Project assessment undertaken in the EIS the existing projects included in the cumulative impact assessment for the Project are listed in the Table O-2 and Table O-3. It is recognised that there are no local existing projects, with Regional projects listed in Table O-2 and State/National projects listed in Table O-3. The locations of these existing projects are shown on Figure O-1.

Table O-2 Existing Regional projects relevant to the Kevin's Corner Project

Project	Area	Location	Description	Project Status
Clermont, Rio Tinto Coal Australia Ltd	Regional	Clermont	Open-cut coal mine operation producing 12 Mtpa with 360 employees	7 year mine life remaining
Blair Athol, Rio Tinto Coal Australia Ltd	Regional	Clermont	Open-cut coal mine operation producing 11 Mtpa with 290 employees.	5 year mine life remaining

Figure O-1 Figure of Projects (From EIS)

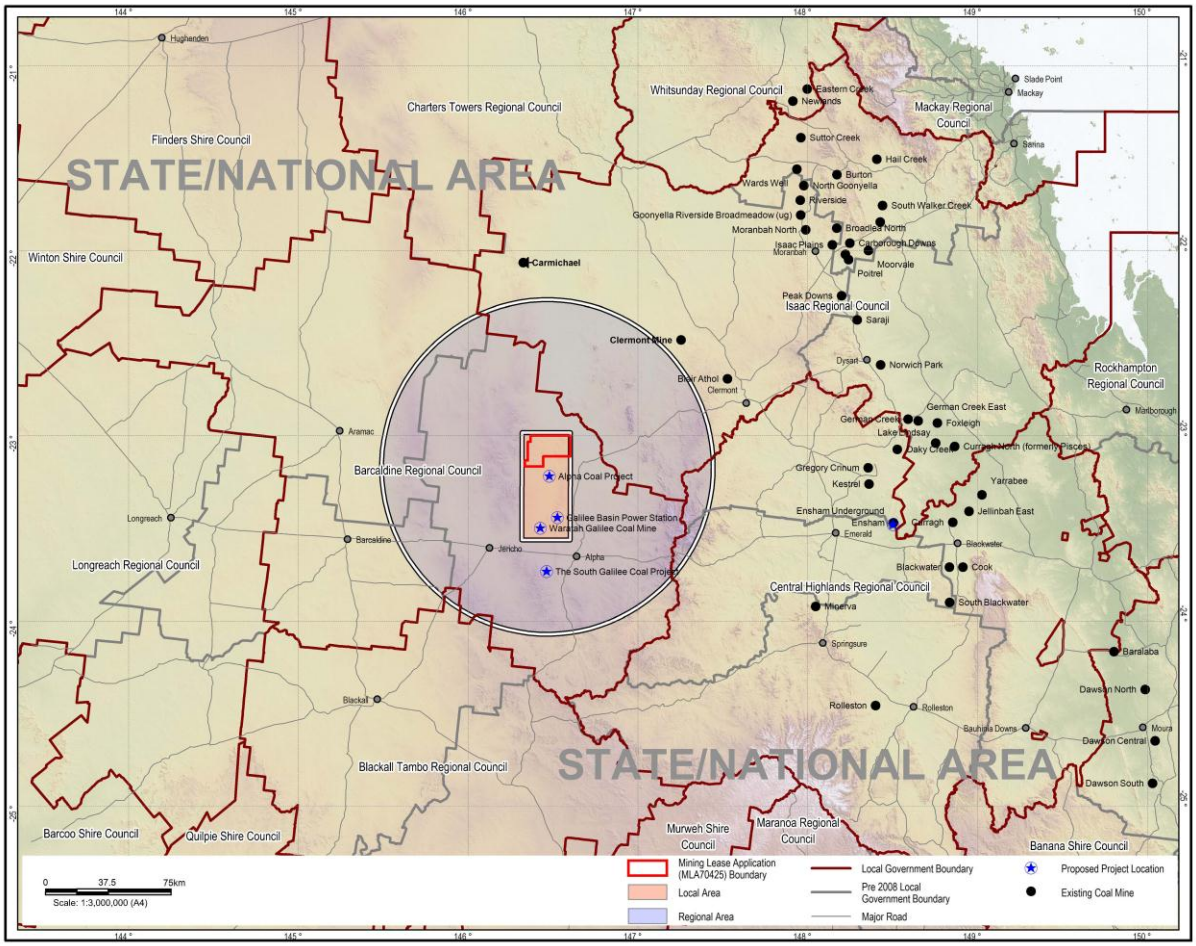


Table O-3 Existing State/National projects relevant to the Kevin's Corner Project

Project	Area	Location	Description	Project Status
Blackwater, BMA	State/ National	Blackwater	Open-cut coal mining operation producing 11 Million tonnes per annum (Mtpa) and employing 1,570 personnel	30 year mine life remaining
Cook, Caledon Resources PLC	State/ National	Blackwater	Underground coal mine operation producing 12 Mtpa with 360 employees	At least 10 year mine life remaining
Crinum, BMA	State/ National	Tieri	Underground coal mine operation producing 4 Mtpa with 420 employees (live in Emerald)	15 year mine life remaining
Curragh, Wesfarmers Ltd	State/ National	Blackwater	Open-cut coal mine producing 7 Mtpa	Curragh operations employ 1,530 staff, in total
Curragh North, Wesfarmers Ltd	State/ National	Blackwater	Open-cut coal mine producing 3 Mtpa	(suspended in December 2010 due to flooding)
Ensham, Ensham Resources Ltd	State/ National	Emerald	Open-cut coal mine producing 7 Mtpa with 600 employees	At least 20 year mine life remaining
Gregory, BMA	State/ National	Tieri	Open-cut coal mine producing 2 Mtpa with 225 employees (live in Emerald)	Only two years of mining remaining
Jellinbah East, Jellinbah Resources Ltd	State/ National	Blackwater	Open-cut coal mine producing 4 Mtpa with 380 employees.	At least 10 years of mine life remaining
Kestrel, Rio Tinto Coal Australia Ltd	State/ National	Tieri	Underground coal mine producing 4 Mtpa with 515 employees (live in Emerald)	At least 20 year mine life remaining
Yarrabee, Yancoal Australia Ltd	State/ National	Blackwater	Open-cut coal mine producing 2 Mtpa with 220 employees	15 year mine life remaining

In addition, using the criteria listed in Section 3, the proposed projects included in the cumulative impact assessment for the Project are listed in Table O-4. The locations of these projects are shown on Figure O-1.

Table O-4 Proposed projects relevant to assessing cumulative impacts of Kevin's Corner Project

Project	Area	Location	Description	Project Status
Alpha Coal Project, Hancock Coal Pty Ltd	Local	Alpha, 50 km north-west.	Open-cut coal mine producing 30 Mtpa. Maximum personnel – 2,300	SEIS completed
Galilee Basin Power Station, Galilee Power Pty Ltd (fully owned subsidiary of Waratah Coal Pty Ltd)	Regional	Alpha, 30 km north-west, immediately to the east of Waratah Galilee Coal Mine.	Coal-fired power station producing 900 MW (net). Maximum personnel – 1,000	IAS completed
Waratah Galilee Coal Mine, Waratah Coal Inc. (China First)	Local	Alpha, 13 km west and 35 km north.	Open-cut mine with export capacity of 25 Mtpa and capability to expand to more than 50 Mtpa. Maximum personnel – 2,200	EIS advertised
South Galilee Coal Project (SGCP), joint venture of AMCI (Alpha) Pty Ltd and Alpha Coal Pty Ltd.	Regional	Alpha, immediately south-west.	15-20 Mtpa open-cut and underground mining operation and associated infrastructure. Maximum personnel – 1,500	IAS completed
Ensham Underground 1 and 2, Ensham Resources	State/ National	Emerald	Underground mine expansion. Maximum personnel – 1200	Supplement EIS submitted
Carmichael Coal Mine and Rail Project	State/ National	Clermont	Open-cut and underground mine and rail infrastructure, up to 60 Mtpa. Maximum personnel – not known	IAS completed
Powerlink power transmission line	Regional	-	Transmission lines from Lilyvale substation to a new Galilee Hub substation (during construction phase). Maximum personnel – 500	EIS advertised
SunWater raw water line	Regional	-	Water pipeline from Moranbah to a raw water dam within Alpha Coal Project MLA (during construction phase). Maximum personnel – 500	-

4. Cumulative Impacts Assessment

4.1. Air Quality

4.1.1. Background

The region of the Project is predominantly rural in character supporting cattle grazing and low density farming. In addition to natural sources such as dust storms and bush fires, anthropogenic emission sources in the region consist of activities such as crop cultivation and harvesting. Therefore, air quality in the region can generally be considered typical of this area of central Queensland.

4.1.2. Cumulative Impact Assessment – Alpha Coal and Kevin's Corner

A quantitative assessment has been undertaken using publically available information from Kevin's Corner and Alpha Coal mines to estimate the likely cumulative impact on the future air quality environment. Due to uncertainties relating to the available information for the Waratah Project it has not been included in this assessment. However, it is considered that as a predominantly underground mining operation whose lease is 28 km from MLA70425 at its nearest point, emissions from the Waratah mine are unlikely to impact on sensitive receptors in proximity to the Kevin's Corner mine. Therefore, such is the distance of the Kevin's Corner and Waratah coal mines from each other it is unlikely that the cumulative impact from all three mines will differ significantly from the cumulative impacts of Alpha Coal plus Waratah or Alpha Coal plus Kevin's Corner.

The adjustments and refinements made to the SEIS for the Kevin's Corner coal mine project are described in Appendix G, Air Quality and Greenhouse Gas. The assessment of cumulative impacts also includes the refinements and adjustments made to the Alpha Coal Mine project SEIS model which are described in the Alpha Coal Mine Project Air Quality Assessment-Model Refinements technical report[1]. The updated cumulative impact assessment incorporates all new datasets and mitigation measures described in Section 3.

The cumulative impact assessment includes 11 sensitive receptors as defined by the EPP (Air) and two gazetted protected places under the Nature Conservation Act. The Spring Creek and Glenn Innes Homesteads (sensitive receptors 13 and 14) were introduced to the Alpha Coal Mine Project Refined Model assessment after they were understood to be habited on an infrequent basis. These receptors, which are located to the south of MLA70426 over 30 km from MLA70425 were not been assessed in the Kevin's Corner coal mine SEIS as impacts were expected to be minor. However, they are included in the cumulative assessment.

Table O-5 summarises the sensitive receptors and protected places at which cumulative impacts have been assessed.

[1] Hancock Coal Pty Ltd (2012). Alpha Coal Mine Project Air Quality Assessment-Model Refinements. 21st May 2012.

Table O-5 Locations of Cumulative Impacts Assessment Sensitive Receptors and Protected Places

ID*	Description	Location Type	X	Y
1	Forrester Homestead	Sensitive receptor	446462	7460888
2	Surbiton Station	Sensitive receptor	460936	7458001
3	Eulimbie Homestead	Sensitive receptor	464135	7453631
4	Surbiton Homestead	Sensitive receptor	461950	7440055
6	Burtle Homestead	Sensitive receptor	464057	7429716
8	Kia Ora Homestead	Sensitive receptor	437918	7414891
9	Monklands Homestead	Sensitive receptor	445097	7411185
10	Mentmore Homestead	Sensitive receptor	460780	7408727
11	Tressillian Homestead	Sensitive receptor	462419	7416374
13	Spring Creek Homestead	Sensitive receptor	429264	7414981
14	Glenn Innes Homestead	Sensitive receptor	441884	7408274
15	Cudmore Resources Reserve**	Category C Protected Place	435317	7456407
16	Cudmore National Park***	Category A Protected Place	433435	7452889

* IDs 5, 7 and 12 are not included because they were allocated to the Hobartville, Wendouree Homesteads and the Alpha Accommodation Village which are not sensitive receptors.

** Represented by predictions from the CALPUFF grid point at 435750 m east and 7456250 m north

*** Represented by predictions from the CALPUFF grid point at 433750 m east and 7453250 m north

4.1.2.1. Oxides of nitrogen, sulphur dioxide and carbon monoxide

The impacts of emissions of nitrogen oxides, carbon monoxide and sulphur dioxide from blasting were assessed qualitatively in the Alpha and Kevin's Corner coal mine SEIS'.

The sensitive receptors and protected places are more than 10 km from both the Alpha and Kevin's Corner coal mines. Therefore, the assessment locations in the study area are lie outside the typical exclusion zone of the most intense blasts expected from the Alpha and Kevin's Corner coal mines.

4.1.2.2. Total Suspended Particulates and Dust Deposition

For TSP, the highest predicted individual contribution from the Kevin's Corner coal mine was predicted to be 7.3 $\mu g.m^{-3}$ or 8% of the Project goal in year 5 at Receptor 1 (Appendix G, Table 4-5). Predictions ranged from 0.1 to 1.3 $\mu g.m^{-3}$ at all other receptors. Therefore, the Kevin's Corner Coal Mine is unlikely to be the major contributor to any cumulative exceedences of the Project goal of 90 $\mu g.m^{-3}$.

For dust deposition the highest predicted individual contribution from the Kevin's Corner coal mine were predicted to be 6.5 mg/m^2/day or 5% of the Project goal in year 5 at Receptor 1 (Appendix G, Table 4-6). Predictions ranged from 0.03 mg/m^2/day (Receptor 6) to 4.4 mg/m^2/day (Cudmore National Park) at all other assessment locations. Therefore, the Kevin's Corner Coal Mine is unlikely

to be the major contributor to any exceedences of the Project goal of 140 mg/m^2/day (dust nuisance) or a precautionary threshold of 500 mg/m^2/day for the protection of flora and fauna[2].

As the contribution of the Kevin's Corner coal mine to any cumulative TSP and dust deposition impact has been shown to be minor, a quantitative cumulative impact assessment for TSP and dust deposition was not undertaken.

4.1.2.3. Particulate Matter as PM_{10}

A summary of fifth highest predicted 24-hour average ground-level concentration of PM_{10} for the Kevin's Corner and Alpha Coal mines scenario for each assessed receptor is presented in Table O-6 for years 5 and 25. The associated contour plots are shown in Figure O-2 and Figure O-3.

The concentrations represent the fifth highest value when both the Kevin's Corner and Alpha Coal mines are modelled simultaneously. As such, these concentrations will differ from the sum of the individual fifth highest values for each mine[3], which were predicted on different days under different meteorological conditions.

Table O-6 Predicted 5th Highest 24-hour average ground level concentration of PM_{10} (µg.m^{-3}) (Cumulative – Alpha Coal plus Kevin's Corner)

Receptor	Y5			Y25		
	Projects	Total1	% of EPP (Air)	Projects	Total1	% of EPP (Air)
1	47.3	74.3	149	35.0	62.0	124
2	12.3	39.3	79	9.8	36.8	74
3	8.8	35.8	72	7.9	34.9	70
4	21.6	48.6	97	15.2	42.2	84
6	7.7	34.7	69	4.8	31.8	64
8	50.2	77.2	154	54.5	81.5	163
9	80.1	107.1	214	39.7	66.7	133
10	4.9	31.9	64	4.1	31.1	62
11	4.7	31.7	63	3.7	30.7	61
13	28.0	55.0	110	26.9	53.9	108
14	63.2	90.2	180	49.4	76.4	153
Project Goal	**50**		**100%**	**50**		**100%**

Note (1) Background concentration estimated at 27 µg/m^3 has been included.

[2] The impact of deposited dust on ecology, including flora and fauna, is outside the scope of the EHP objective for nuisance (140 mg/m2/day) and there are currently no deposited dust goals or standards defined for the protection of flora and fauna. However, research on dust impacts on vegetation for the Curragh North project (Doley, (2003) Effects of mineral dusts on vegetation a review of literature and model calculations), indicates that a precautionary threshold of 500 mg/m2/day would be sufficient to protect flora and fauna.

[3] Kevin's Corner fifth highest values at each modelled receptor presented in Table 4-1 of Kevin's Corner SEIS. Alpha Coal fifth highest values at each modelled receptor presented in Table 3-1 of Model Alpha Coal Refinement Report dated 21 May 2012.

Figure O-2 24-hour average PM_{10} (year 5) (Alpha Coal plus Kevin's Corner Coal Mine)

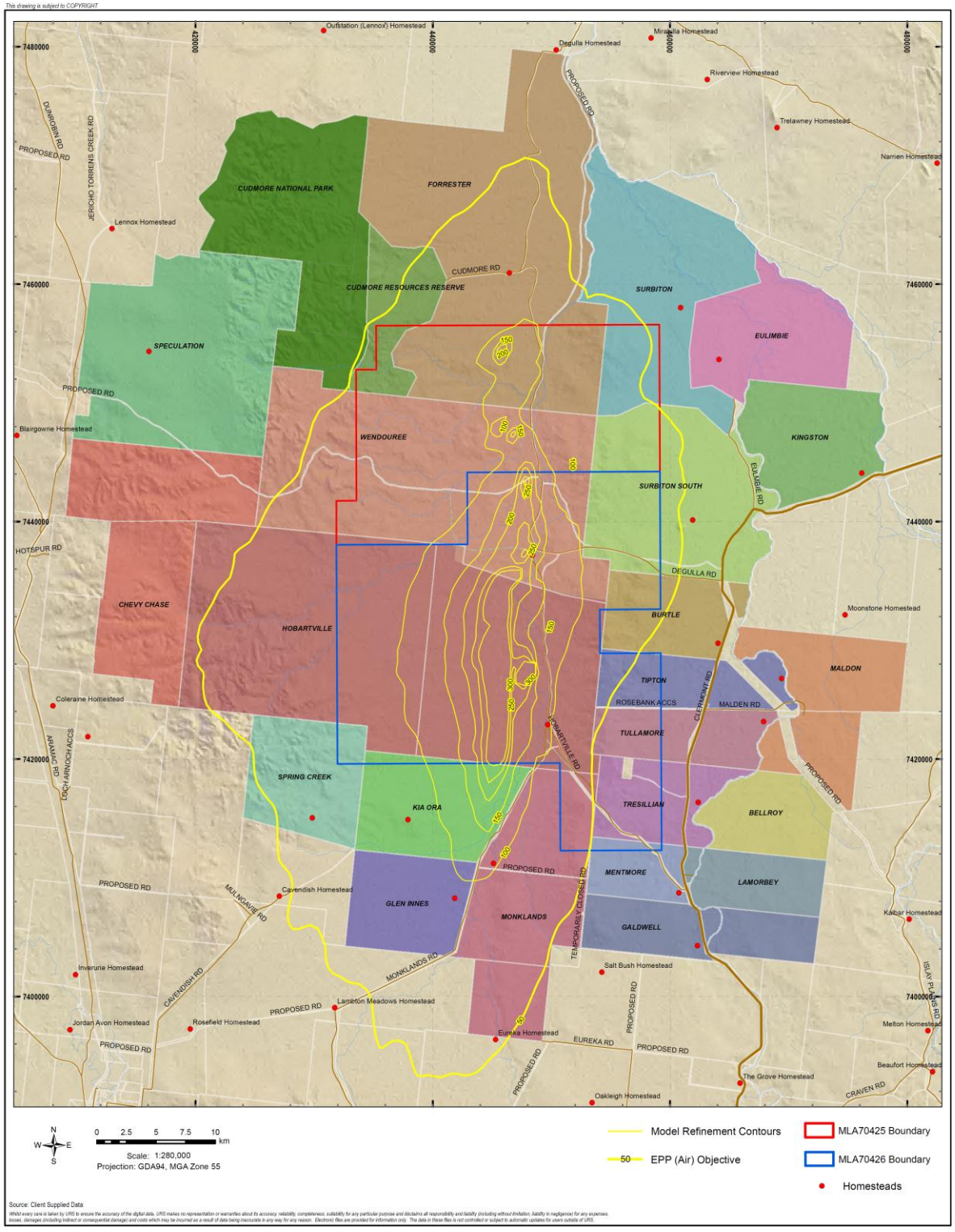


Figure O-3 24-hour average PM_{10} (year 25) (Alpha Coal plus Kevin's Corner Coal Mine)

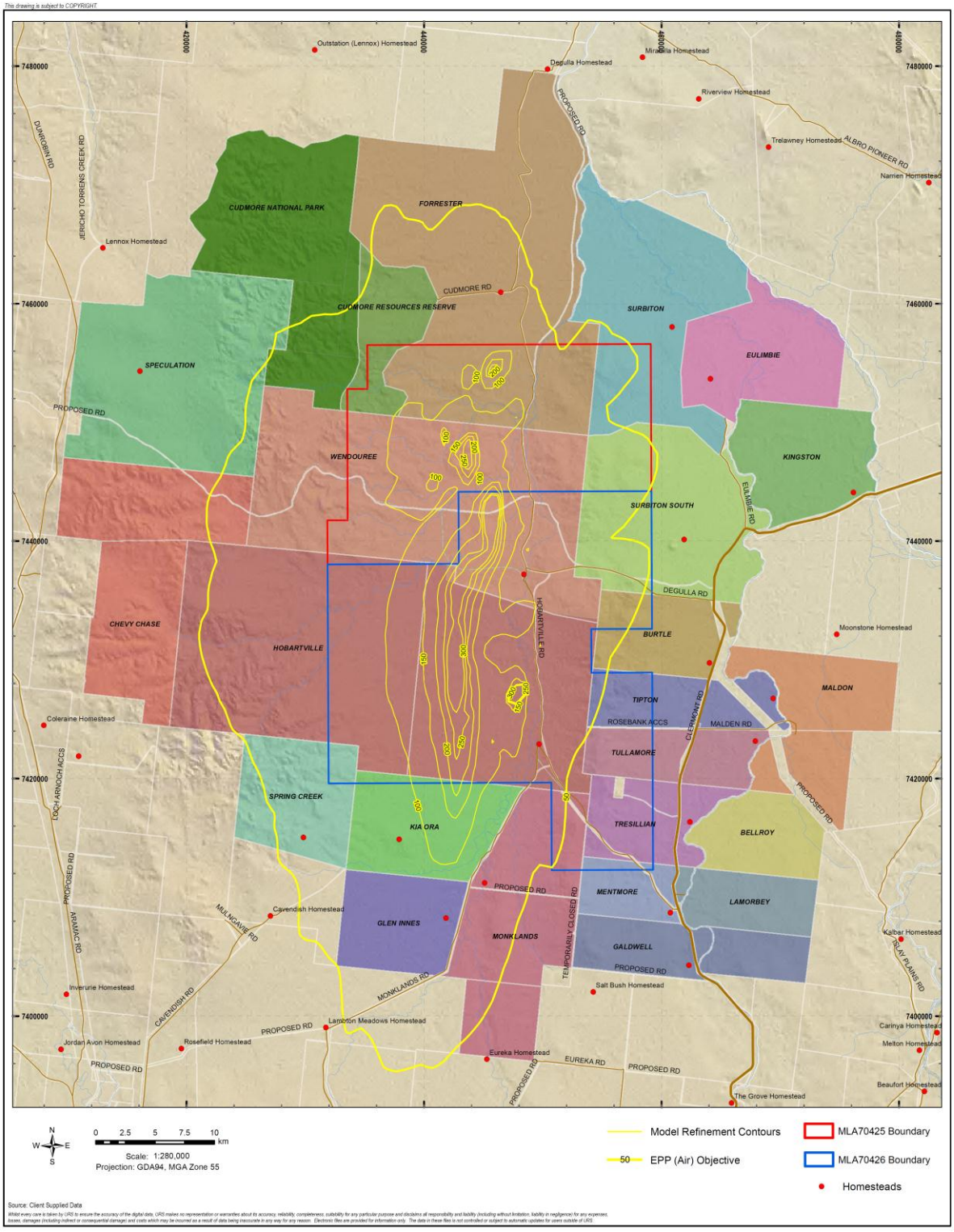


Table O-6 shows that for year 5, exceedences are predicted at Receptors 1, 8, 9, 13 and 14. At Receptor 4, the concentration is predicted to be 97% of the Project goal. For year 25, exceedences are predicted at the same receptors. The magnitude of the exceedences is higher at Receptor 8 and lower at Receptor 9 in year 25 as the open-cut elements of the both mines migrate west. It should be noted that the Alpha Coal Project is the dominant contributor to exceedences at Receptors 8, 9, 13 and 14 and Kevin's Corner at Receptor 1. Figure O-4 and Figure O-5 illustrate the westward migration of the 50 µg.m^{-3} contour and exceedence of the Project goal at Receptor 1 in years 5 and 25.

4.1.3. Particulate Matter as $PM_{2.5}$

A summary of highest predicted 24-hour average ground-level concentration of $PM_{2.5}$ for the Kevin's Corner and Alpha Coal mines scenario for each assessed receptor is presented in Table O-7 for years 5 and 25.

The concentrations represent the highest predicted value when both the Kevin's Corner and Alpha Coal mines are modelled simultaneously. As such, these concentrations will differ from the sum of the individual highest values for each mine[4], which were predicted on different days under different meteorological conditions.

Table O-7 Predicted Highest 24-Hour Average Ground Level Concentration of $PM_{2.5}$ (µg.m^{-3}) (Alpha Coal plus Kevin's Corner)

Receptor	Y5			Y25		
	Projects	Total	% of EPP (Air)	Projects	Total	% of EPP (Air)
1	10.2	15.6	62	8.0	13.4	54
2	3.0	8.4	34	2.2	7.6	30
3	2.8	8.2	33	2.1	7.5	30
4	7.1	12.5	50	4.3	9.7	39
6	3.5	8.9	36	2.4	7.8	31
8	11.8	17.2	69	12.3	17.7	71
9	19.3	24.7	99	9.5	14.9	60
10	3.2	8.6	34	2.6	8.0	32
11	4.5	9.9	40	3.3	8.7	35
13	6.1	11.5	46	6.7	12.1	48
14	13.5	18.9	75	11.6	17.0	68
Project Goal	**25**		**100%**	**100%**		**100%**

Note (1): Background concentration estimated at 5.4 µg/m^3.

Table O-7 shows that no exceedences of the 24-hour average concentration of $PM_{2.5}$ are predicted at any of the sensitive receptors. However, the year 5 concentration at Receptor 9 is predicted to be 99% of the EPP (Air) objective. Therefore there is the potential for an exceedence to occur at this location.

[4] Kevin's Corner highest 24-hour values at each modelled receptor presented in Table 4-2 of Kevin's Corner SEIS. Alpha Coal highest values at each modelled receptor presented in Table 3-2 of Model Alpha Coal Refinement Report dated 21 May 2012.

Figure O-4 24-hour average $PM_{2.5}$ (year 5) (Alpha Coal plus Kevin's Corner Coal Mine)

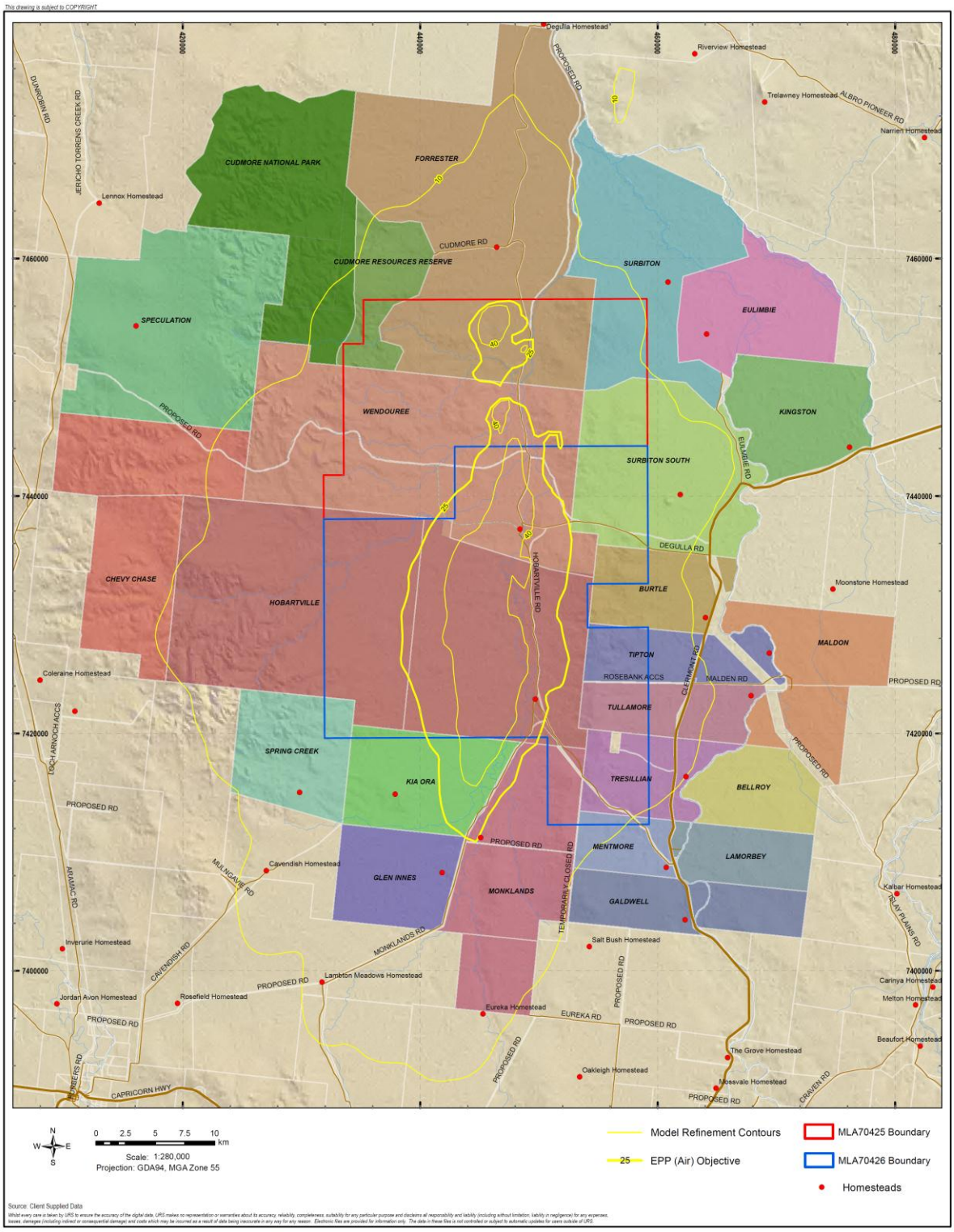
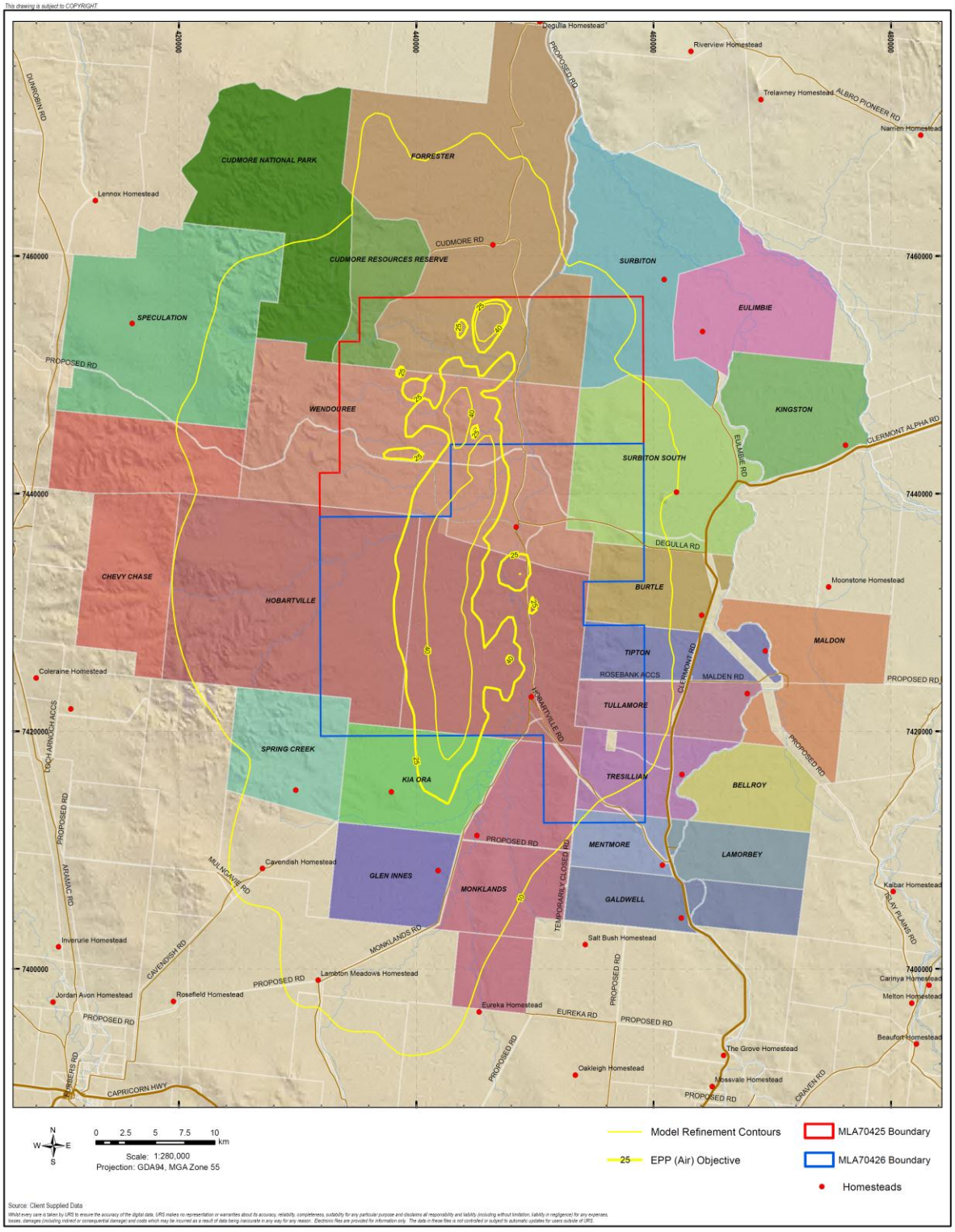


Figure O-5 24-hour average $PM_{2.5}$ (year 25) (Alpha Coal plus Kevin's Corner Coal Mine)



A summary of the highest predicted annual average ground-level concentration of $PM_{2.5}$ for the Kevin's Corner and Alpha Coal mines scenario for each assessed receptor is presented in Table O-8 for years 5 and 25.

Table O-8 Predicted annual average ground level concentration of $PM_{2.5}$ ($\mu g.m^{-3}$) (Alpha Coal plus Kevin's Corner)

Receptor	Y5			Y25		
	Projects	Total	% of EPP (Air)	Projects	Total	% of EPP (Air)
1	1.7	4.5	56	0.9	3.7	46
2	0.1	2.9	37	0.1	2.9	37
3	0.1	2.9	36	0.1	2.9	36
4	0.2	3.0	38	0.1	2.9	37
6	0.1	2.9	36	0.01	2.8	35
8	2.1	4.9	62	2.5	5.3	66
9	2.1	4.9	61	0.9	3.7	46
10	0.1	2.9	36	0.01	2.8	35
11	0.1	2.9	36	0.01	2.8	35
13	1.2	4.0	50	1.3	4.1	51
14	0.1	2.9	36	0.1	2.9	37
Project Goal	**8**		**100%**	**8**		**100%**

Note (1): Background concentration estimated at 2.8 µg/m3.

Table O-8 shows that no exceedences of the Project goal are predicted at any of the sensitive receptors in years 5 or 25.

4.1.4. Mitigation Measures

The Kevin's Corner and Alpha Coal Mine cumulative dust model incorporates a number of mitigation methods for the minimisation of dust generation. These mitigation methods are presented in the respective EIS documentation and include limiting dragline drop heights, commitments to levels of road watering and spraying of overburden dumps. In addition to these assumed control measures, each site has identified a range of additional control levels or actions that can be implemented on site if required. These mitigation measures were included in the modelling, and therefore their impact is included in all results presented.

4.1.5. Potential Residual Risks

The residual risk of dust impacts on the environment surrounding the mining projects is dependent on the effectiveness of the proposed mitigation measures, the location of the sensitive receptors and effectiveness of local meteorology in dust dispersion. It is considered likely that some sensitive receptors may experience potentially elevated exceedences above the EPP (Air) guidelines.

4.1.6. Cumulative Impact Assessment – Galilee Basin

Plans for the development of the Waratah and Kevin's Corner Coal mines indicate a dominant component of underground mining with a relatively small proportion of high dust generating open-cut mining. The EIS's for the Kevin's Corner and Waratah coal mines have shown that emissions generation is likely to be significantly lower than Alpha Coal which means that Alpha Coal will be the dominant contributor to the cumulative impact. Such is the distance of the Kevin's Corner and Waratah coal mines from each other it is unlikely that the cumulative impact from all three mines will differ significantly from the cumulative impacts of Alpha Coal plus Waratah or Alpha Coal plus Kevin's Corner.

The sensitive receptors at which the highest concentrations are predicted are Receptor 8 (Kia-Ora Homestead), 9 (Monklands Homestead), 13 (Spring Creek Homestead) and 14 (Glenn Innes Homestead) which are located to the south and south-west of the Alpha Coal mine. Therefore, the impact on peak concentrations at these receptors from dust generated during northerly and north-easterly wind events will be impacted cumulatively mainly by the Alpha Coal and Kevin's Corner coal mines . Similarly, during southerly wind events, these receptors will be impacted by emissions mainly from the Waratah coal mine. Therefore, it is unlikely that all three coal mines would contribute to the peak concentration at these receptors at the same time. However, all three mines could contribute to the number of exceedence days during the year. When winds are from the north, exceedence days would predominantly be caused by the Kevin's Corner and Alpha Coal mines. When they are from the south, impacts would be predominantly caused by the Waratah and Alpha Coal mines and not Kevin's Corner. It is expected that all three mines will adopt similar methodologies to manage impacts at sensitive receptors. It should be noted that Kia Ora and Monklands Homesteads are situated within the Waratah mining lease and through the progression of this Project are likely to be removed as sensitive receptors.

It is acknowledged that as the number of mining projects in the Galilee Basin increases, there is the potential for increased cumulative air quality impacts due to dust emissions. HGPL are committed to participating in future air quality cumulative impact assessments on request of the regulating authority.

4.2. Groundwater

4.2.1. Background

The Kevin's Corner Coal Project is located along the eastern limb of the geological Galilee Basin and is targeting the C and D Seams within the Permian Colinlea Sandstone unit. A schematic presentation of the Galilee Basin geology is presented in Figure O-6. A geological (west to east) cross-section across the Project, based on exploration drilling results, is presented in Figure O-7. Both cross-sections present the target coal measures within the Colinlea Sandstone, which is located between the younger Rewan Formation (base of the Great Artesian Basin (GAB)) to the west and the older Joe Joe Formation (aquitard) to the east.

For the purposes of the Kevin's Corner Project and other proposed projects along the eastern limb of the Galilee Basin the aquifers immediately surrounding the targeted coal seams will have to be dewatered and depressurised to allow safe mining to occur.

Figure O-6 Galilee Basin Geology

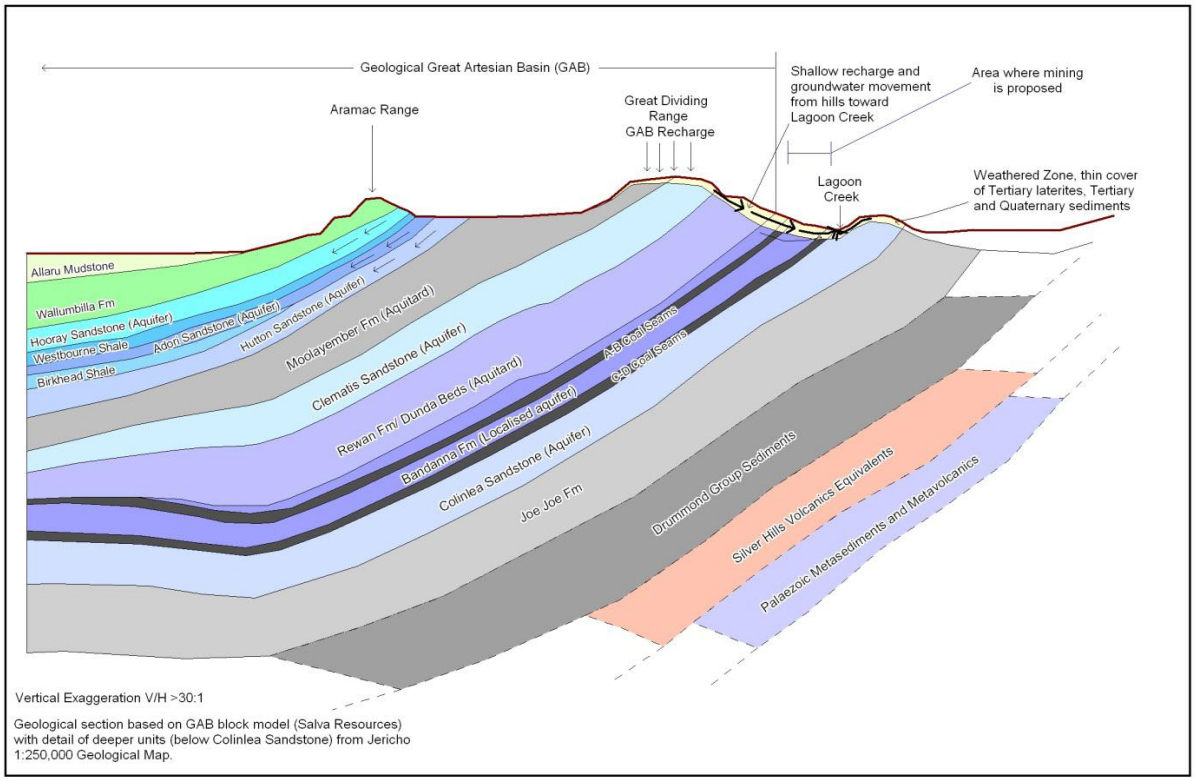
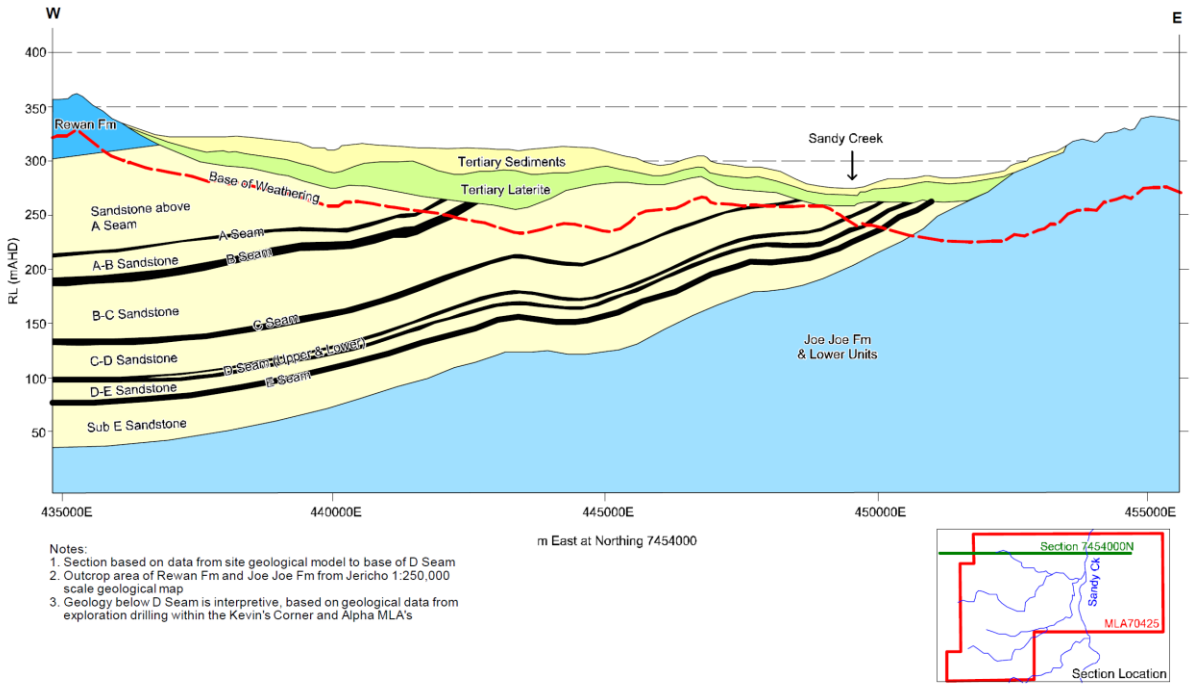


Figure O-7 A geological (west to east) cross-section across the Project



4.2.2. Cumulative Impact Assessment – Approach

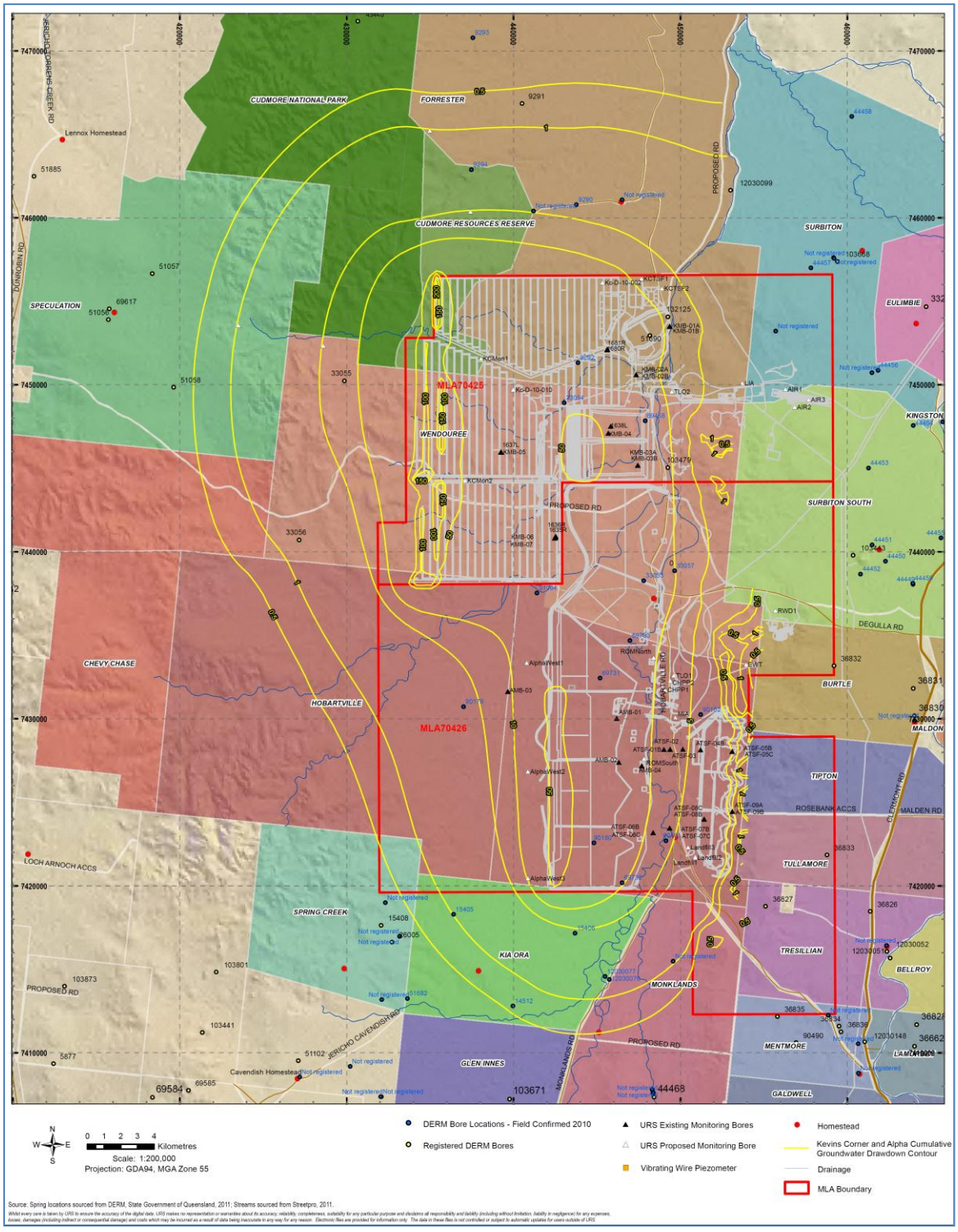
The cumulative impact of mine dewatering at Kevin's Corner and Alpha Coal was assessed using predictive groundwater modelling. The inclusion of other proposed coal projects, namely Waratah and South Galilee, was considered based on EIS requests received. Cumulative impacts of all proposed mining operations raises issues regarding use of data, reliance on unchecked / validated data available in the public domain, limited information, and potentially leading to inaccurate impact assessments. This could, in the case of Waratah and South Galilee, result in consequences where these proponents do not agree with the regional model approach, resultant impact evaluation, or predictions. Based on the number of assumptions, differences in conceptualisation (geology and hydrogeology), and simplifications that would be required to obtain a very preliminary high level assessment of potential drawdown using a large regional the model. It is, therefore, considered that a cumulative model, at this stage without all the proponents buy-in and data, would not provide a very accurate assessment of potential impacts of mine dewatering associated with all proposed projects within this portion of the Galilee Basin.

Accordingly the cumulative impact assessment for groundwater for Alpha Coal and Kevin's Corner has been detailed in this section. The cumulative impact assessment for groundwater with regards to other adjacent projects has only been discussed in terms of possible additional impacts.

4.2.3. Cumulative Impact Modelling Results

The outcome of the Kevin's Corner and Alpha Coal life of mine predictive groundwater modelling results for the D seam coal measures are presented in Figure O-8. These results take into account all of the identified potential impacts to groundwater on both Project sites including open-cut and underground mining operations, mine dewatering, tailings storage facilities and subsidence.

Figure O-8 Kevin's Corner drawdown contours in target D seam at end of mining



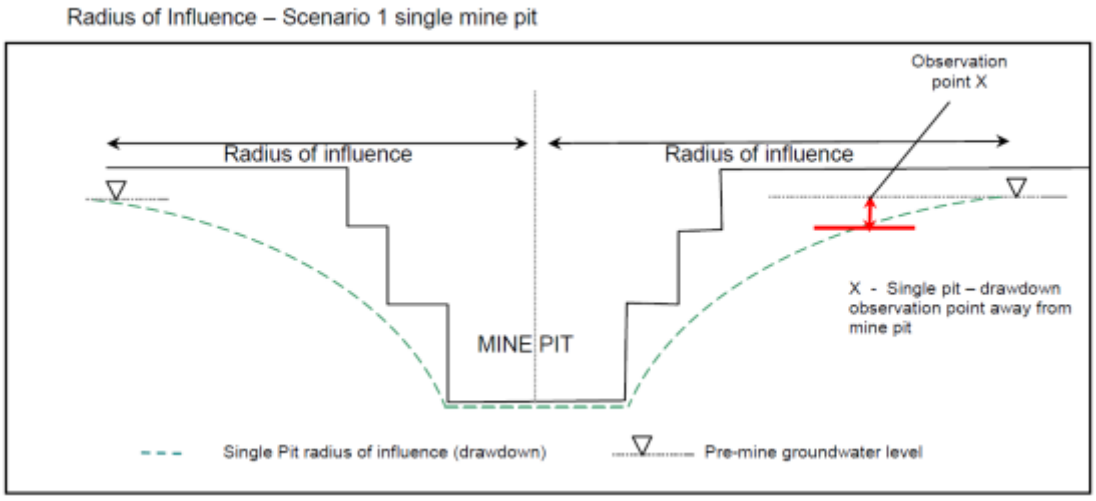
Assessment of Drawdown as a Result of a Single Project and Multiple Projects

Drawdown cones in the D coal seam were contoured, up to 1 m, to assess groundwater level change during mining for Kevin's Corner alone as well as for (cumulative contours) Alpha Coal and Kevin's Corner. The projected groundwater level contours indicate that there will be minimal drawdown to the east of the mine footprint because of the aquitard nature of the Joe Joe Formation shales. This low permeability unit restricts groundwater drawdown, resulting from mining, to the east. Thus groundwater users within the older Joe Joe Formation will not be impacted by mine dewatering. Drawdown contours, constructed for the cumulative impact of both Kevin's Corner and Alpha, elongate north and south, within the more permeable Colinlea Sandstone. The cumulative impact of adding mining operations along strike results is deeper drawdown where drawdown cones overlap and further elongation along strike. The low permeable Bandana Formation and Rewan Formation limit the potential for induced flow and drawdown to the west. These constraints apply across the entire portion of the Galilee Basin containing Kevin's Corner and Alpha Coal Projects. This means that the potential for induced flow from the GAB or drawdown in the older units to the east of the Joe Joe Formation does not increase based on additional mining along strike.

4.2.4. Cumulative Impacts of Multiple Mine Pits

The possible impact of mine dewatering and depressurisation around the proposed Kevin's Corner Project is predicted to impact on groundwater levels in each of the model layers / geological units, to varying degrees based on groundwater heads (gradient) and permeability. A simplification of this is presented in Figure O-9.

Figure O-9 Sketch of Zone of Radium Influence

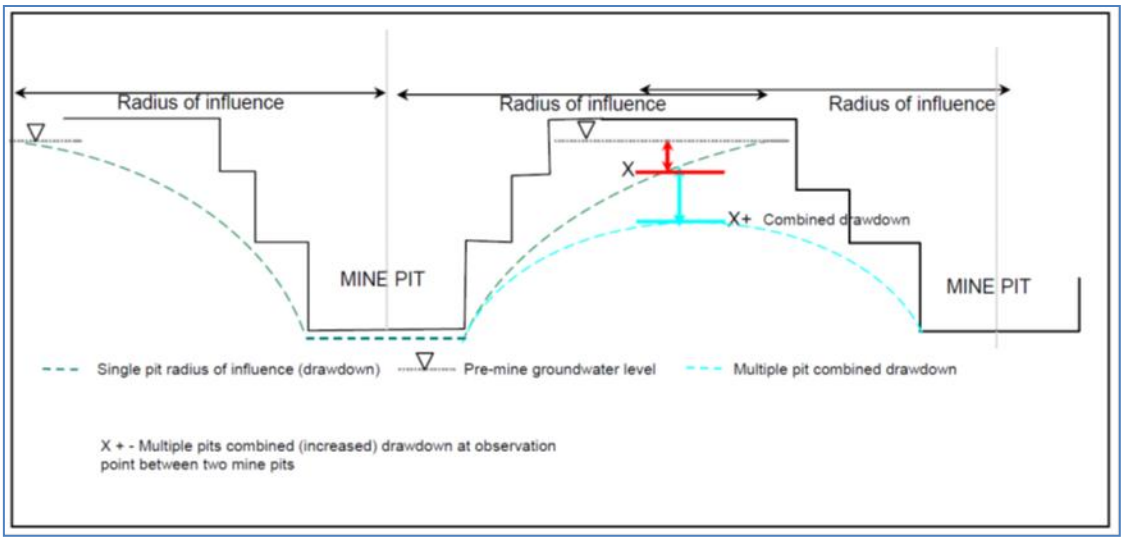


The predicted change in groundwater level was estimated at selected observation points within the model.

The impact of additional mines, proposed adjacent and along strike, where predicted drawdown cones overlap will result in an increase in the drawdown in groundwater level. These areas are recognised to occur (as simulated in Figure O-8) outside of the Kevin's Corner MLA boundaries and are considered to increase the potential impacts on groundwater resources and users.

The extent of the drawdown cones outside any overlap will be governed by the hydraulic conductivity. Figure O-10 provides an illustration of the conceptualised drawdown around one pit and also the impact of overlapping drawdown cones.

Figure O-10 Mine Pit Drawdown Conceptualisation



Dewatering impacts (drawdown cones) are, therefore, predicted to elongate north and south, within the more permeable sandstone units of the Colinlea Sandstone. The cumulative impact of adding the additional mine dewatering will result in deeper drawdown where drawdown cones overlap and further elongation along strike.

Note: Drawdown cones created for mining both Alpha Coal and Kevin's Corner (Figure O-8) do not indicate any additional or cumulative impact to the west, i.e. the cumulative drawdown only increases to the south of Kevin's Corner where the two drawdown cones overlap. This is important as this indicates that the risk to the units to the west (i.e. the GAB units) is not increased by additional mine projects along strike of one another. The Joe Joe Formation aquitard limits drawdown to the east, regardless of projects or location, based on the drilling (dry) and aquifer assessments.

4.2.5. Dewatering Constraints

Consideration of cumulative impacts of multiple projects, all within the same Permian coal bearing sediments, was given with respect to potential impacts on the GAB units to the west and to the older units to the east (below the Joe Joe Formation).

It is noted that the same geological / hydrogeological constraints (Rewan Formation aquitard) that separates the mining operations at Hancock from the GAB are the same for Waratah and South Galilee, thus it is predicted that the dewatering associated with these mining operations will not result in drawdown in the Rewan Formation or Clematis Sandstone.

The Joe Joe Formation aquitard, similarly, reduces the potential for induced drawdown, associated with additional mining projects, in the older units to the east.

The cumulative impact of these mining operations will, however, impact over a larger area within the Colinlea Sandstone and affect long term groundwater flow patterns and resources.

4.2.6. Risk to Registered Springs

One area of concern for the Galilee Basin is the potential impact of mine dewatering on registered springs. As can be seen in Figure O-11 there are a large number of registered recharge reject springs that occur at the Hutton Sandstone outcrop over 50 km to the west of the proposed mine sites. These springs are separated from the proposed mining by significant aquitards (Bandana Formation, Rewan Formation, and Moolayember Formation) and will not be impacted by the mine dewatering.

Also present on the Figure O-11 are the registered bores to the north of the Kevin's Corner lease. The groundwater model was run for a 300 year period for both Alpha Coal and Kevin's Corner mines and the results shown in Figure O-12 indicate no impact to these springs.

Figure O-11 Registered Springs

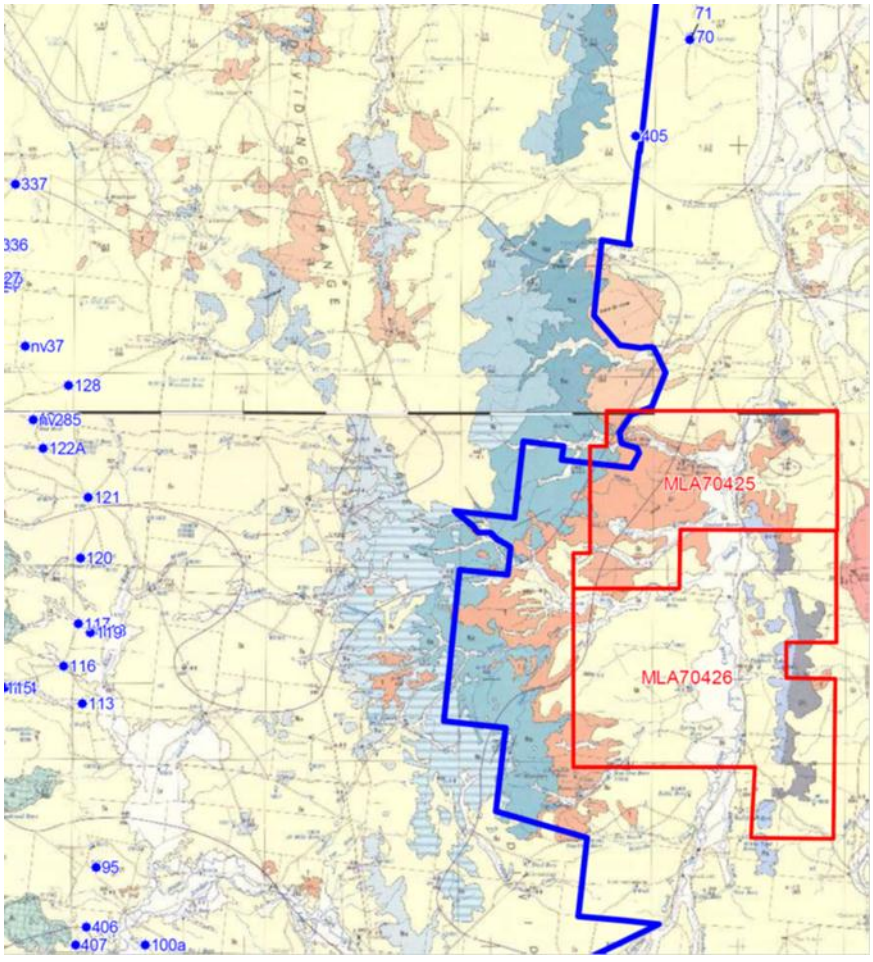
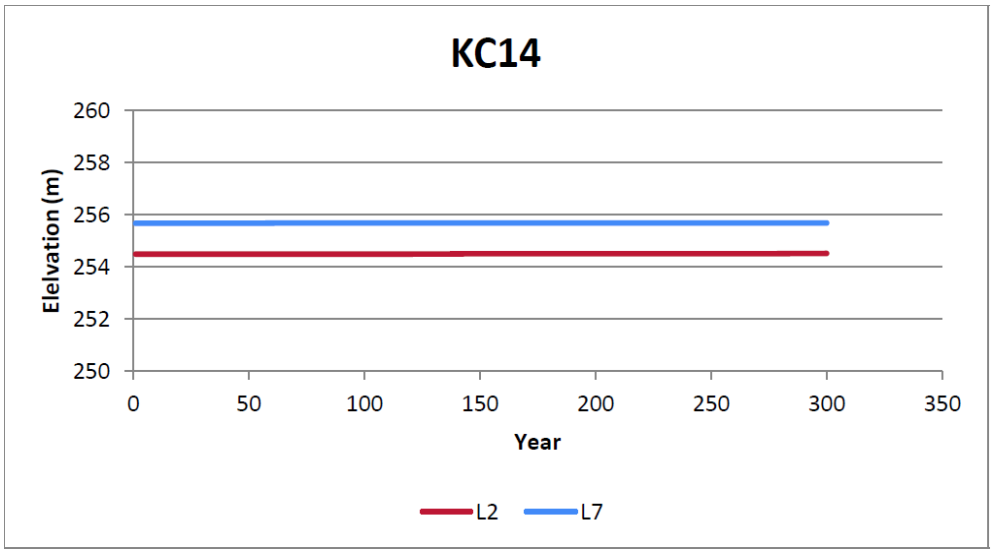


Figure O-12 Groundwater drawdown impact on northern registered springs



4.2.7. Risk to GAB Units

The predictive model was used to project groundwater level drawdown, within different aquifers and corresponding model layers, over time and spatially across the model domain. Projected groundwater levels below the Great Artesian Basin Rewan Formation and Clematis Sandstone units do not indicate any drawdown effects as a result of mine dewatering over the life of mine. Observation points within the model domain were included to the north, south, and west of the Kevin's Corner mine, which allowed for the evaluation of groundwater level changes, in different geological or hydrogeological layers, over time (during mining and for 300 years post mining). The predicted long term groundwater levels, as a result of mining and final void (rebound), indicate a permanent alteration to groundwater flow patterns and levels around the final void (both Kevin's Corner alone and for Kevin's Corner and Alpha Coal combined).

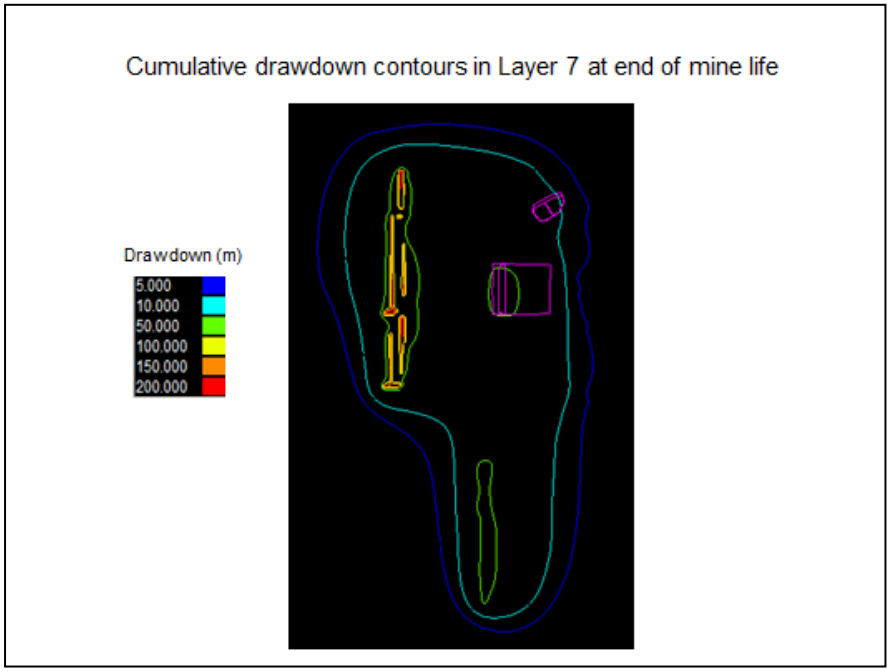
There are predicted changes in potentiometric pressure in the target D coal seam, extending below the Clematis Sandstone outcrop, after 300 years, to the northwest of Kevin's Corner. This drawdown (projected to be ~ 7 m over 300 years) is sufficiently small (allowing for model uncertainty, topographic data accuracy, and natural (dry/wet) fluctuations) that the risk of induced flow from the Clematis Sandstone to the mine depressurised units is minor. Larger drawdown (~ 10 m) is projected below the Rewan Formation, which indicates limited potential (to the west of Kevin's Corner) to induce flow from this unit. The resultant change in groundwater levels would, however, not result in marked reductions in available groundwater resources.

4.2.8. Long Term Impacts Considering Cumulative Impacts

Final void predictions have been made using the integrated model. It was considered that the Alpha Coal final void, based on its large size, will alter long term groundwater flow patterns and levels within this portion of the Galilee Basin.

The drawdown resulting from the cumulative impact of mining both Alpha Coal and Kevin's Corner, in the target D seam, is presented in Figure O-13 and the resultant head contours across the model are included in Figure O-8.

Figure O-13 Cumulative Drawdown Contours at End of Mining

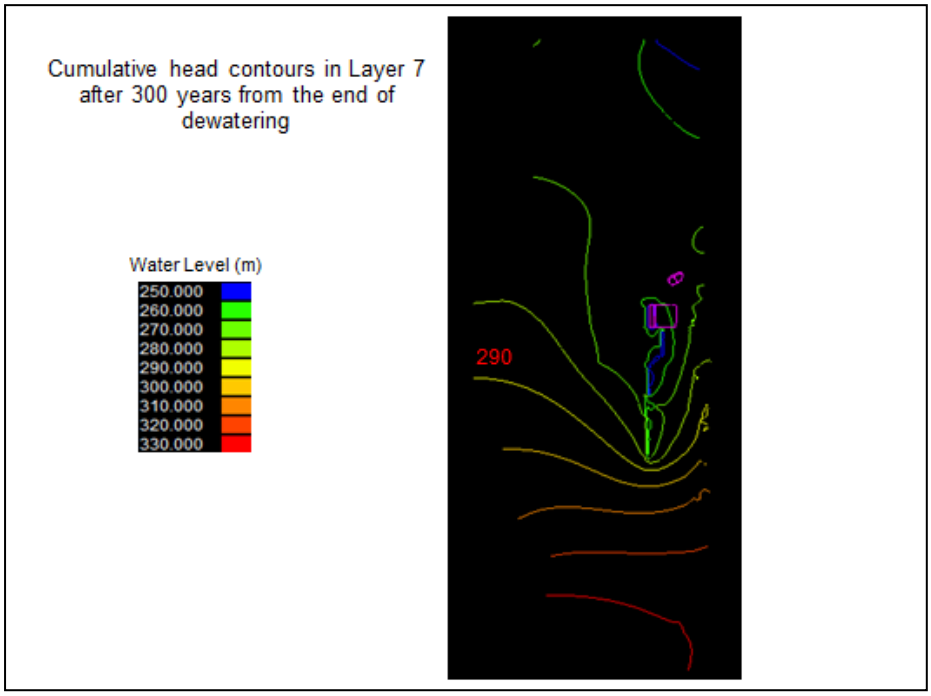


Groundwater recovery was simulated for both mine Projects and the influence of the two final voids (Alpha Coal and Kevin's Corner Southern open pit) was predicted after 300 years. The long term groundwater flow patterns and groundwater levels (Figure O-13) indicate a marked difference to the initial (current pre-mining) groundwater patterns as determined for the steady-state calibration

Figure O-14 indicates the long term groundwater contours, after 300 years recovery, will be slightly altered due to the small "pumping" effect of the Kevin's Corner South open pit final void, where evaporation exceeds ingress and thus the final void acts as a sink. This evaporation is considered to have a similar effect as if water was pumped from the void.

The much larger Alpha Coal final void will permanently alter the long term groundwater flow patterns, and will impact on the groundwater recovery at Kevin's Corner.

Figure O-14 Long term groundwater contours 300 years after mining ceases

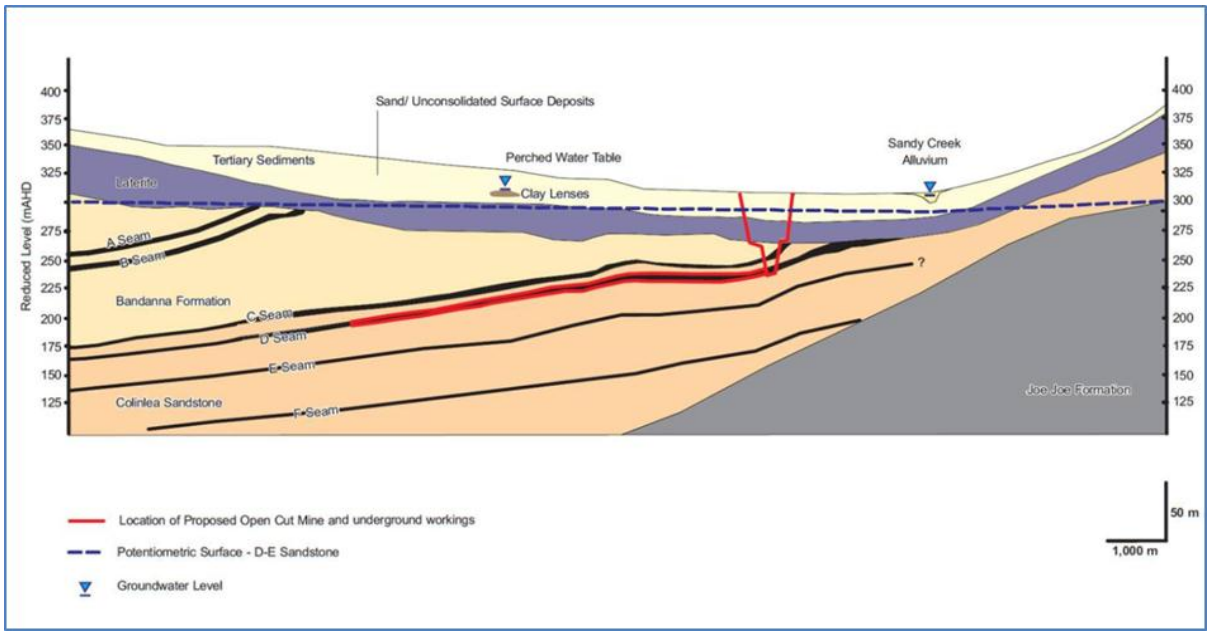


4.2.9. Direct and Indirect Cumulative Impacts on Vegetation Communities

An assessment of the direct and indirect impacts on vegetation communities was undertaken as part of the cumulative groundwater modelling and indicates limited potential for induced flow from the isolated perched water tables to depressurised deeper aquifers (as shown in Figure O-15). These perched water tables are regular recharged through rain and flood events and not reliant on upward groundwater movement. Direct impacts to the perched water table(s) can however occur around open mine voids where the excavated void intersects the perched water table.

Riparian woodlands are either opportunistically dependent or without apparent dependence on regional groundwater. These riparian woodlands are at low risk to perched water table alterations due to induced downward groundwater flow. On the outcrops and valley slopes within the drawdown area there exists non-remnant grassland and large patches of open woodland. These vegetation communities are situated at least 25 m above the regional groundwater system and are therefore considered at 'negligible risk' or 'very low risk' to drawdown impacts.

Figure O-15 Perched and Confined Groundwater Systems



4.2.10. Groundwater Recharge

As part of the Alpha Coal and Kevin's Corner EIS' investigations were undertaken to determine the most likely source of the groundwater recharge for the Colinlea Sandstone in which the coal beds to be mined are located. A detailed study of the Colinlea Sandstone subcrop area to the east of the Alpha Coal site determined that it was not a source location for groundwater recharge. The remaining potential recharge mechanism is diffuse recharge from the Great Dividing Range. It was determined through modelling that rate of recharge within the basin is relatively slow and will take many years to rebound. It is recognised through hydrogeological assessments that recharge occurs in the area to the west, within the Great Dividing Range, for this portion of the Galilee Basin. No alteration to these high lying areas to the west is proposed for any of the proposed projects (Alpha Coal, Kevin's Corner, Waratah,), thus no cumulative impact is recognised.

4.2.11. Mitigation Measures

To enable safe mining of the coal in any of the proposed Galilee Basin mines the groundwater will need to be dewatered and the seams depressurised. This will require the unavoidable removal water from the mine workings for the life of mine. As such there is very little in terms of mitigation against the potential impacts of drawdown that can be employed. It is likely that the project Proponents will have to enter into make good agreements with effected landholders to ensure water supply for their farming activities. There is also the potential for the use of available groundwater resources, if required, to supplement surface water resources impacted by one or more of the projects. This may include the artificial recharge of registered springs. This is currently not anticipated to be required for the Kevin's Corner Project.

Make Good Agreements:

As part of the development of the make-good agreements for each potentially affected groundwater user, a comprehensive groundwater assessment of the individual at risk bores will be undertaken. This assessment (for Kevin's Corners potentially impacted wells) will occur before the commencement of mining activities and will inform the make-good commitment of the baseline conditions prior to mining commencing. The factors considered when developing the make-good commitment are presented in the SEIS EM Plan Section W3.4.6, Volume 2, Appendix T1. HGPL is committed to the development of effective and timely make good agreements as is documented in SEIS Volume 2, Appendix C Proponent Commitments.

4.2.12. Potential Residual Risks

The largest potential risk relating to groundwater drawdown is if observed real life impacts (once the mine commences) from dewatering are greater than those modelled. This risk is considered to be acceptable as the modelling undertaken has utilised a large amount of site specific data including the observations from the Alpha Coal test pit and is conservative in its predictions. Additionally as part of the Project approvals it is expected that the sites will have to regularly update the groundwater models and calibrate them against monitoring data from the sites.

4.2.13. Cumulative Impact Assessment – Galilee Basin

Low permeability units restrict groundwater drawdown to east and west consequently groundwater drawdown elongates north and south. The cumulative impact of adding the Alpha Coal dewatering results is deeper drawdown where drawdown cones overlap and further elongation along strike (north / south). The low permeable Bandana Formation and Rewan Formations constrain potential impacts of induced drawdown to the west. These constraints apply across the entire portion of the Galilee Basin containing Kevin's Corner and Alpha. This means that the potential for induced flow from the GAB or drawdown in the older units to the east of the Joe Joe Formation does not increase based on additional mining.

4.2.14. Conclusions

- No impact is predicted for registered springs to the north or west, when considering the Project alone or with the Alpha Coal Project being mined concurrently;
- Cumulative impacts of projects on drawdown predictions does not indicate any increased risk of induced flow from GAB units if the Projects are aligned along strike of each other;
- Final void and long term predictions indicate limited long term groundwater impacts when considering the Project on its own;
- Geological and hydrogeological constraints are considered to limit dewatering expansion when additional mines are located along strike of each other;
- Dominant recharge mechanism is diffuse recharge along the Great Dividing Range; however, the net effective recharge to the confined Permian aquifers is negligible. No cumulative impact of the proposed projects, along strike within the eastern limb of the Galilee Basin, will impact on the recharge areas to the west; and

- Monitoring to validate modelling predictions, groundwater conceptualisation, and the current assessment of cumulative impacts will be undertaken through the life of mine and post mining.

4.3. Surface Water Hydrology

4.3.1. Background

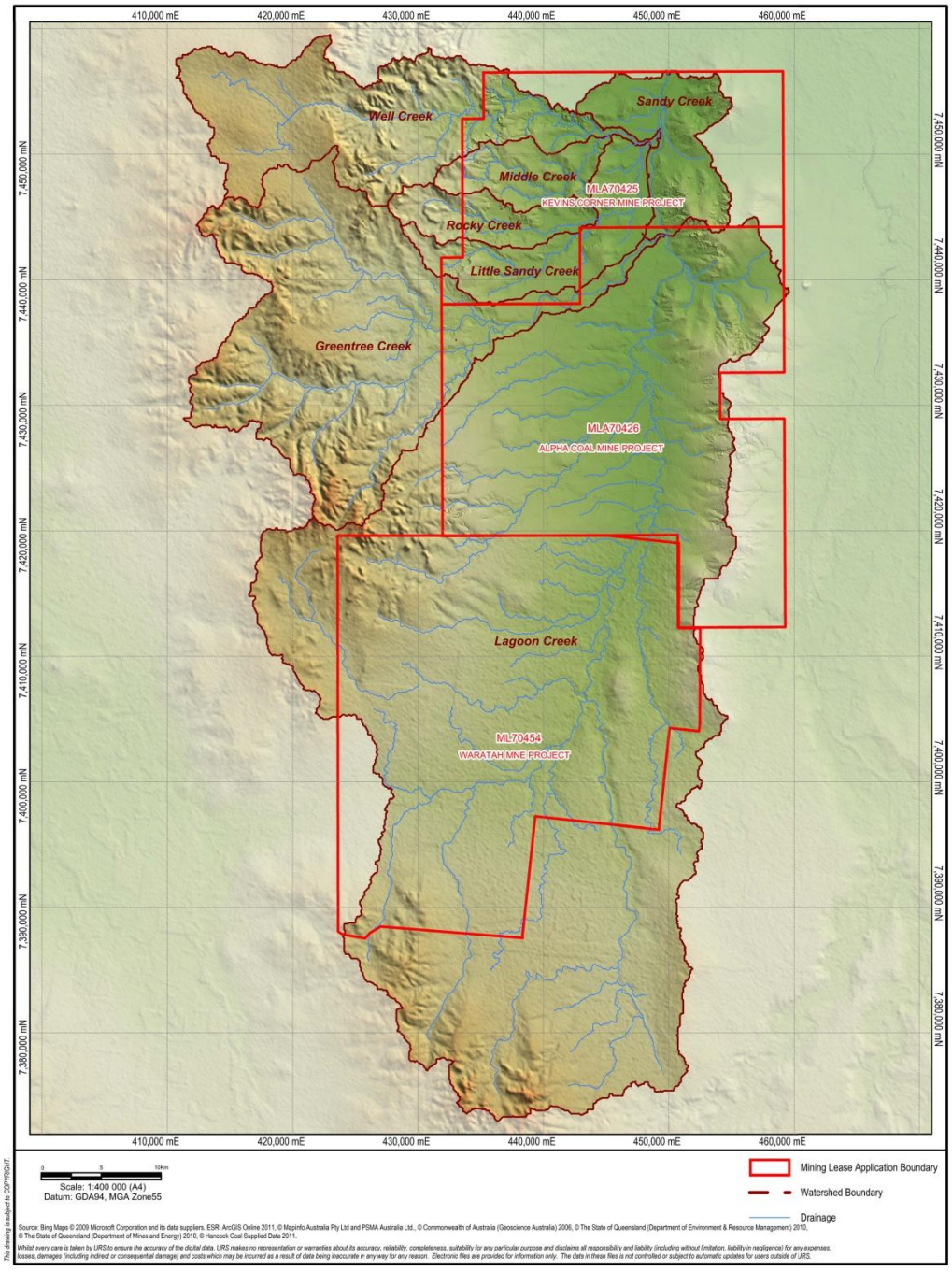
The Kevin's Corner Project site is located in the Sandy Creek catchment, which is a tributary of the Belyando River within the greater Burdekin River Basin. The area of the study catchment (to the northern lease boundary of the Project) is approximately 2,740 km^2. The proposed Alpha Coal mine and Waratah Coal mine are also located within the study catchment as shown in Figure O-16.

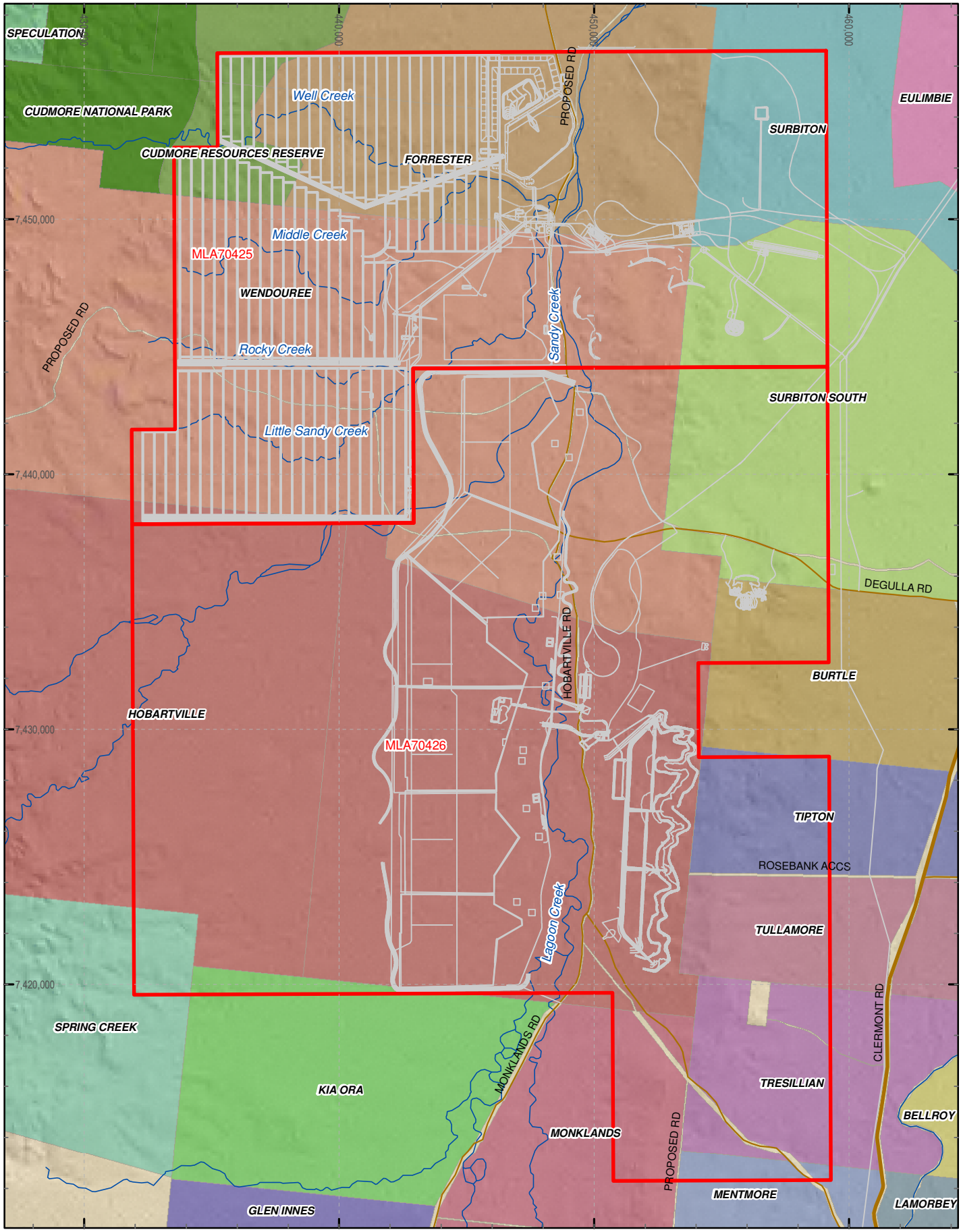
All three projects will involve modifications to the baseline hydrological conditions. However only the Kevin's Corner and Alpha Coal Projects are sufficiently progressed within the public arena at the time of preparation of this report (September 2012) to enable an assessment of the potential cumulative impacts of these projects on surface water hydrology. The SEIS mine layout for the Kevin's Corner and Alpha Coal Projects are provided in Figure O-17.

The Kevin's Corner Project will involve modifications to surface water hydrology through the diversion of Little Sandy and Rocky Creeks into Middle Creek and the capture of 33.94 km2 of catchment within the mine water management system. In addition modifications to the floodplain will occur through the construction of the diversion levee, central open-cut levee, northern open-cut levee and the train load out facility levee.

The Alpha Coal Project will involve modifications to surface water hydrology through the Sandy Creek, Spring Creek and Lagoon Creek diversions, the loss of 139.63 km2 of catchment within the mine water management system. In addition modifications of the floodplain will occur through the construction of the Lagoon Creek levee, Western catch drain, Spring Creek diversion levee, Sandy Creek diversion levee and levees along the southern and northern MLA boundary to provide flood immunity for the mine.

Figure O-16 Project Catchment Map





Drainage

Mining Lease Application Boundary

Source: See Copyright Details below and for full disclosure Please Refer to the EIS ***Volume 4 - References***

0 1.25 2.5 5 Km

Scale 1:200,000 (A4)

Datum: GDA 94, MGA Zone55

N W E S

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Kevin's Corner Project
Supplementary Environmental Impact Statement

MINE LAYOUT: KEVIN'S CORNER AND ALPHA

Job Number	4262 6920
Revision	A
Date	31-10-2012

Figure: O-17

File No: 42626920-g-2130.mxd

4.3.2. Cumulative Impact Assessment – Alpha Coal and Kevin's Corner

An assessment of cumulative impacts was undertaken using publically available information on the SEIS mine plans for Kevin's Corner and Alpha Coal mines to estimate the likely cumulative impact on the future surface water environment in terms of the following:

1 Impacts on Flood Immunity
2 Impacts on Sedimentation and Erosion
3 Impacts on Matters of National Environmental Significance (MNES) from inundation.

The technical report for the Cumulative Surface Water Impact Assessment has been provided separately as Appendix S of the SEIS. A summary of the findings of this report are provided below..

4.3.2.1. Flood Immunity

A combined TUFLOW flood model was run for the 1:1000 AEP (extreme) event which included the SEIS mine plans for both the Alpha Coal and Kevin's Corner mines to establish the cumulative impact on the flood extent and flood level. The modelling results were then compared with the flood level for the Kevin's Corner Project alone to determine whether flood levels within the Kevin's Corner mine had increased and whether the flood protection measures proposed for the Kevin's Corner mine were adequate.

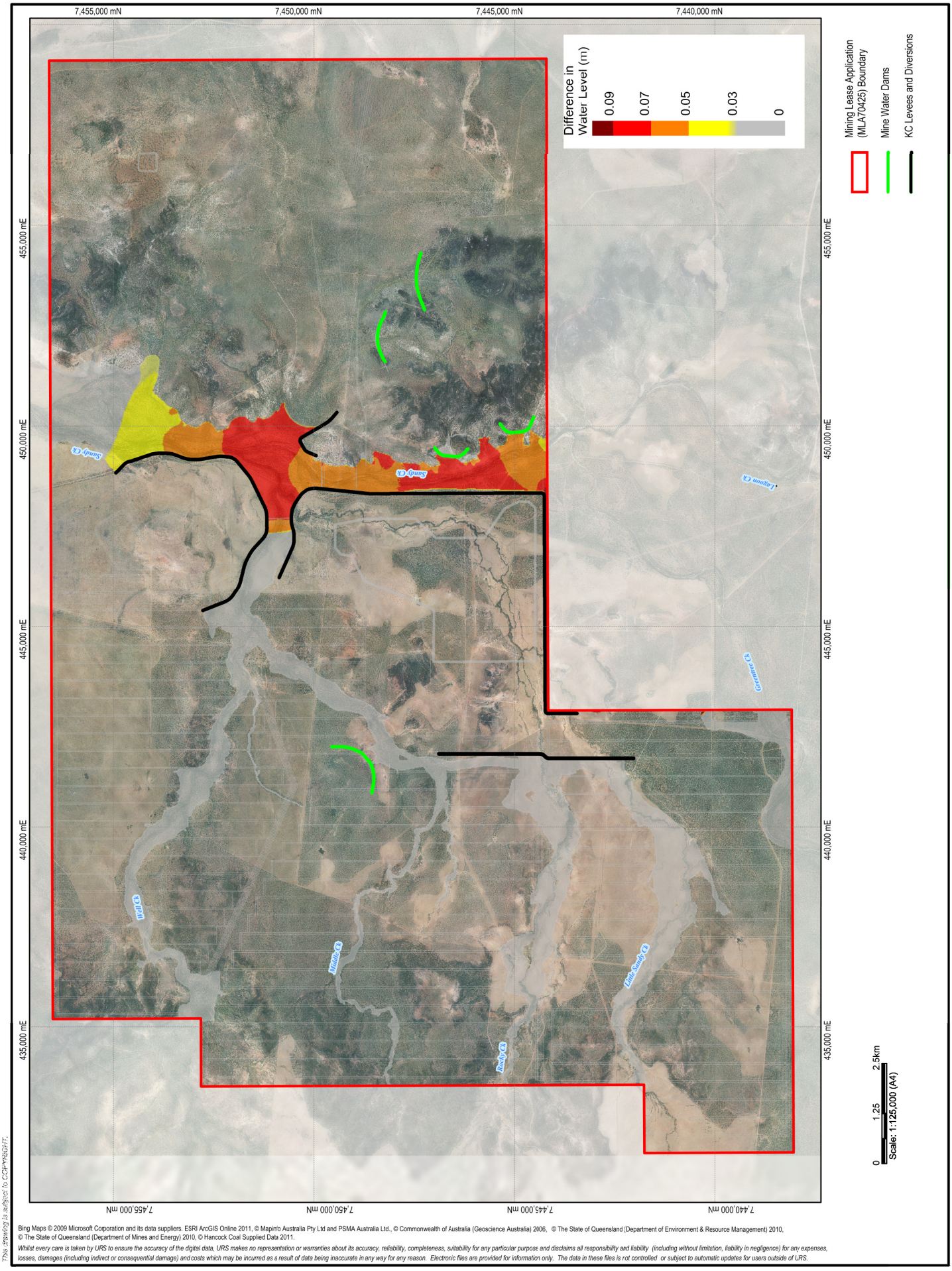
Figure O-18 shows the changes in flood levels within the Kevin's Corner MDL that are predicted from the cumulative impacts of the Alpha Coal Mine and Kevin's Corner development compared to that for the Kevin's Corner Project alone. The data shown in the figure indicates that the cumulative effect of the Alpha Coal and Kevin's Corner mines does not increase the flood extent but may increase flood levels within the Kevin's Corner mine lease area by up to 80 mm. The maximum increase is restricted to Sandy Creek around it's confluence with Well Creek. Downstream of this location flood levels decline to be equivalent to that modelled for the Kevin's Corner Project alone at the downstream lease boundary.

The flood protection infrastructure proposed for the Kevin's Corner has been designed with a 1 m freeboard above the 1:1,000 AEP flood level which is adequate to prevent inundation of the site from the potential 80 mm increase in water levels. Consequently consideration of the cumulative impacts of the Alpha Coal and Kevin's Corner coal mines does not change the flood protection measures proposed for the Kevin's Corner Project.

4.3.2.2. Sedimentation and Erosion

To assess whether the cumulative impacts increase stream flow, velocity and power within the Kevin's Corner MLA compared with the effect of the Kevin's Corner mine alone, a combined HEC-RAS model was run for the 1:2 and 1:50 AEP (minor) events.

The stream power, velocity and shear stress results for the cumulative impact assessment and that for the Kevin's Corner mine alone are provided in Table O-9. The results presented in the table show that there are no significance differences between the hydraulic parameters predicted for the Kevin's Corner Project and those that would occur if both the Alpha Coal and Kevin's Corner coal mines are considered. This indicates that there is not predicted to be a cumulative impact on erosion and sedimentation rates within the Kevin's Corner lease.



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Kevin's Corner Project
Supplementary Environmental Impact Statement

CUMULATIVE IMPACTS ON FLOOD IMMUNITY (1:1000 AEP)

URS

CUMULATIVE IMPACT ASSESSMENT REPORT

Figure: O-18

File No: 42626920-g-2128.wor | Drawn: XL | Approved: RS | Date: 31-10-2012 | Rev: B | A4

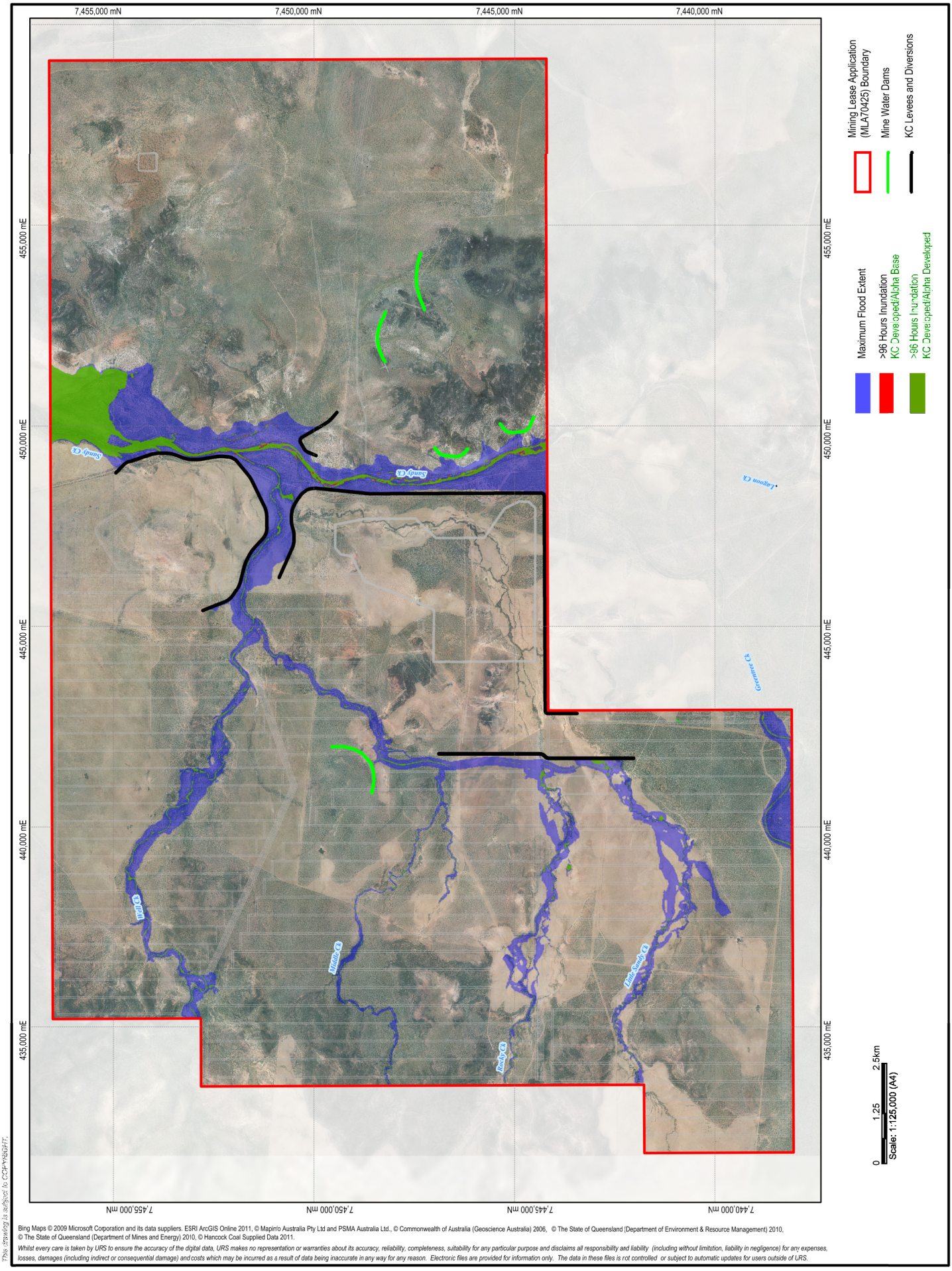
Table O-9 Cumulative Assessment HEC-RAS Results

Reach	Scenario	Flow Velocity	Stream Power	Shear Stress	Flow Depth
		(m/s)	(W/m2)	(N/m2)	(m)
1:2 AEP					
1. Greentree Creek to Well Creek	Kevin's Corner	0.4 - 1.0	1.2 - 22.5	2.9 - 21.8	1.0 - 2.0
	Cumulative Impact	0.4 - 1.1	1.2 - 23.4	2.8 - 22.5	1.0 - 1.9
2. Downstream of Well Creek	Kevin's Corner	0.5 - 1.3	1.8 - 34.4	3.6 - 27.5	1.4 - 2.1
	Cumulative Impact	0.5 - 1.2	1.7 - 34.1	3.6 - 27.4	1.3 - 2.1
1:50 AEP					
3. Greentree Creek to Well Creek	Kevin's Corner	1.4 - 2.2	29.8 - 111.8	21.9 - 51.3	3.8 - 5.0
	Cumulative Impact	1.3 - 2.1	28.1 - 107.2	21.0 - 50.0	3.8 - 5.0
4. Downstream of Well Creek	Kevin's Corner	1.6 - 2.4	44.6 - 155.3	27.6 - 63.6	4.2 - 5.5
	Cumulative Impact	1.6 - 2.4	44.3 - 152.2	27.5 - 62.9	4.2 - 5.5

4.3.2.3. Duration of Inundation

In order to establish whether the cumulative effects of the Kevin's Corner and Alpha Coal mines cause an increase in the inundation area of extended duration within the Kevin's Corner MLA (which may be of significance for any MNES vegetation within the inundation extent) a combined TUFLOW model was run for the 1:100 AEP event based on the fully developed mine plans for the Alpha Coal and Kevin's Corner mines. The model outputs were interpreted to identify any additional areas which were inundated for a period of more than four days when compared with that for the Kevin's Corner mine alone. This was based on the precedent set in the Hinze Dam EIS, which determined that "Vegetation could withstand a periodic inundation of up to four days in the event of a Q100 storm, and although vegetation may suffer damage from currents and temporary flooding, it is considered likely to recover'.

Figure O-19 provides a comparison of the areas inundated for 96 hours or more for the cumulative effect in comparison with Kevin's Corner mine alone. The figure shows that the area inundated for more than 96 hours is reduced when the cumulative impacts of Alpha Coal and Kevin's Corner are considered.



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Kevin's Corner Project
Supplementary Environmental Impact Statement

CUMULATIVE IMPACT ON DURATION OF INUNDATION (1:100 AEP)

URS

CUMULATIVE IMPACT ASSESSMENT REPORT

Figure: O-19

File No: 42626920-g-2129.wor | Drawn: XL | Approved: RS | Date: 31-10-2012 | Rev: A | A4

4.3.3. Mitigation Measures

Consideration of the cumulative impacts of the Kevin's Corner and Alpha Coal mines on surface water hydrology does not change the mitigation measures proposed in the SEIS for the Kevin's Corner Project.

4.3.4. Conclusions

- The cumulative effect of Kevin's Corner and Alpha Coal mines does not change the flood extent for the 1:1000 AEP event but may result in an increase in flood levels of up to 80mm within the Kevin's Corner MLA. This increase has no impact on the flood immunity provided for the mine as flood protection infrastructure has been designed with a 1 m freeboard above the 1:1000 AEP flood level.
- The cumulative effect of the Kevin's Corner and Alpha Coal mines does not increase stream, velocity and power within the Kevin's Corner MLA beyond that predicted for the Kevin's Corner mine for either the 1:2 or 1:50 AEP (minor) event.
- The cumulative surface water assessment has shown that there is not predicted to be an increase in the area inundated for greater than 96 hours for a 1:100 AEP event due to consideration of the Alpha Coal mine.

4.4. Geomorphology

4.4.1. Background

The Alpha Coal EIS provides some information on fluvial geomorphology of watercourses through the site. This information primarily focuses on Lagoon Creek and the tributaries Spring Creek and Sandy (also known as Greentree Creek).

The Kevin's Corner EIS provides information on fluvial geomorphology of watercourses through the Kevin's Corner Project site which is downstream of the Alpha Coal Project plus information for context of the surrounding area.

The Waratah project is proposed upstream of the Alpha Coal Project in the headwaters of Lagoon Creek and its tributaries.

4.4.2. Summary of existing situation prior to mining development

The proposed Kevin's Corner Project site and proposed neighbouring mines (Alpha Coal and Waratah to the south) are located in the far south western headwaters of Burdekin Basin. Specifically it is in the headwaters of Sandy Creek sub-catchment of the Belyando River catchment. As well as being in the upstream headwaters of the greater Burdekin Basin, this area is also considered to be the driest part of the basin. The Sandy Creek catchment has some of the lowest generation of flood flows and day-to-day stream flow of whole Burdekin Basin.

In a regional landscape–geomorphological context, the site is in a source zone (that is the zone where stream runoff and channel sediment is generated) of the catchment. This means that it is a natural

morphological expectation that catchment surfaces and watercourses would be eroding to produce sediment transported to the middle (transfer zone) and lower (sink zone) reaches of the basin.

Although the project sites are located relatively high in the headwaters of the basin, the slopes and terrain relief are gentle. The relatively gentle slopes and drier climate are likely key factors why the Sandy Creek sub-catchment (to confluence of Native Companion Creek – well downstream of Kevin's Corner Project) has low sediment generation rates compared to the broader Burdekin Basin. Specifically the Sandy Creek catchment sediment generation rate per km2 is approximately 50% of the greater basin average sediment generation per km2 (refer Kevin's Corner EIS Volume 2, Appendix M1 Geomorphology Technical Report, Section 4.4).

There has been land clearing (particularly in the tributary catchments of Greentree Creek, and Well Creek tributaries traversing the Kevin's Corner MLA) in recent decades, and it is likely this has and will continue in the near future to provide increased sediment supply to the watercourses.

Based on simple interpretation of slopes, the majority of the natural sediment supply to the watercourse will be from steeper slopes upstream of the mine lease areas, but there are relative differences in likely supply as follows.

- The Lagoon Creek channel through the Alpha Coal Project area (the main valley drainage) has lower longitudinal gradient upstream, than in the downstream (Sandy Creek) reach through Kevin's Corner Project area. As such Lagoon Creek through the Alpha Coal Project Area has insufficient energy to convey much bedload sand to the Sandy Creek reach through the Kevin's Corner Project.
- Although Lagoon Creek is the main valley drainage for the greater Sandy Creek catchment, it appears that the Sandy (Greentree) Creek tributary traversing across the northern part of the Alpha Coal MLA is the main source of sediments to lower Sandy Creek through the Kevin's Corner MLA.
- The Spring Creek tributary of Lagoon Creek, which enters the south western part of the Alpha Coal MLA, contributes practically no substantial bed load into Lagoon Creek and beyond. Spring Creek has a discontinuous channel and forms a floodout several kilometres short of the Lagoon Creek. There is no distinguishable channel for Spring Creek across the Lagoon Creek floodplain and there is no discernible true channel confluence of the two streams. The sediment conveyed by upper Spring Creek into the Alpha Coal MLA appears to be deposited to form the floodplain of floodout of Spring Creek and coalescing with the floodplain of Lagoon Creek.

4.4.3. Influences on watercourse morphology to contextualise potential impacts

The major influences on stream geomorphology are:

- Flood hydrology – magnitude and frequency of flood events as a major driver to source and transport sediment
- Sediment supply – rates of sediment movement from catchments to waterways
- Flood hydraulics of the watercourse channels and their floodplains – affects capacity of watercourses to transport sediment
    - High stream power flood hydraulics can transport more sediment and erode bed and banks to deliver more sediment to the channel;

- Low stream power flood hydraulics diminishes stream capacity to transport sediment (sediment will tend to drop out of flow – aggradation); and
- If the sediment carrying capacity of the flow is more than its sediment supply, channel erosion will occur. Conversely if sediment carrying capacity of the flow is less than upstream sediment supply, the channel will aggrade.

- Vegetation (in-stream and on banks) has an important role for:
  - retarding flow energy (increased roughness, lower velocity and stream power);
  - 'stabilising' bed and banks to provide greater resilience to erosive forces of flow; and

Creating small channel features riffle-pool-run forms created by large woody debris and log-jams etc, which could be highly dynamic and vary after each significant flood, and which are also ecologically very important.

4.4.4. Cumulative Impact Assessment – Alpha Coal and Kevin's Corner

4.4.4.1. Kevin's Corner Project

The Kevin's Corner Project proposes mostly underground mining (that will subside the landscape) and two moderate size open-cut pits with flood protection levees. The southern Kevin's Corner Project open-cut pit, requires diversion of little Sandy Creek into Middle Creek and Well Creek.

The diversion channel gradient is less than (flatter) than the gradient of the existing watercourse of Little Sandy Creek. The mild gradient of the diversion will limit the potential for erosion of the constructed diversion. Increased flow, velocity, and stream power will occur in the existing channels of Middle and Well Creek downstream of the diversion. In these reaches the existing vegetation will not be disturbed which will assist to resist increased stream power. Monitoring will be undertaken to identify if the increased flood flows will eventuate into stream response to increase the channel capacity. It is noted that much of the Middle Creek channel is confined by adjacent hillslopes and does not function as a true alluvial channel. It therefore may not be as susceptible to channel erosion under the expected higher stream powers. If monitoring identifies areas of channel widening/deepening, timber pile fields ('groynes') would be installed to stabilise the channel, similar to those in use in the Isaac River in the Bowen Basin. This additional protection will be used if the proposed monitoring shows that it is necessary. Refer to SEIS Volume 2, Appendix N Interim Subsidence Management Plan Section 9.2.2.

The Kevin's Corner Project does not propose to modify the main valley drainage of Sandy Creek through the MLA. The channel will remain intact and vegetation will be protected. The Kevin's Corner Project flood levees will partially restrict the floodplain corridor width of Sandy Creek, but will not cause a substantial increase in flood hydraulic stream power of Sandy Creek. However, the levee will need to be designed appropriately for the expected flow velocities that could occur along it.

Subsidence caused by underground mining in the Kevin's Corner Project will trap sediment in depressions or voids created in the tributary watercourses channels and reduce sediment supply to Sandy Creek. However subsidence across the catchment hillslopes could potentially increase sediment supply if the subsidence or subsidence cracking creates increased erosion of land surfaces due to concentration of overland runoff. This potential impact can be mitigated following monitoring by

re-profiling, stabilising of drainage pathways and potential use of contour banks. As a whole it is expected that the potential increase in local catchment sediment supply will be less than the sediment trapping potential of the depressions in the watercourses (however this remains subject to monitoring and further quantified assessment). It is therefore expected that as a net impact, sediment rates from tributaries across Kevin's Corner MLA could decrease however there remains uncertainty, and in that regard monitoring would be necessary through the mine life. It would also be appropriate at the end of the mine life to require a detailed assessment of sediment sources and stream sediment transport, to determine whether mining-related impacts have been appropriately mitigated, and that the geomorphic systems can continue to function sustainably in the long term once the mining licence has been relinquished. It is for these reasons that an adaptive management approach to mitigation is necessary where mitigation strategies and actions are selected based on monitoring of actual responses observed in the streams.

Subsidence of the tributary watercourses across Kevin's Corner MLA may also increase stream power at isolated locations in the tributary watercourses (mainly over the barrier pillars which do not subside). Timber pile groynes can be used and are proposed to ensure that localised areas of increased stream power do not de-stabilise the watercourse (as utilised in the Isaac River catchment). Once the subsidence voids between the pillar zones have been refilled with sediment, these isolated areas of higher stream power will have been removed as the channel will have returned to its original grade.

4.4.4.2. Combined Alpha Coal and Kevin's Corner Project Cumulative Impacts

The Alpha Coal Project proposes an open-cut mine with watercourse diversions and flood protection levees to protect pits. For Alpha, all watercourses will pass through the site and there will be no on-stream dams on the watercourses. The Alpha Coal Project will not substantially impact on either catchment flood hydrology (flows) or upstream catchment sediment supply (generation rates) to the watercourses, as the upstream catchments are well outside the MLA area beyond the 'control' of the Project.

Surface disturbance by mining could potentially be a source of increased sediment to streams, however all these areas will be contained by a mine water management system which will substantially prevent sediment laden flow from the mine disturbance entering into the watercourses.

The overall impact of the Alpha Coal Project will be potential for increased sediment transport to the watercourses downstream. The amount of potential sediment rate increase to downstream watercourse will depend extensively on final design features of the diversions, success of rehabilitation and maintenance, adaptive management response actions, and any influences from upstream of the mine beyond the control of the mine owner (such as changes in sediment supply or hydrology). Given that the Lagoon Creek channel has a relatively low gradient compared to Sandy Creek downstream it is possible that potential increased sediment movement rates caused by the Alpha Coal Project may have little subsequent significance or be limited downstream of the Sandy Creek junction.

Considering the types of potential watercourse impacts described for Alpha Coal and Kevin's Corner above, it is inferred that drivers of cumulative impacts of Alpha Coal and Kevin's Corner Project would likely involve interactions of the following:

- No change in stream flow, velocity and shear stress;

- No increase in sediment supply from upstream catchments into the respective Project lease areas;
- Alpha Coal Project could increase sediment supply into the Sandy Creek through Kevin's Corner Project MLA, however this would be subject to the effectiveness of Alpha's mitigation measures.
- The low gradient of Lagoon Creek may limit the increase in Alpha-sourced sediment transport into the Kevin's Corner Project.
- The potential increased sediment supply from the Alpha Coal Project into Sandy Creek would likely pass through Kevin's Corner Project (as the Project will leave most of Sandy Creek intact)
- The Kevin's Corner Project could have varying effects on sediment delivery in Middle and Well Creeks:
    - In the short to medium term, increased sediment delivery may occur as a response downstream of the diversion. Retained vegetation in the downstream channels will be important to mitigate erosion risks.
    - Following subsidence from the underground mining, local catchment sediment supply may increase subject to implementation of effective measures to mitigate impacts caused by surface cracking and modified drainage patterns.
    - The subsided water courses may decrease sediment delivery from the tributary streams until stream bed and channel profiles adjust to a new equilibrium
    - In the long term it is probable there will be reduced sediment generation and delivery from these streams relative to existing conditions.
- The combined long-term impact is that Kevin's Corner impact to decrease sediment supply may potentially offset Alpha Coal Project impact of potential increased sediment supply.

There is a possibility of no-net effect, however it is importantly subject to effectiveness of proposed mitigation, and it remains possible that a minor net increase in sediment supply will occur in Sandy Creek downstream of both Projects.

A geomorphological study will detail the model outputs of a proposed geomorphological assessment from Alpha Coal and Kevin's Corner Projects. The geomorphological model will define the expected conditions and identify the impacts. It will also detail combined mitigation strategies for the mines and identify the residual risks post mitigation.

If the residual risks are high, further mitigation strategies can be implemented.

The model will define the impacts on:

- Stream erosion;
- Stream sedimentation; and
- Water course stability.

4.5. Traffic

4.5.1. Background

The Galilee Basin is located to the west of the regional town of Emerald and is dissected by the Capricorn Highway. A location map of the Kevin's Corner mining lease area and the surrounding State and Local road network is provided in Figure O-20.

Figure O-20 State and local road network surrounding Project site

4.5.2. Cumulative Impact Assessment – Alpha Coal and Kevin's Corner

As part of the Kevin's Corner Coal Project EIS and SEIS a road impact assessment has been undertaken on the surrounding road network. This assessment is to determine whether the traffic generated by the Project (only) will have a significant impact on the performance of the existing road network (Volume 2, Appendix J of the SEIS).

There is however a number of other regionally significant developments either currently operating or whose operations are proposed to coincide with the construction and/or operational phase of the Project. Cumulative impacts of all proposed mining operations raises issues regarding use of data, reliance on unchecked / validated data available in the public domain, limited information, and potentially leading to inaccurate impact assessments. It is, therefore, considered that a cumulative model, at this stage without all the proponents buy-in and data, would not provide a very accurate assessment of potential impacts associated with all proposed projects within this portion of the Galilee Basin.

Accordingly the cumulative impact assessment for traffic impacts for Alpha Coal and Kevin's Corner has been detailed in this section.

Table O-10 provides a summary of the proposed Hancock Developments (Alpha Coal and Kevin's Corner) within the Galilee Basin region that have been considered as part of the traffic and transport cumulative impact assessment.

The existing condition of the surrounding road network in the road impact assessment has been based on midblock 2010 AADT volumes supplied by DTMR and intersection turning movement data collected in March 2012.

The assumed vehicle routes for the proposed development is also incorporated into the cumulative impact assessment as these values are aggregated for that particular road length or intersection to determine if suitable road network performance is being maintained. Traffic volumes have been sourced from the development's EIS.

It should be noted that for this cumulative impact assessment it has been assumed that the maximum daily trip generation for both developments will coincide with the 2014 peak construction phase of the Kevin's Corner Coal Project to produce a 'worst case' scenario.

As a reference, the peak vehicle generation rate for the Kevin's Corner Coal Project is in 2014 during the peak construction phase with a total of 115 trips per day (40% commercial vehicles).

Table O-10 Assumed Vehicle Routes for Proposed Hancock Developments in Galilee Basin Region – 2014

Proposed Development	Relative Size to Kevin's Corner Coal Project (%)	Maximum Daily Trip Generation	Assumed Vehicle Route
Kevin's Corner Coal Project (30 Mtpa)	100%	115	Refer to Kevin's Corner Coal Project EIS
Alpha Coal Project (30 Mtpa)	100%	105	Identical to Kevin's Corner Coal Project

Table O-10 identifies that the proposed Alpha Coal Project will be utilising the same intersections and road sections as those recommended for the Kevin's Corner Coal Project. In particular, the Capricorn

Highway (between Barcaldine and Rockhampton), the Peak Downs and Gregory Highways (between Emerald and Mackay) and roads surrounding the Kevin's Corner site will experience a cumulative impact from these developments.

4.5.3. Cumulative Impact on Road Lengths

Given the increase in vehicles generated by the Kevin's Corner Coal Project (when compared to existing conditions), the inclusion of additional projects may impact on the modelled level of service (LOS) for particular road sections. The modelled year of 2014 assumes the largest vehicle generation for both the Alpha Coal and KC ProjectS and therefore this cumulative impact assessment creates a 'worst case' scenario.

Table O-11 summarises the estimated traffic volumes in 2014 and compares the three scenarios of 'Background Traffic', '2014 Daily Traffic with Kevin's Corner Project Only' and '2014 Daily Traffic with Kevin's Corner Project and all Other Proposed Developments' outlined previously in Table O-10. It should be noted that for comparison purposes the numbers indicated in brackets are the percentage increase in traffic volumes of that scenario when compared with the 2014 Background AADT volumes.

Table O-11 Summary of Cumulative Impact Traffic Volumes on Road Lengths – 2014

Road	Link	2014 Background AADT Volumes (Without Project)	2014 Daily Traffic with Kevin's Corner Project Only (two-way)	2014 Daily Traffic with Kevin's Corner Project and Alpha Coal combined (two-way)
Degulla Road (Inc Jericho-Degulla Road)	Clermont-Alpha Rd to Site	22	137 (+522.7%)	242 (+1,000.0%)
Clermont-Alpha Rd	Alpha- Hobartville Rd	99	196 (+98.0%)	296 (+199.0%)
	Hobartville Rd to Mistake Ck	24	42 (+75.0%)	48 (+100.0%)
	Mistake Ck-Clermont	91	109 (+19.8%)	115 (+26.4%)
Capricorn Hwy	Jericho-Alpha	420	437 (+4.0%)	443 (+5.5%)
	Alpha-Gemfields	587	655 (+11.6%)	711 (+21.1%)
	Gemfields-Emerald	1,415	1,483 (+4.8%)	1,539 (+8.8%)
	Emerald-Rockhampton	4,319	4,335 (+0.4%)	4,337 (+0.4%)
Gregory Hwy	Emerald-Capella	2,746	2,774 (+1.0%)	2,803 (+2.1%)
	Capella-Clermont	1,343	1,371 (+2.1%)	1,400 (+4.2%)
Peak Downs Hwy	Clermont-Peak Downs	734	760	787

Road	Link	2014 Background AADT Volumes (Without Project)	2014 Daily Traffic with Kevin's Corner Project Only (two-way)	2014 Daily Traffic with Kevin's Corner Project and Alpha Coal combined (two-way)
			(+3.5%)	(+7.2%)
	Peak Downs-Mackay	5,450	5,476 (+0.5%)	5.503 (+1.0%)

As illustrated above, the cumulative effect of including the nearby Alpha Coal Project will contribute to increases in traffic volumes along all road sections analysed. Table O-12 summarises the LOS for each of these road sections to determine whether these increases in traffic volumes lead to a deterioration in the performance of these midblocks.

Table O-12 Summary of Cumulative Impact Traffic Volumes on Road Sections - 2014

Road	Link	2014 Background LOS	2014 LOS with Kevin's Corner Project Only	2014 LOS with Kevin's Corner Project and Alpha Coal combined
Degulla Road (Inc Jericho-Degulla Road)	Clermont-Alpha Rd to Site	A	A	B
Clermont-Alpha Rd	Alpha- Hobartville Rd	A	A	B
	Hobartville Rd to Mistake Ck	A	A	A
	Mistake Ck-Clermont	A	A	A
Capricorn Hwy	Jericho-Alpha	A	A	A
	Alpha-Gemfields	A	A	A
	Gemfields-Emerald	A	A	A
	Emerald-Rockhampton	B	B	B
Gregory Hwy	Emerald-Capella	A	A	A
	Capella-Clermont	A	A	A
Peak Downs Hwy	Clermont-Peak Downs	A	A	A
	Peak Downs-Mackay	B	B	B

Table O-12 provides an indication of the extent that the cumulative impact will have on the surrounding road network. It should be noted that although the LOS for Degulla Road/Jericho-Degulla Road and Clermont-Alpha Road (Alpha to Hobartville Road) deteriorate from their LOS when compared to the 2014 Background scenario, they are all still at LOS 'C' or above. This is considered to be an acceptable minimum level of performance for each road length under the midblock threshold criterion within the Guidelines for Assessment of Road Impacts of Development (2006, Queensland Department of Main Roads). The LOS for all remaining road sections considered in Table 10 remains unchanged under the cumulative impact scenario. As a result, no further road upgrade works (other than those specified in Volume 2, Appendix J of the SEIS) are required to any road sections analysed in Table 9 based on its operational performance under the cumulative impact scenario.

4.5.4. Cumulative Impact on Intersections

Capricorn Highway/Gregory Highway (North) Intersection – within Emerald Township

The Capricorn Highway / Gregory Highway (North) intersection analysis identifies that there is very little, if any, incremental impact between the 'no development' and 'with development' scenarios for the Project in 2014 and 2017. It should be noted though that the intersection performance approaches capacity between 2014 and 2017; however this is the case with or without any development occurring (i.e. background traffic growth to 2017 will result in the reduced intersection performance). As such, the Kevin's Corner and Alpha Coal Projects outlined in Table O-8 will have no cumulative impact on the existing configuration or performance of this intersection as it will have already reached capacity prior to 2017 due to the background growth in the existing traffic volumes.

Capricorn Highway/Gregory Highway (South) Intersection – east of Emerald

The analysis of the Capricorn Highway / Gregory Highway (South) intersection indicates that there is negligible Degree of Saturation (DOS) and queue lengths for all scenarios modelled in 2014 and 2017 (i.e. DOS<0.5). The addition of the vehicles generated by the Kevin's Corner and Alpha Coal Projects outlined in Table O-8 will have little impact on the performance of this intersection.

Capricorn Highway/Clermont Alpha Road Intersection - Alpha

The analysis of the Capricorn Highway / Clermont-Alpha Road intersection indicates that there is negligible Degree of Saturation (DOS) and queue lengths for all scenarios modelled in 2014 and 2017 (i.e. DOS<0.1). The addition of the vehicles generated by the Kevin's Corner and Alpha Coal Projects outlined in Table O-8 will have little impact on the performance of this intersection.

Other Intersections

The remainder of intersections along the vehicle routes are operating in a similar capacity to the Capricorn Highway / Clermont-Alpha Road intersection. As such it is expected that there will be no cumulative impact at these intersections based on the vehicles generated by the proposed developments.

4.5.5. Cumulative Impact on Existing Road Users (eg. School buses)

Following the development of the Kevin's Corner Road-use Management Plan (RUMP) completed prior to construction, and further discussions with the potentially impacted existing road users, the cumulative impacts assessment report will be updated to reflect these findings.

4.5.6. Mitigation Measures

The mitigation measure that is most appropriate to reducing the potential cumulative impacts on the road transport infrastructure and existing road users is the development of project-specific RUMPs that take into account the other developments in the area. In addition to this, each respective Proponent will be responsible for the required road and intersection upgrades that are identified as required in their individual approvals process.

4.5.7. Potential Residual Risks

As the assessment presented in this document assumes a conservative approach that the peak construction activity for both the Kevin's Corner and Alpha Coal Projects occurs at the same time (i.e. 2014) the potential for cumulative impacts of a magnitude greater than assessed are unlikely. There is however the future potential for additional developments to commence and add different pressures to the regional transport infrastructure. It will be the responsibility of these new development proponents to undertake the required cumulative impact assessments to effectively manage any impact to existing road users and the road infrastructure.

4.6. Significant Vegetation Communities and Habitats

Unlike previous sections of this interim report, the combined Alpha Coal and Kevin's Corner impact assessment for significant vegetation communities and habitats has not yet been undertaken. This section outlines the study scope which will detail the potential for cumulative impacts as a result of Alpha Coal and Kevin's Corner on a number of State and Commonwealth significant biodiversity values. The matters to be assessed include significant vegetation communities, listed fauna and flora species and their habitats and connectivity.

4.6.1. Cumulative Impact Assessment –Kevin's Corner and Alpha

The cumulative impact assessment will be based on results of field surveys, vegetation mapping and habitat modelling that has been undertaken and reported on for both the Alpha Coal and Kevin' Corner Projects. The Projects' supplementary EIS reports provide a refined list of State and Commonwealth listed flora and fauna species and the likelihood of occurrence within the respective Project areas. Those species that are identified as known or likely to occur in the Project areas will be used for the purpose of this cumulative impact assessment. The occurrence and estimated extent of impacts to significant vegetation communities are also presented in the SEIS reports and will be assessed.

The cumulative impact assessment will identify those significant vegetation communities and habitats that are predicted to have a residual impact by the respective Projects, outline what those predicted total extent of residual impacts are, and map their distribution and where impacts are expected to occur. The cumulative impact assessment will also detail combined mitigation strategies and proposed offsets for the Alpha Coal and Kevin's Corner mines. The potential for cumulative impacts on the significant vegetation communities and habitats will then be discussed taking into consideration the mitigation measures and offsets proposed.

The significant biodiversity values to be assessed are:

- Significant Vegetation Communities (such as Endangered and Of Concern Regional Ecosystems and Threatened Ecological Communities);
- Listed fauna species and habitats;
- Listed flora species and habitats; and
- Biodiversity Corridors and connectivity.

Terrestrial biodiversity corridors and connectivity will also be assessed in this cumulative impact assessment. The model will identify where biodiversity corridors have been mapped by the Department of Environment and Heritage Protection (DEHP) as well as proponents in the vicinity of the Alpha Coal and Kevin's Corner Projects. It will also discuss and identify where important areas are for connectivity of flora and fauna species at a local and regional scale. The cumulative impact assessment will also detail combined mitigation strategies and proposed offsets for the Alpha Coal and Kevin's Corner mines in regards to this matter. The potential for cumulative impacts on connectivity will then be discussed taking into consideration those mitigation measures and offsets proposed.

Any additional mitigation or offset measures considered as appropriate to further minimise the potential for cumulative impacts on the above biodiversity values will then be discussed and proposed.

4.7. Social Impacts

4.7.1. Background

HGPL will participate with the Office of the Co-ordinator General, key stakeholders (local government and state agencies), and the Alpha Coal Project in the development of the terms of reference for the Galilee Basin Cumulative Social Impacts Assessment (CSIA) Study and Galilee Basin Social Infrastructure Plan through the Galilee Basin CSIA Roundtable.

At this stage the study will detail the combined social impacts from the development of Alpha Coal and Kevin's Corner. However, depending on the timing of other proponent approvals in the Galilee Basin at the commencement of the Galilee Basin CSIA Study, they would also be included. The study will assess cumulative social impacts for relevant issues such as, but not limited to:

- Population – changing demographic profile of region
- Housing and Accommodation – affordability and availability
- Traffic Management and Road Safety (refer to Section 4.5)
- Workforce Management
- Health – increased demand and use of community infrastructure and services

The Galilee Basin Social Infrastructure Plan will determine short, medium and long term actions to deliver agreed priority social infrastructure initiatives (via an agreed Priority Social Infrastructure Schedule) through partnerships between industry, communities and governments.

HGPL will participate in annual data collection conducted by OESR specifically the:

- Resources Operations Employment Survey, and
- Resources project Employment Survey

to provide current and future workforce and accommodation data for all employees and contractors engaged in construction, production and maintenance of the Kevin's Corner Project.

Future cumulative social impact mitigation and management measures identified through this Social Infrastructure Study and plan will be included in subsequent versions of the Kevin's Corner Coal Project Social Impact Management Plan.

5. Review and Validation

Some of the proposed Projects may not proceed and over time validation of the cumulative impacts and the success of the mitigation measures will become more evident. Accordingly the following preparation and review timetable is recommended for the Cumulative Impacts Report.

Table O-13 Cumulative Impacts Report Schedule

Task	Expected Date	Kevin's Corner Timeline
Submission of Cumulative Impacts Report for review by DEHP and SEWPaC	31 March 2012	Prior to Project approval
Cumulative Impacts Report Completed	31 July 2013	Prior to construction
First Review of Cumulative Impacts Report	31 March 2015	Prior to full production
Second Review of Cumulative Impacts Report	31 March 2020	Full Production
Subsequent Review	Every 5 years	Till end of mine life.

Note: The Coordinator General's Report for the Alpha Coal Project conditioned (refer to Condition 5, pg 85) that the Galilee Basin Cumulative Social Impact Assessment Roundtable be established with 90 days of final investment decision. On this basis the terms of reference for the Cumulative Impacts Assessment Study may not be commenced until early 2013 and therefore not completed until the latter half of 2013. Accordingly, the Cumulative Impacts Report Schedule (set out in Table O-14) would not include social impacts.

5.1. Forward Work Plan

To achieve the cumulative impact reporting schedule presented in Table O-13, the Kevin's Corner Project will require the completion of some additional specific studies using available information from one or more neighbouring projects. The projects that are anticipated to be covered by these studies and the studies themselves are outlined in Table O-14.

Table O-14 Cumulative Impacts Report Schedule

Study Area	Study Title	Projects included in Quantitative Assessment*	Timing
Air Quality	Revised Air Quality and Greenhouse Gas Assessment	Kevin's Corner and Alpha Coal Projects	Completed as part of the Kevin's Corner SEIS (Volume 2, Appendix G)
Groundwater	Kevin's Corner SEIS Groundwater Report	Kevin's Corner and Alpha Coal Projects	Complete as part of the Kevin's Corner SEIS (Volume 2, Appendix L)
Surface Water Hydrology	Cumulative Impact Flood Assessment of Kevin's Corner and Alpha Coal Projects	Kevin's Corner and Alpha Coal Projects	Complete as part of the Kevin's Corner SEIS Appendix A of this report.
Geomorphology	A Cumulative Geomorphological Study (Kevin's Corner and Alpha Coal Projects)	Kevin's Corner and Alpha Coal Projects	Post Project approval
Significant Vegetation	Cumulative Impact Terrestrial Biodiversity Report	Kevin's Corner, Alpha Coal and Waratah's	Post Project approval

Study Area	Study Title	Projects included in Quantitative Assessment*	Timing
Communities and Habitats		China First Projects	
Social Impacts	Galilee Basin Social Infrastructure Study and Plan as part of Galilee Basin CSIA Roundtable	Kevin's Corner and Alpha Coal Projects	Post Project approval

* Using only publically available information.