

Watermark Coal Project

Residual Matters following
Response to Submissions
OAS&FS

10 February 2014



Agenda

1. Development of the Soil and Land Capability Assessment
2. Evolution of SRLUP Protocols
3. BSAL Verification
4. Avoidance
5. Soil Balance
6. Rehabilitation Plan
7. Interactions with Surrounding Agricultural Activities



Development of Soils and Land Capability Assessment

- Soils and Land Capability Assessment within the Project Boundary (including initial Alluvial Black Soil survey) undertaken according to NSW guidelines and typical project DGRs Jan/Mar 2011
- Additional high intensity survey within Project Boundary and sampling along The Dip Road to confirm Alluvial Black Soil boundary. Mine plan modified to maintain 150m buffer from this boundary Aug 2011
- Soil and Land Capability Assessment completed for Project Dec 2011



Development of Soils and Land Capability Assessment (Cont.)

- Project DGRs issued, which required

Apr 2012

“...a specific focused assessment of the impacts of the proposal on strategic agricultural land, having regard to the gateway criteria in the draft New England North West Strategic Regional Land Use Plan...”

- Attachment 1 of the DGRs stipulates that

“Applicants use their best endeavours to address the draft gateway criteria when assessing the impacts of the proposal on strategic agricultural land.”

The assessed impacts on BSAL was based on the verification process described in the following slide.



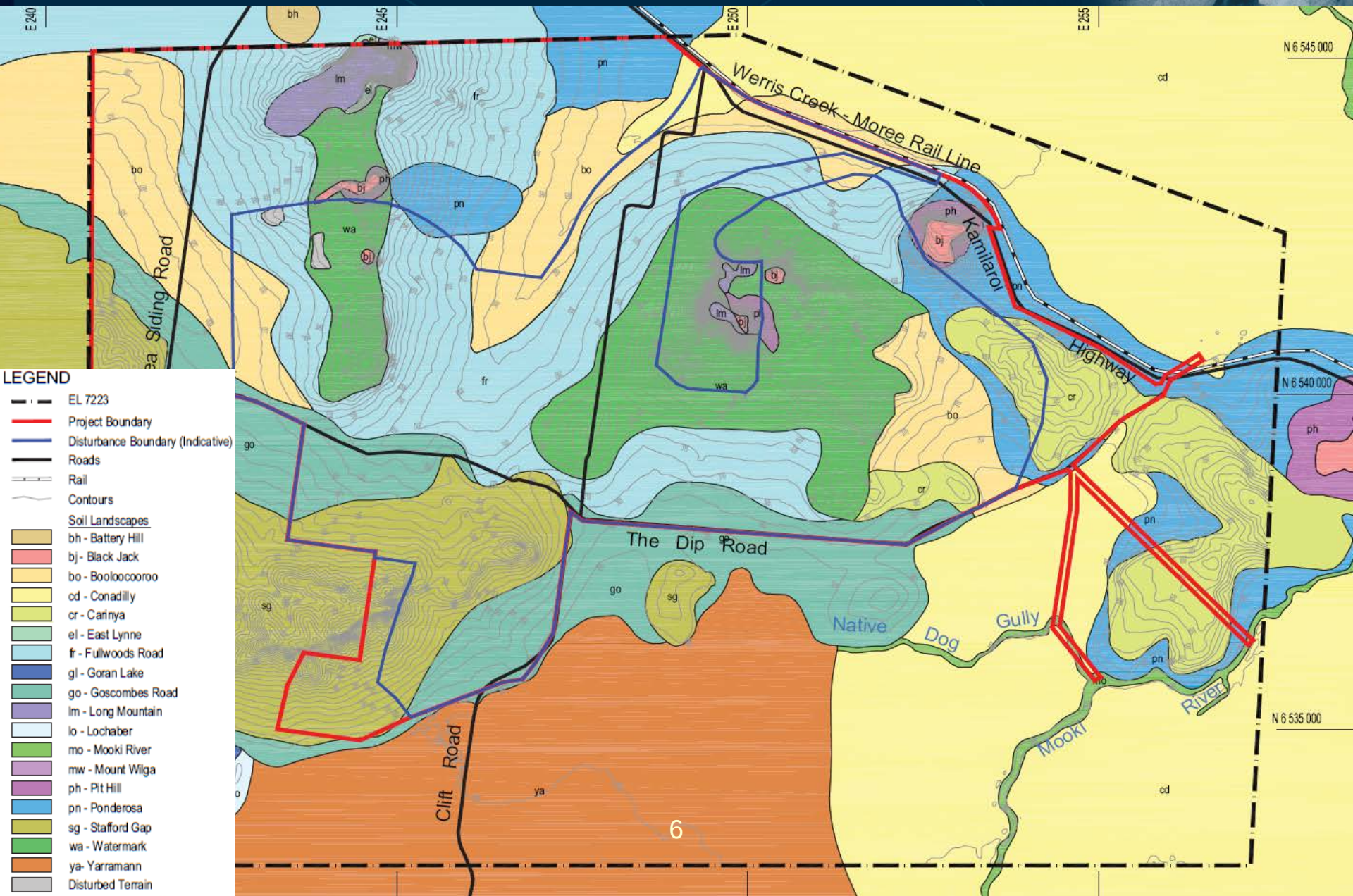
Development of Soils and Land Capability Assessment (Cont.)

“The assessment can include site verification information if the applicant believes that the land mapped as strategic agricultural land does not meet the published draft criteria for strategic agricultural land.”

The assessment verified BSAL in accordance with the draft criteria of the SRLUP.

Draft Criteria	Trigger
Land that falls under soil fertility classes ‘high’ or ‘moderately high’ under the Draft Inherent General Fertility of NSW (OEH), and	Ponderosa (7) and Carinya (8) soil landscapes fulfil criteria
Land capability classes II or III under the Land and Soil Capability Mapping of NSW (OEH), and	Fullwoods Road (1), Goscombes Road (3), Ponderosa (7) and Booloocooroo (6) soil landscapes fulfil criteria

Soil Landscapes



Development of Soils and Land Capability Assessment (Cont.)

Draft Criteria	Trigger
Reliable water of suitable quality, characterised by land having rainfall of greater than 350mm per annum (9 out of 10 years) or land within 150m of the following surface or groundwater resource: • unregulated rivers where there are flows for at least 95% of the time (ie the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers, or • groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L.	Groundwater and surface water impact assessments confirm a reliable water source is available within the Project Boundary and as such fulfils the criteria.
Minimum 20 hectares in area (based on minimum area required for commercial food production).	Ponderosa soil landscape (7) fulfils land capability and fertility criteria. This covers an area greater than 20ha.

Use of the draft criteria as site verification protocols was the only procedure for identifying BSAL at the time. This is consistent with the conditions of the DGRs. The assessment identified 96 ha of BSAL associated with the Ponderosa soil landscape within the Disturbance Boundary.

Development of Soils and Land Capability Assessment (Cont.)

- Soil and Land Capability Assessment revised to meet DGRs Apr 2012

The EIS (including the soils and land capability assessment) adequately meets the requirements as set out in the DGRs for the Project. This was confirmed through DP&I's acceptance of the EIS following adequacy review, which enabled the EIS to be placed on public exhibition.

Shenhua Watermark and DP&I acknowledges that there are inconsistencies between the DGRs and current policies given the timing of release. However, the assessment is compliant with the DGRs.



Evolution of SRLUP Protocols and Interactions with the Project

- Draft SRLUP released for exhibition Mar 2012

The Project DGRs were issued in April 2012 requiring an assessment of strategic agricultural land having regard to the criteria of the draft SRLUP. The assessment was undertaken using the criteria of the draft SRLUP as site verification protocols, which was the only procedure for identifying BSAL at the time.

- Final SRLUP released Sep 2012
 - Included trigger maps of BSAL
 - Revised definition for BSAL
 - No BSAL verification protocols



Evolution of SRLUP Protocols and Interactions with the Project (Cont.)

Prior to the Project's EIS adequacy review in October 2012 the assessment was revised to incorporate the final criteria of the SRLUP, including:

- land that falls under soil fertility classes 'high' or 'moderately high' under the Draft Inherent General Fertility of NSW (OEH), and
- land capability **classes I, II or III** under the Land and Soil Capability Mapping of NSW (OEH), and
- reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (ie the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L.

OR



Evolution of SRLUP Protocols and Interactions with the Project (Cont.)

- land that falls under soil fertility classes 'moderate' under the Draft Inherent General Fertility of NSW (OEH), and
- and capability classes I or II under the Land and Soil Capability Mapping of NSW (OEH), and
- reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (ie the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L.

Items in red highlight changes from the draft to the final SRLUP. These changes gave rise to a broader definition for BSAL and a potential increase in the extent of BSAL when compared against the draft.



Evolution of SRLUP Protocols and Interactions with the Project (Cont.)

Use of the criteria as site verification protocols was the only procedure for identifying BSAL at the time. This is consistent with the conditions of the DGRs. Despite the revision to the final SRLUP, the assessment maintained its position with 96 ha of BSAL associated with the Ponderosa soil landscape within the Disturbance Boundary.

A reconnaissance level site visit found no obvious limiting factors on some of the cultivated areas. As such, concessions have been made to exclude these areas from the offset for ongoing agricultural use.

- Environmental Impact Statement (EIS) for the Project submitted for adequacy review Oct 2012
- Fact sheet release for comment outlining a summary of the Interim Protocol for Site Verification and Mapping of BSAL (Interim Protocol) Nov 2012

DP&I advised no action required due to Project timing.

Evolution of SRLUP Protocols and Interactions with the Project (Cont.)

- Regulatory comments received following adequacy review (OAS&FS 21 November 2012) Nov 2012
 - OAS&FS reviewed the assessment against the DGRs
 - **No recommendation** to consider the Interim Protocol or revise BSAL verification
 - Highlighted that BSAL within the biodiversity offsets will be taken out of agricultural production and that the assessment of these lands has not been adequately considered

The EIS was revised (including the soils and land capability assessment) in consideration of regulatory comments. The assessment adequately meets the requirements as set out in the DGRs for the Project. This was confirmed through DP&I's acceptance of the EIS following adequacy review, which enabled the EIS to be placed on public exhibition.

- EIS for the Project publicly exhibited Feb 2013



Evolution of SRLUP Protocols and Interactions with the Project (Cont.)

- Regulatory comments received following EIS review (OAS&FS 24 April 2013) Apr 2013

- OAS&FS suggested additional BSAL may be present within the Disturbance Boundary and biodiversity offsets. Recommended an assessment for land within the Disturbance Boundary and biodiversity offsets be undertaken in line with the Interim Protocol.

An assessment against the Interim Protocol is not stipulated by the Project's DGRs. However, to address OAS&FS the existing assessment was reviewed against the Interim Protocol criteria as part of the RTS (see following slides).

- Interim Protocol released Apr 2013

- Included site verification criteria (consistent with the fact sheet) and associated protocols.

An assessment against the Interim Protocol is not stipulated by the Project's DGRs. However, the existing assessment was reviewed against the Interim Protocol criteria as part of the RTS (see following slides).

Evolution of SRLUP Protocols(Cont.)

- Draft State-wide BSAL mapping released Oct 2013

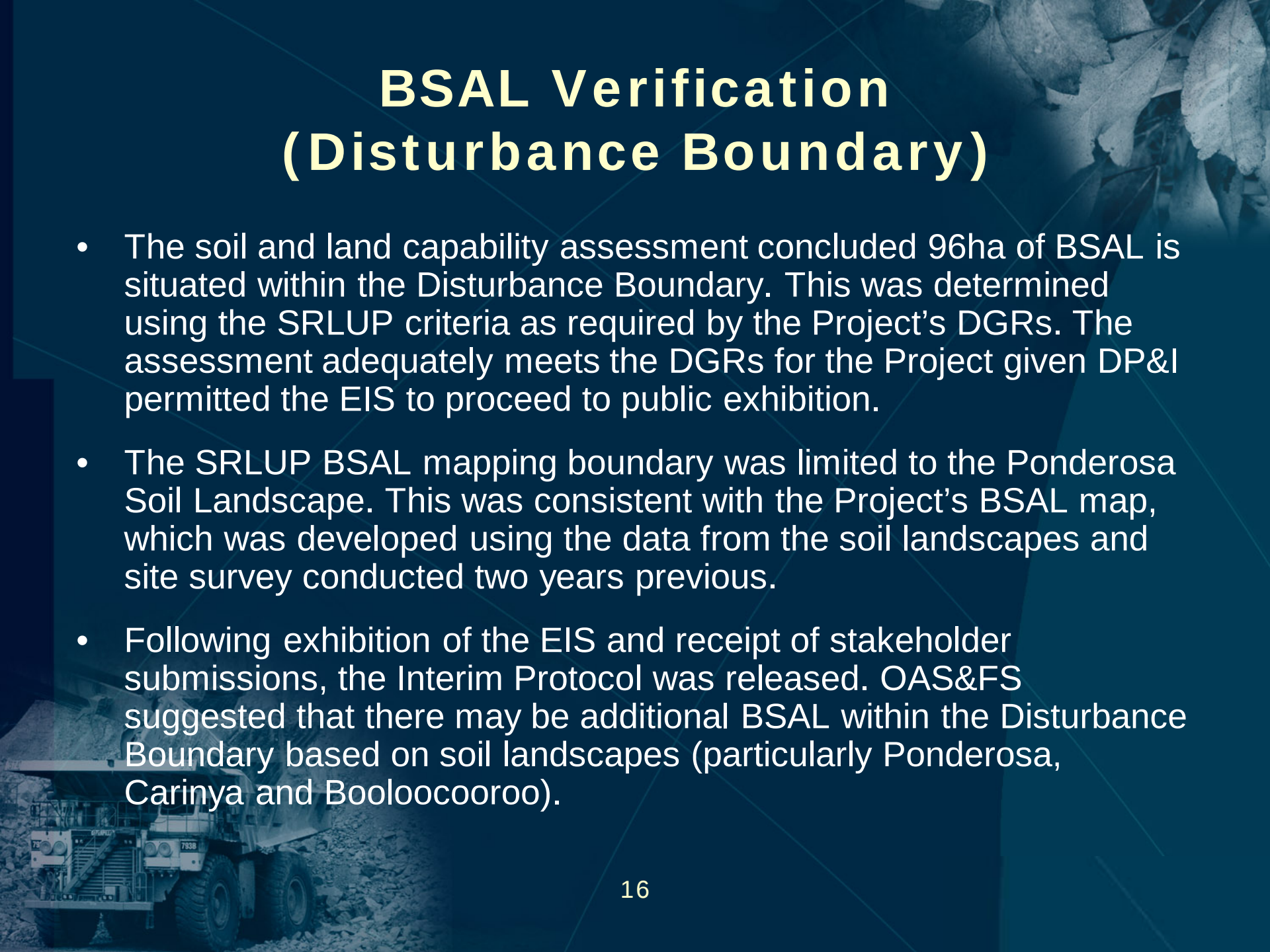
An assessment against the draft State-wide BSAL mapping is not stipulated by the Project's DGRs. However, the existing assessment was reviewed against the mapping as part of the RTS (see following slides).
- Response to Submissions (RTS) for the Project issued Nov 2013
- Regulatory comments received following RTS review Dec 2013
(OAS&FS 13 December 2013)
 - OAS&FS suggested that BSAL verification has not been undertaken for the additional biodiversity offset and that additional BSAL may be present within the Disturbance Boundary.

Responses provided as part of this presentation

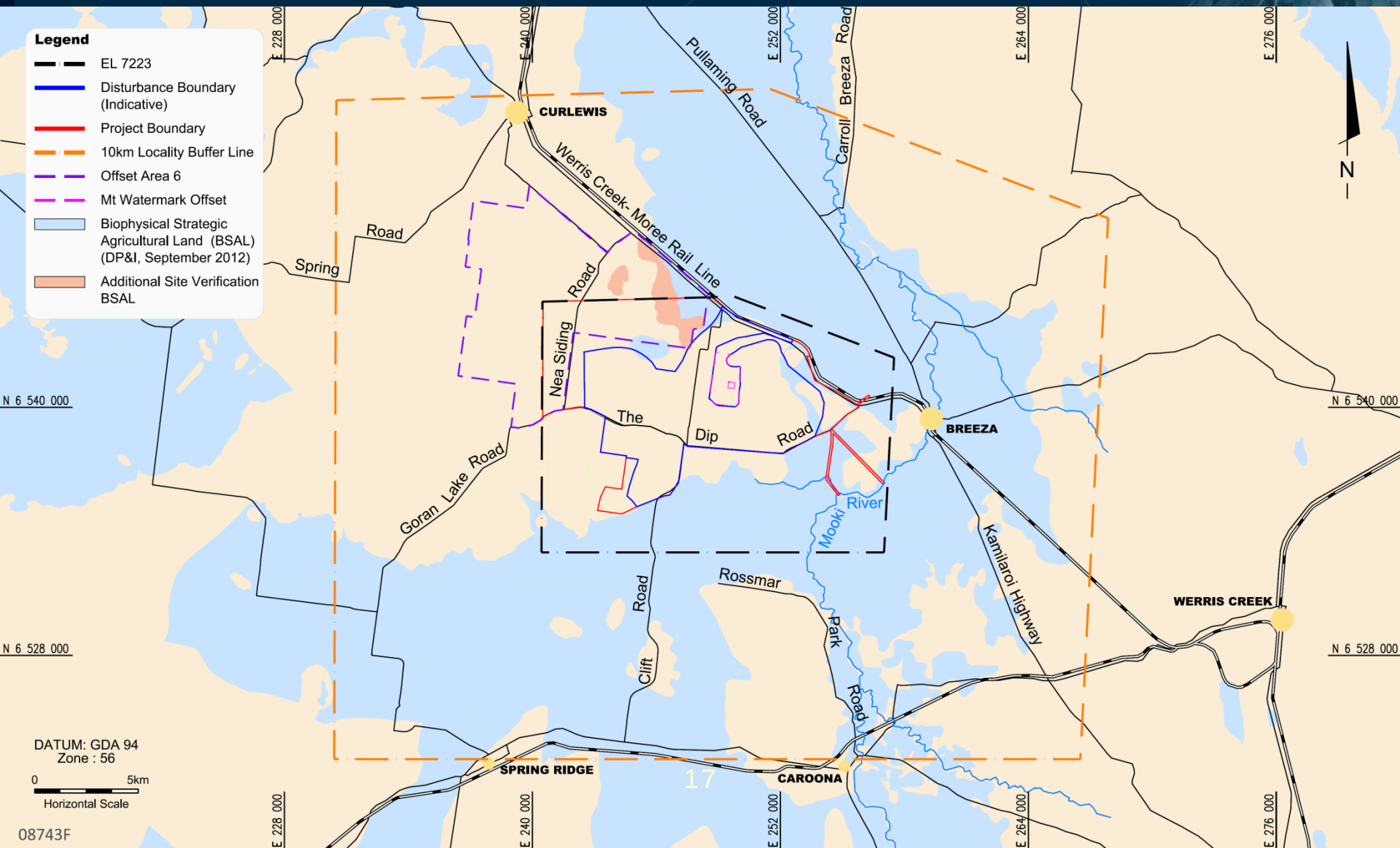


BSAL Verification (Disturbance Boundary)

- The soil and land capability assessment concluded 96ha of BSAL is situated within the Disturbance Boundary. This was determined using the SRLUP criteria as required by the Project's DGRs. The assessment adequately meets the DGRs for the Project given DP&I permitted the EIS to proceed to public exhibition.
- The SRLUP BSAL mapping boundary was limited to the Ponderosa Soil Landscape. This was consistent with the Project's BSAL map, which was developed using the data from the soil landscapes and site survey conducted two years previous.
- Following exhibition of the EIS and receipt of stakeholder submissions, the Interim Protocol was released. OAS&FS suggested that there may be additional BSAL within the Disturbance Boundary based on soil landscapes (particularly Ponderosa, Carinya and Booloocooroo).



Onsite BSAL Verification



BSAL Verification (Soil Landscapes)

- In response, SLR applied a retrospective comparison of existing information in the EIS with the BSAL verification criteria as part of the RTS
- The comparison provided the following outcomes:
 - Ponderosa Soil Landscape: Assessment information confirmed the soil landscape within the Disturbance Boundary has no limiting factor and represents BSAL. According to this assessment, it was concluded that mining will disturb an area of 96 ha of BSAL
 - Carinya Soil Landscape: Assessment information confirmed the soil landscape within the Disturbance Boundary (223 ha) does not conform to BSAL due to the land capability class (V) and shallow stoney soils with rock outcrops
 - Booloocooroo Soil Landscape: Assessment information confirmed the soil landscape within the Disturbance Boundary (723 ha) does not conform to BSAL due to limiting factors, including salinity, drainage and chemical barriers (i.e. pH)



BSAL Verification (Soil Landscapes) Cont.

- Booloocooroo soil landscape limiting factors

Booloocooroo sites		Soil Type	Reviewed BSAL	Conclusion (applying existing soil data to 2013 protocols)
Eastern Mining Area	GSSE Site 7	Sodic Brown Dermosol	BSAL Criteria needs to be $E_{ce} < 4dS/m$, (or chlorides ,800mg/kg when gypsum is present. There was no noted gypsum present in this soil pit) (Layer 1: 0-20cm E_{ce} 10.6dS/m (Highly Saline)) (Layer 3: 80-140cm E_{ce} 13.2dS/m (Highly Saline))	Not BSAL due to Salinity.
Western Mining Area	C90 (Banks 1991)	Red Chromosol Dr2.32	BSAL Criteria: Drainage better than poor. Poorly drained, High erosion hazard, footslope in low hills under woodland shrub understorey. Used for timber scrub unused.	Not BSAL due to Drainage
	GSSE Site 24	Yellow Duplex (likely Sodosol from field notes)	BSAL Criteria: Drainage better than poor. Impeded drainage, Mottles 15% brown 15% grey 15% Red. Pasture grazing.	Not BSAL due to Drainage
Central Northern infrastructure Area	GSSE 3	Brown Vertosol	BSAL Criteria: Drainage better than poor. Drainage 'Poor' below 0.35m, mottles 30% light Yellow. Cultivated paddock.	Not BSAL due to Drainage
			BSAL Criteria: pH 5.0 to 8.9 (outside this range is considered a chemical barrier). pH 15cm-35cm is 9.1 pH 35cm-80cm is 9.3	Not BSAL due to Chemical Barrier (pH)

BSAL Verification (Soil Landscapes) Cont.

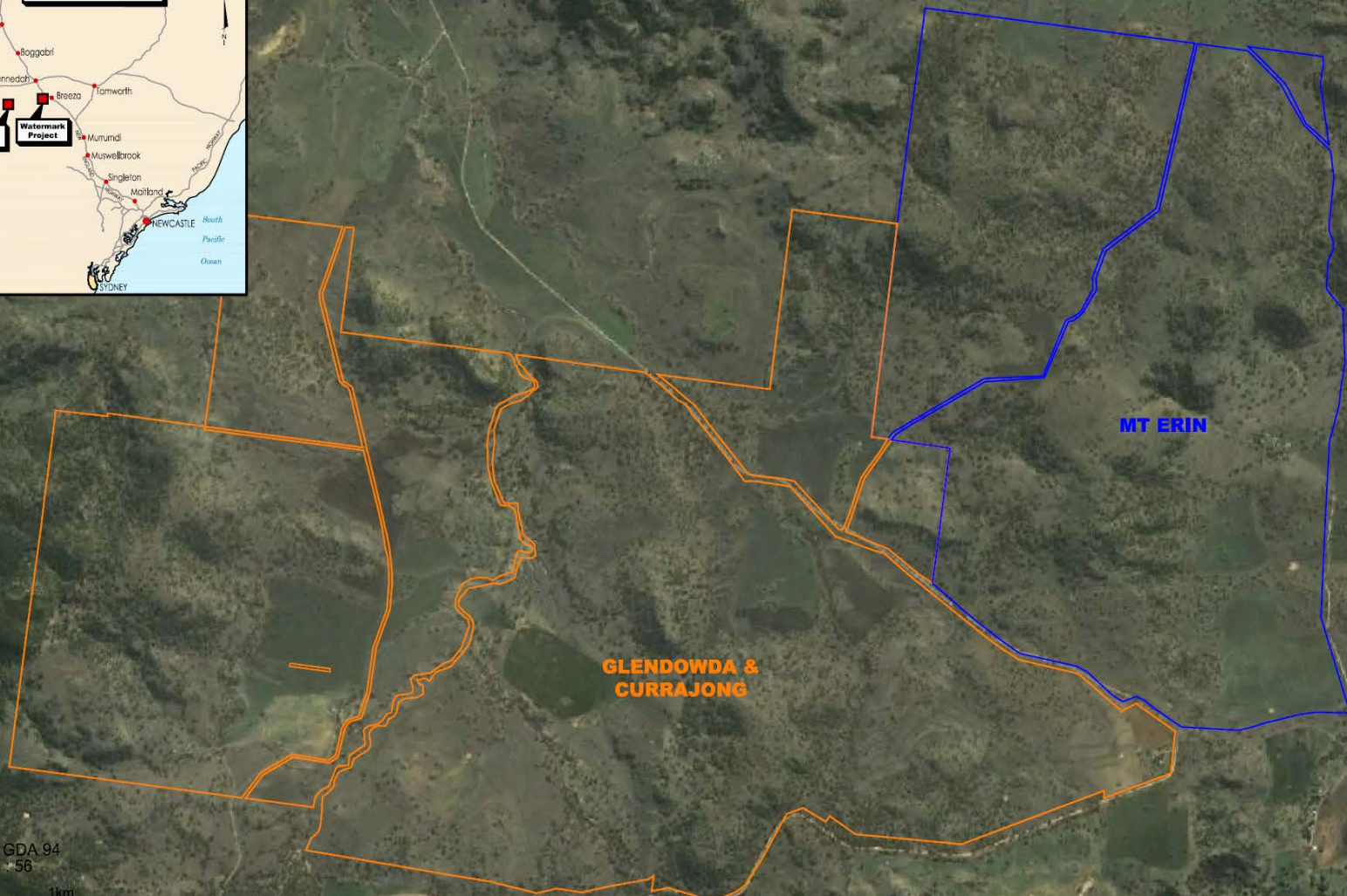
- Based on the limiting factors from the information currently available across much of the soil landscapes within the Disturbance Boundary, there is no evidence supporting the presence of additional BSAL beyond that currently identified
- The Booloocooroo soil landscape has limiting factors of drainage and pH based on the available data. However, as part of the rehabilitation program there is the potential to improved drainage and lower pH through blending soils to ultimately recreate additional land which conforms to BSAL on the post mining landform



BSAL Verification (Offsets)

- At the time of preparing the EIS, the SRLUP mapping and site reconnaissance work based on land capability and inherent fertility (as per final SRLUP criteria) indicated approximately 696 ha of BSAL occurred within the proposed Onsite Biodiversity Offset Areas.
- The Biodiversity Offset Strategy was modified to exclude the 696 ha of BSAL.
- A new Additional Offsite Biodiversity Offset Area was included in the Biodiversity Offset Strategy to account for the reduction in available land for biodiversity. The SRLUP did not map any BSAL on the Additional Offsite Biodiversity Offset Area.
- In October 2013, the NSW Government released draft State-wide BSAL mapping. This mapping indicated the presence of BSAL on the Additional Offsite Biodiversity Offset Area.

et



DATUM: GDA 94
Zone : 56

Horizontal Scale

et

BSAL Verification (Offsets) Cont.

- A desktop assessment was undertaken based on land capability and known soil types within the area. The latest land capability data from the Namoi CMA showed the site to be dominated by class IV, V and VI, which fails the SRLUP criteria for BSAL
- A reconnaissance level site visit found no obvious limiting factors on some of the cultivated areas. As such, concessions have been made to exclude these areas from the offset for ongoing agricultural use



Avoidance

Biodiversity Offsets

- To remove the potential for land use conflict:
 - 696 ha of BSAL was excluded from Offset Area 6
 - Any land currently cultivated or historically cropped within the Additional Offsite Biodiversity Offset Area has been excluded from the biodiversity offset. Approximately 514 ha of existing higher quality agricultural land within the offset area will be maintained for continued agricultural production

Buffers

- There is no condition under current policies/guidelines that suggests a buffer around verified BSAL is required
- Shenhua Watermark has modified the mine plan to maintain a minimum 150 m buffer to the alluvial black soils and black soil plains



Soil Balance (Topsoil)

- The Elliot and Reynolds (2007) method of assessing material characterisation for reuse as topdressing in rehabilitation is used only as a guide. This is an industry accepted document.
- The topsoil balance is calculated to provide an overall indication of the volume of material to be salvaged, handled and available to achieve the required depths for rehabilitation. Variability in soil and practicalities of stripping soil need to be considered when discussing these soil volumes
- The topsoil stripping depths of four soil types (1, 4a, 6b and 7) were challenged by OAS&FS based on pH and EC



Soil Balance (Topsoil) Cont.

Soil Type		Soil Landscape	EIS Stripping depths for soil volume calculations (m)	OAS&FS stripping depth used for soil volume calculations (m)	OAS&FS Comments	Soil Details and Management
1	Brown Sodosol	Fullwoods Road	0.20	0.15	Stated pH and EC exceed criteria (ph 4.5-8.4 & ECe <1.5dS/m) below 15cm.	pH = 9.2 (Very Strongly Alkaline) in Layer 2: 0.15 to 0.55m To be mixed with upper layer pH 7.1 (Neutral) ECe = 2.2 dS/m (Slightly Saline) in Layer 2: 0.15 to 0.55m To be mixed with upper layer ECe 0.5 dS/m (Non Saline)
4a	Brown Sodosol	Watermark	0.25	0.15	Stated pH exceed criteria (ph 4.5-8.4) below 15cm.	pH = 9.3 (Very Strongly Alkaline) in Layer 2: 0.15 to 0.45m To be mixed with upper layer pH 6.8 (Neutral)
6b	Brown vertosol	Boolloocooroo	0.35	0.15	Stated pH and EC exceed criteria (ph 4.5-8.4 & ECe <1.5dS/m) below 15cm.	pH = 9.1 (Very Strongly Alkaline) in Layer 2: 0.15 to 0.35m To be mixed with upper layer pH 6.9 (Neutral) ECe = 1.81 dS/m (Non-Saline) in Layer 2: 0.15 to 0.35m To be mixed with upper layer ECe 0.95 dS/m (Non Saline)
7	Red Ferrosol	Ponderosa	0.60	0.15	Stated pH exceed criteria (ph 4.5-8.4) below 15cm.	pH = 8.6 (Strongly Alkaline) in Layer 2: 0.15 to 0.60m To be mixed with upper layer pH 7.1 (Neutral) Note this soil is BSAL and should be retained for Rehabilitation.

Soil Balance (Topsoil) Cont.

- The Elliot & Reynolds 2007 is considered a guide. Furthermore the 'R' box within the guide allows for 'Restricted' use, unless:

- a. Soil is ameliorated in some approximate way; or
- b. Soil is mixed with other more suitable materials;

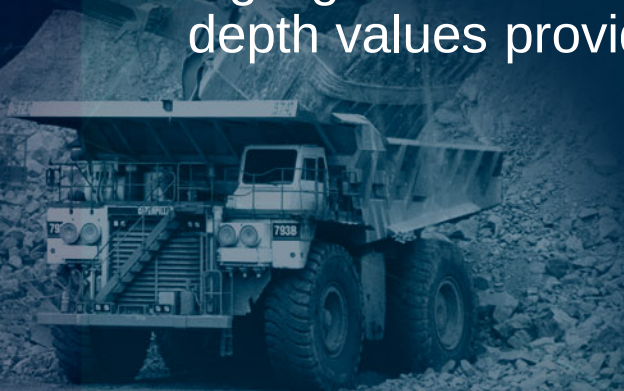
Criteria was used as a guide. (Refer to Figure 12 in EIS Appendix Y)

- SLR recommend salvaging as much good quality topsoil as possible for mine rehabilitation. This can include the transitional soil or boundary soil when the layer 1 soil is very high quality, and the layer 2 just over the threshold in the guide. Or the parameters outside the guides thresholds can be ameliorated with typical agronomic practices, as it is in this case.



Soil Balance (Subsoil)

- There are fewer risks associated with the subsoils that are recommended for use as an intermediate layer between the overburden and the topsoil material and as such are assessed separately
- The variance in the assessment of topsoil availability with OAS&FS appears to be a result of adopting only the soil profile information from GSSE 2011, when data from SALIS, Banks (1995) and field observations were also used to calculate subsoil stripping depths for use as an intermediate layer between overburden and topsoil
- Additional information from the above sources is provided to highlight the variability in soil depths and the conservative stripping depth values provided in the EIS



Soil Balance (Subsoil) Cont.

Soil Type		Soil Landscape	EIS Stripping depths for soil volume calculations (m)	OAS&FS stripping depth used for soil volume calculations (m)	Curlewis Soil Landscapes	Final Comment
1	Brown Sodosol	Fullwoods Road	1.20	0.90	Topsoil depths range from 0.10 - 0.30m with total soil depth ranging from 1.00-3.00m as many profiles are underlain by unconsolidated sediments or buried soil profiles on lower slopes and fans.	Strip to 1.20m is quite conservative.
3a	Brown Sodosol	Goscombes Rd	1.20	0.60	Topsoils are up to 0.60m deep, with total soil depth often exceeding 3.00m, but predominantly deep 1.50m.	Strip to 1.20m is quite conservative.
3b	Brown Chromosol		1.20	0.95		
4a	Brown Sodosol	Watermark	1.20	0.25	Extremely variable: 0.50-1.50m on crests and up to 1.50m on sideslopes, occasionally up to 3.00m	Not sure why OAS&FS chose 0.25m. Variable but strip to 1.20m average is fair.
4b	Brown Kandosol		1.20	0.80		
5	Red Chromosol	Stafford Gap	1.20	1.00	Highly variable: 0.40-1.50m on crests and upper sideslopes. 0.60-2.00m on lower sideslopes and drainage lines.	Variable but strip to 1.20m average is fair.
6a	Brown Dermosol	Booloocoroo	1.20	0.00	Typically very deep between 1.50m and 3.00m	Not sure why OAS&FS chose not to strip this at all. But 1.20m is very conservative.
6b	Brown vertosol		1.20	0.80		
7	Red Ferrosol	Ponderosa	1.20	0.60	Predominantly moderately deep (0.50-1.50m) to deep (>1.50m) on upper and mid footslopes, with deep (>1.50m) on mid and lower footslopes.	Variable but 1.20m average is fair. Plus this soil landscape is BSAL.
8	Brown vertosol	Carinya	1.20	0.65	Shallow (<0.50m) to deep (>1.50m) on sideslopes, with moderately deep (1.50m) on benches and in fans along drainage lines and on lower sideslopes.	Variable but 1.20m average is fair.

Soil Balance (Management)

- Given the conservative estimates made in the EIS, as shown in the table above, there is expected to be a surplus of both topsoil and subsoil available to achieve the desired rehabilitation outcomes
- The nature of stripping operations also ensures soils are continually assessed during this process. The depths of soils salvaged is continually modified on a daily basis based on the soils that are uncovered at this intensive scale
- There will also be a GIS database of soil resources salvaged and stockpiled during the mining operation, which can be compared with EIS estimates and stripping depths modified accordingly



Rehabilitation Plan

- Shenhua Watermark proposes to reinstate 1,000 ha of Class III land within the Disturbance Boundary for agricultural purposes; of which 100 ha will represent BSAL (see figure)
- The Rehabilitation Strategy presented in the EIS demonstrates how Shenhua Watermark proposes to implement, manage and monitor its reinstatement of agricultural land
- Shenhua Watermark is currently preparing a detailed Rehabilitation Plan based on the Rehabilitation Strategy for the broader Project with a particular focus on the reinstatement of Class III land and BSAL. The proposed structure for the document is provided in the following slides for discussion

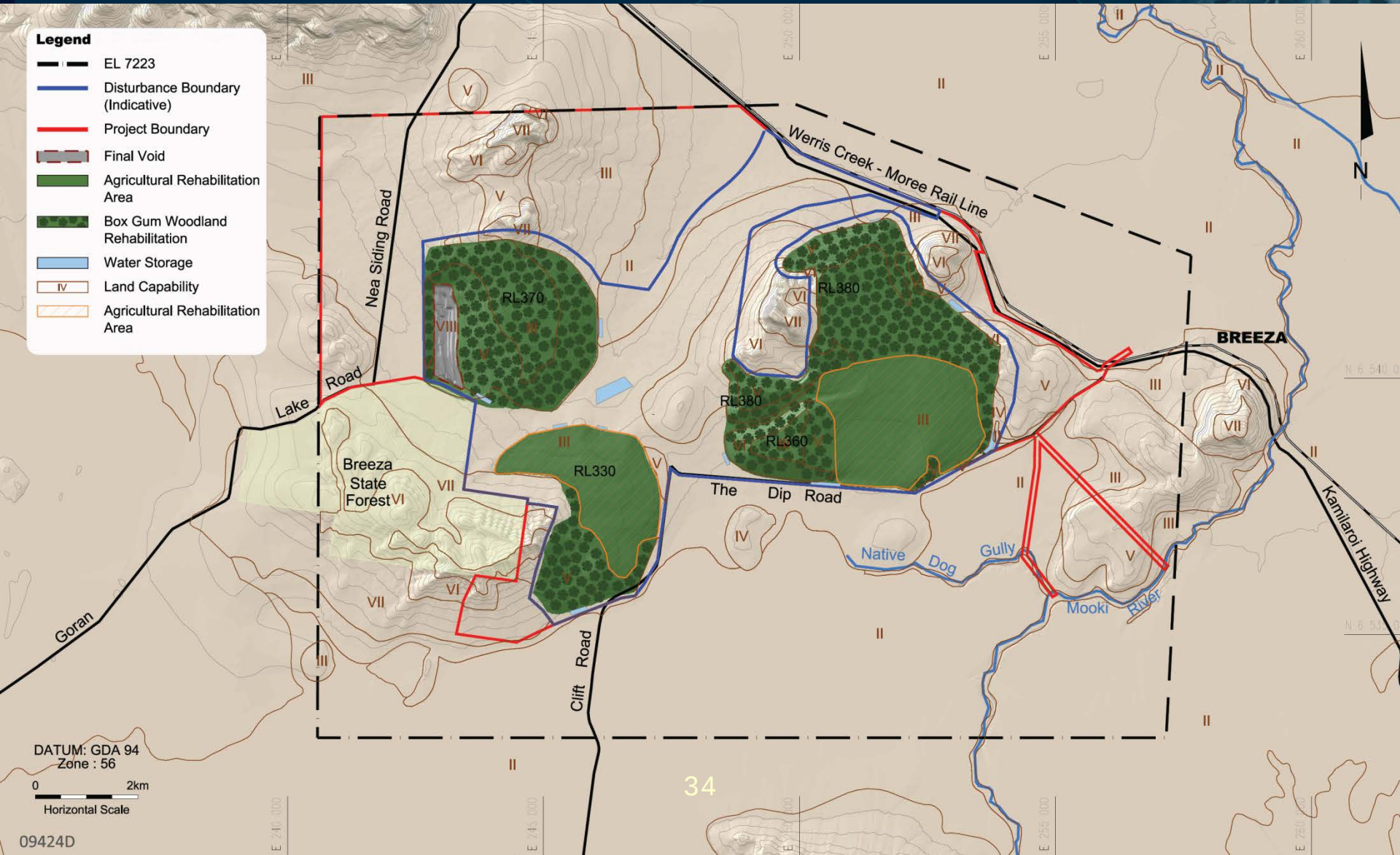


Rehabilitation Plan (Cont.)

- Rehabilitation success criteria for the reinstatement of BSAL and agricultural land will be based on the criteria of the Interim Protocol and consideration of the land and soil capability Class 3 hazard criteria in the Land and Soil Capability Guideline
- The Project's soil balance indicates sufficient topsoil and subsoil resources to achieve target post mining land capabilities (as per previous slides). Predicted surplus material will be stored as a contingency to improve rehabilitation, if required



Final Land Capability and Use



Rehabilitation Plan (Cont.)

- Examples of successful agricultural rehabilitation:
 - The Alluvial Lands Project provided evidence that rehabilitation of mined land to land capability Class 1 and 2, which can facilitate agricultural production, land is achievable
 - Bengalla Mine has recently established an area of approximately 5.7 ha of an existing OEA to Class 3 land capability
- Darmody et al. (2002) compiled research which has shown that surface mining can be a short term land use which can be followed by productive higher agricultural uses, if rehabilitation is undertaken correctly
- Achieving a higher mine land productivity is possible if rehabilitation plans are designed to minimise compaction, if good quality soil materials are used, and if high management levels (herbicides, fertility, adapted crop varieties) and practices are followed

Rehabilitation Plan Structure

INTRODUCTION

- Project Background
- Purpose of this Report
- Guidelines and Standards
- Description of Rehabilitation Domains
- Structure of the Rehabilitation and BSAL Reinstatement Plan
- Key Project Members

REHABILITATION OBJECTIVES

- Overview
- Objectives

PLANNING AND LEGISLATION

- Mining Act and Mining Operations Plan
- Director General's Environmental Assessment Requirements
- Policy and Guidelines
- Relevant Project Environmental Assessment Reports

EXISTING ENVIRONMENT

- Climate
- Hydrology and Topography
- Geology
- Soil Landscape Units
- Soil Types
- Vegetation and Land Use
- Agricultural Land Classification

PRELIMINARY IMPACT ASSESSMENT

- Risk Assessment
- Entire Project Footprint
- Biophysical Strategic Agricultural Land within Project Footprint

Rehabilitation Plan Structure (Cont.)

POST-MINING LANDFORM AND LANDUSE

- Conceptual Landform Design and Planning
- Project Decommissioning Strategy
- Conceptual Final Landform Shape
- Post-mining Rural Land Capability Classification
- Post-mining Agricultural Suitability
- Post-mining Land Use
- Integration of Post-mining Rural Land Use and Surrounding Environment

PRELIMINARY BSAL POST-MINING GOALS

- Overview
- Post-mining Soil and Landscape Characteristics
- Post Mining Land and Soil Capability Class
- Post-mining Quantity of BSAL
- Evidence of Successful Reinstatement of Prime Agricultural Land

BSAL REINSTATEMENT PLAN

- Scope
- Stakeholder Consultation
- Success Criteria
- Management
- Stockpiles
- Procedures
- Testing
- Records and Reporting
- Rehabilitation Effectiveness

REHABILITATION MANAGEMENT STRATEGY

- Short-term and Long-term Objectives
- Progressive Rehabilitation Schedule
- Soil Resources
- Revegetation
- Weed Management
- Water Management in Rehabilitation Areas
- Erosion and Sediment Control



Rehabilitation Plan Structure (Cont.)

REHABILITATION MONITORING AND PERFORMANCE

- Preliminary Rehabilitation Success Criteria
- Rehabilitation Monitoring Design

FINAL VOID MANAGEMENT

- Objectives
- Final Land Use Operations (Final Void)
- Final Void Rehabilitation

REVIEW OF REHABILITATION MANAGEMENT AND BSAL REINSTATEMENT PLAN

CONCLUSION

COMMITMENTS

BSAL Reinstatement Plan

Scope

Stakeholder
Consultation

Indirect Temporary Impacts

Success Criteria

Direct and Temporary Impacts

Direct and Permanent Impacts

MANAGEMENT

General

Training

Inductions and Toolbox Talks

Role of Experienced Soils Consultant

Soils Plan

Inventory Reconciliation

Stockpile Locations and Configurations

Control of stockpile placement

Signage

Erosion Control and Drainage

Dust Control

Seeding

Weed Control

Stockpile Inspections

STOCKPILES

BSAL Reinstatement Plan (Cont.)

PROCEDURES

- Assessment of Equipment
- Procedures for Stripping, Stockpiling, Recovery and Reinstatement
- Establishment
- Stockpiling and Stripping Guidelines

TESTING

- In-situ Test Pits
- Test Pits in Stockpiles
- Test Pits in Reinstated Land

RECORDS AND REPORTING

- Reconciliation
- Reports
- Inventory
- Stockpile Height Monitoring
- Reviews
- Seeding and Weed Control

REHABILITATION EFFECTIVENESS



Interactions with Surrounding Agriculture

Water

- Within 10 km of the Project Boundary, 35 bores are predicted to experience maximum groundwater level reductions of greater than or equal to 0.1 m. Of these, four bores adjacent to the Southern Mining Area have a maximum predicted drawdown between 1 metre and 1.5 m
- If requested by the landowner, all private bores within the zone of depressurisation with a predicted drawdown of greater than 0.25 m as a consequence of the Project will be monitored for flow, water level and quality to validate model predictions and/or provide early warning of anomalous results
- Should monitored private bores experience a drawdown of greater than 2m, Shenhua Watermark will offer “*make good provisions*”

Interactions with Surrounding Agriculture (Cont.)

Air Quality

- Suggested discrepancies in the prevailing wind data (OAS&FS note west north-westerly), which could lead to greater impacts
- The wind roses for the two Watermark meteorological stations (WS1 and WS2) and regional meteorological stations (Gunnedah) show that for 2011, 2012 and the first half of 2013 the prevailing winds are consistently south-easterly and east south-easterly at WS1 and southerly at WS2. These prevailing winds only occur up to 35% of the year
- The next most common wind direction at WS1 is with a westerly component, varying between north-westerly and south-westerly while at WS2. These winds occur around 5% to 15% of the year

Interactions with Surrounding Agriculture (Cont.)

- Although these are not the most prevalent wind directions, they were captured in the air quality dispersion modelling for the EIS via the inclusion of the entire year of hourly data
- Shenhua Watermark currently operate an air quality monitoring network, which is representative for the Project Boundary and immediate surrounds (including agricultural enterprises), Breeza village and Gunnedah. This network will remain operational throughout the life of the Project



Monitoring Network



Interactions with Surrounding Agriculture (Cont.)

- A study undertaken by CSIRO (2009) found that Australia had the lowest levels of contaminants of all cotton crops imported by an international spinning mill with no mention of dust, dirt or sand
- Discussions with Australian cotton industry professionals largely indicated that dust impacts on cotton was not a known issue
- As predicted by the air quality modelling, a dust deposition rate of $2\text{g/m}^2/\text{month}$ is equivalent to $0.067\text{g/m}^2/\text{day}$ which is well below the dust deposition rate of $0.5\text{g/m}^2/\text{day}$ estimated by Dooley and Rossato (2010) to cause reduction of canopy photosynthesis and yield in cotton



Interactions with Surrounding Agriculture (Cont.)

- Andrews and Skriskandarajah (1992) investigated the effects of dust generated from coal mines on cattle production. It was found that cattle did not find feed unpalatable nor did it affect the amount eaten at a dust concentration of $120\text{g/m}^2/\text{month}$. This is substantially greater than the concentrations predicted over the agricultural land reserve and surrounds
- Kannegieter (2006) reported that there is little scientific evidence which demonstrates a definitive adverse effect on the increase in dust levels on grazing animals
- In support of this conclusion, Mt Arthur Coal Mine has demonstrated (through existing operations) that it is capable of undertaking mining activities in conjunction with the Angus and Wagyu beef cattle enterprise run approximately 2 km away (NSW Minerals Council, 2012)

Interactions with Surrounding Agriculture (Cont.)

- Given the information provided during consultation with relevant experts and the available literature, the predicted dust deposition rates generated by the Project is not expected to have an impact on agriculture situated in the immediate vicinity of the Project Boundary
- No need to compensate as there is no evidence that the Project will affect the productivity of surrounding agricultural enterprises



Interactions with Surrounding Agriculture (Cont.)

Visual

- The Project will result in high and moderate visual impacts at varying viewing locations as mining advances
- Strategic mitigation measures to address the Project's visual impacts were outlined in the EIS and RTS
- Detailed information and associated actions/timeframes for each mitigation measure will be provided in a Visual and Lighting Management Plan, which will be prepared upon grant of Development Consent and implemented prior to operations



Interactions with Surrounding Agriculture (Cont.)

- The plan will detail offsite mitigation and management measures to reduce the availability and duration of the visual impacts, including:
 - Where requested by the owner of a primary residence which has a moderate to high visual impact from the Project, Shenhua Watermark will provide landscaping treatments or vegetation;
 - Developing and implementing a landscape plan for relevant sections of the Kamilaroi Highway in long term impact areas; and
 - Establishing tree screens along relevant sections of Clift Road, The Dip Road and Nea Siding Road.



Interactions with Surrounding Agriculture (Cont.)

Socio-Economics

- Deloitte Access Economics (2012) found that property prices in Singleton were not statistically significantly different from other areas
- Shenhua Watermark will prepare a Social Impact Management Plan upon grant of Development Consent and implemented prior to operations
- The plan will allow scope to monitor property data in the local area and report in the regulatory required Annual Review



Interactions with Surrounding Agriculture (Cont.)

- The Project will provide the following benefits:
 - \$1,310 Million of net production benefits accruing to Australia. This net production benefit is distributed amongst a range of stakeholders, including the local community
 - Provide significant direct and indirect employment and household incomes
 - Monetary contributions to support community infrastructure and services
- The socio-economic benefits of the Project will far outweigh its social and environmental costs.



Watermark Coal Project

**Residual Issues following
Response to Submissions
OAS&FS**

19 March 2014



Residual Issues

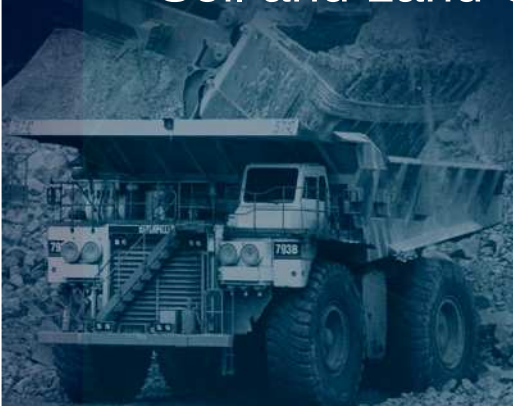
1. Correct Identification and Protection of BSAL
2. Characterisation of Soil for Stripping and Rehabilitation
3. Rehabilitation of Agricultural Land
4. Monitoring of Agricultural Land

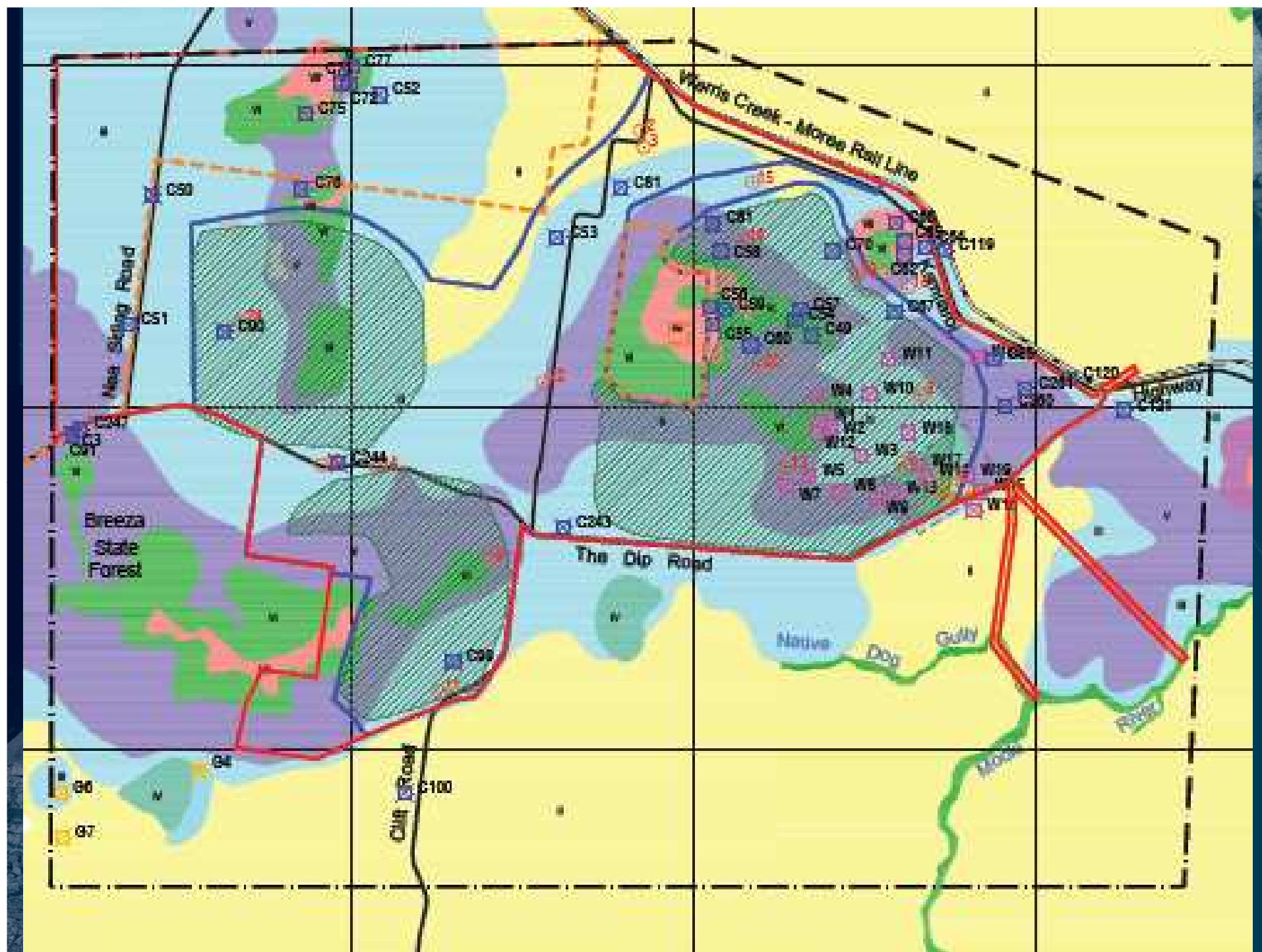


1. Correct Identification and Protection of BSAL

Rural Land Capability V's Land and Soil Capability

- The Watermark EIS assessment included a Rural Land Capability Assessment (Class I to VIII). This is not to be confused with the new 'Land and Soil Capability (LSC) Assessment Scheme – Second Approximation' (Class 1 to 8) which was finalised in November 2012.
- There is NSW mapping of LSC which includes the Watermark Project. At a scale of 1:100,000 scale for that region.
- Soil and Land Capability Assessment completed for Project Dec 2011





1. Correct Identification and Protection of BSAL

DGR Requirements for the Project

- Project DGRs issued, which required

Apr 2012

“...a specific focused assessment of the impacts of the proposal on strategic agricultural land, having regard to the gateway criteria in the draft New England North West Strategic Regional Land Use Plan...”

- Attachment 1 of the DGRs stipulates that

“Applicants use their best endeavours to address the draft gateway criteria when assessing the impacts of the proposal on strategic agricultural land.”



1. Correct Identification and Protection of BSAL

SRLUP Details

Prior to the Project's EIS adequacy review in October 2012 the assessment was revised to incorporate the final criteria of the SRLUP, including:

- land that falls under soil fertility classes 'high' or 'moderately high' under the Draft Inherent General Fertility of NSW (OEH), and
- land capability **classes I, II or III** under the Land and Soil Capability Mapping of NSW (OEH), and

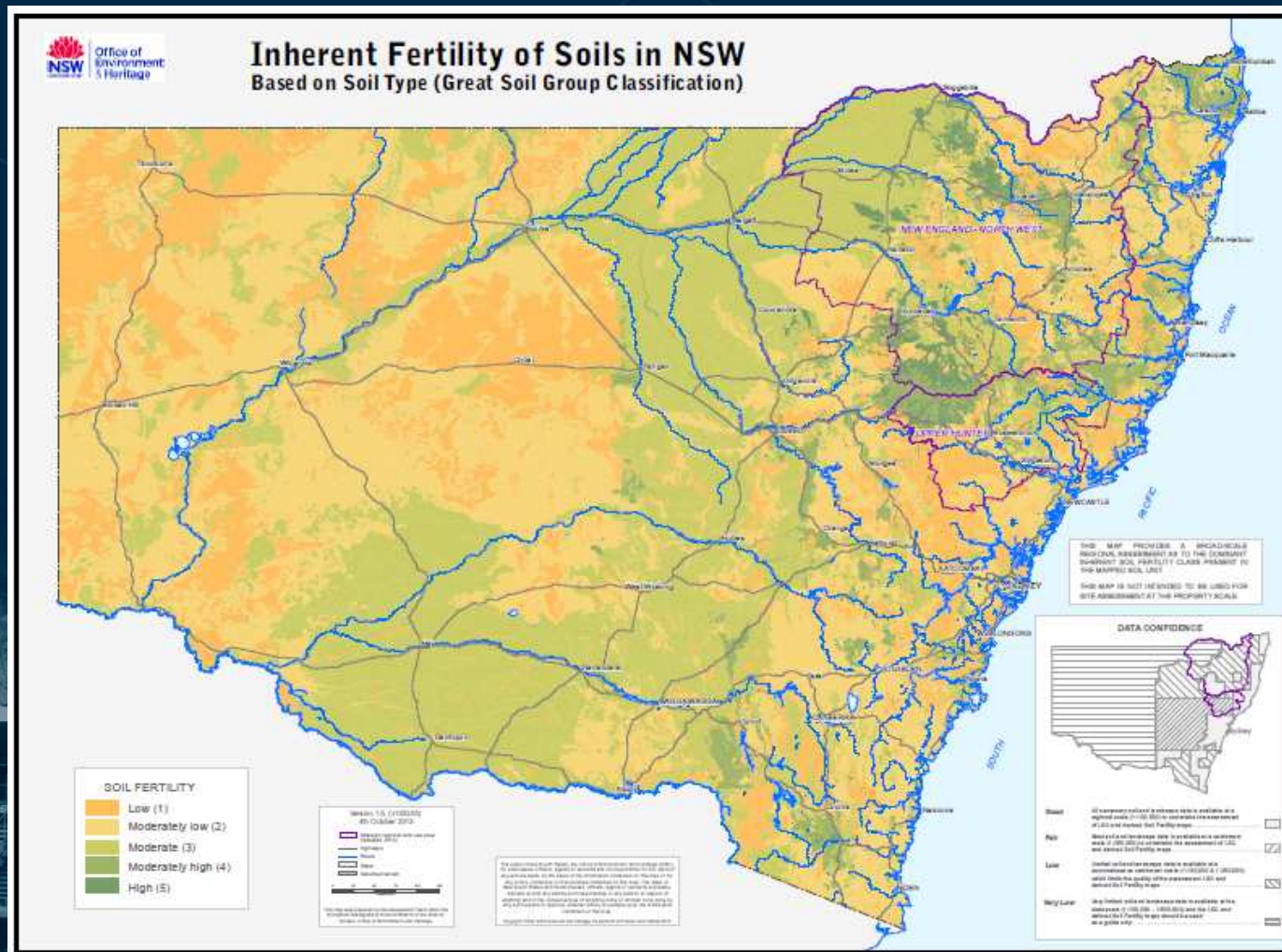
OR

- **land that falls under soil fertility classes 'moderate' under the Draft Inherent General Fertility of NSW (OEH), and**
- **and capability classes I or II under the Land and Soil Capability Mapping of NSW (OEH), and**

Items in **red highlight** changes from the draft to the final SRLUP. These changes gave rise to a broader definition for BSAL and a potential increase in the extent of BSAL when compared against the draft

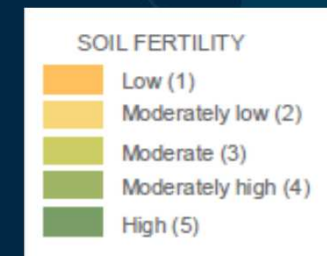
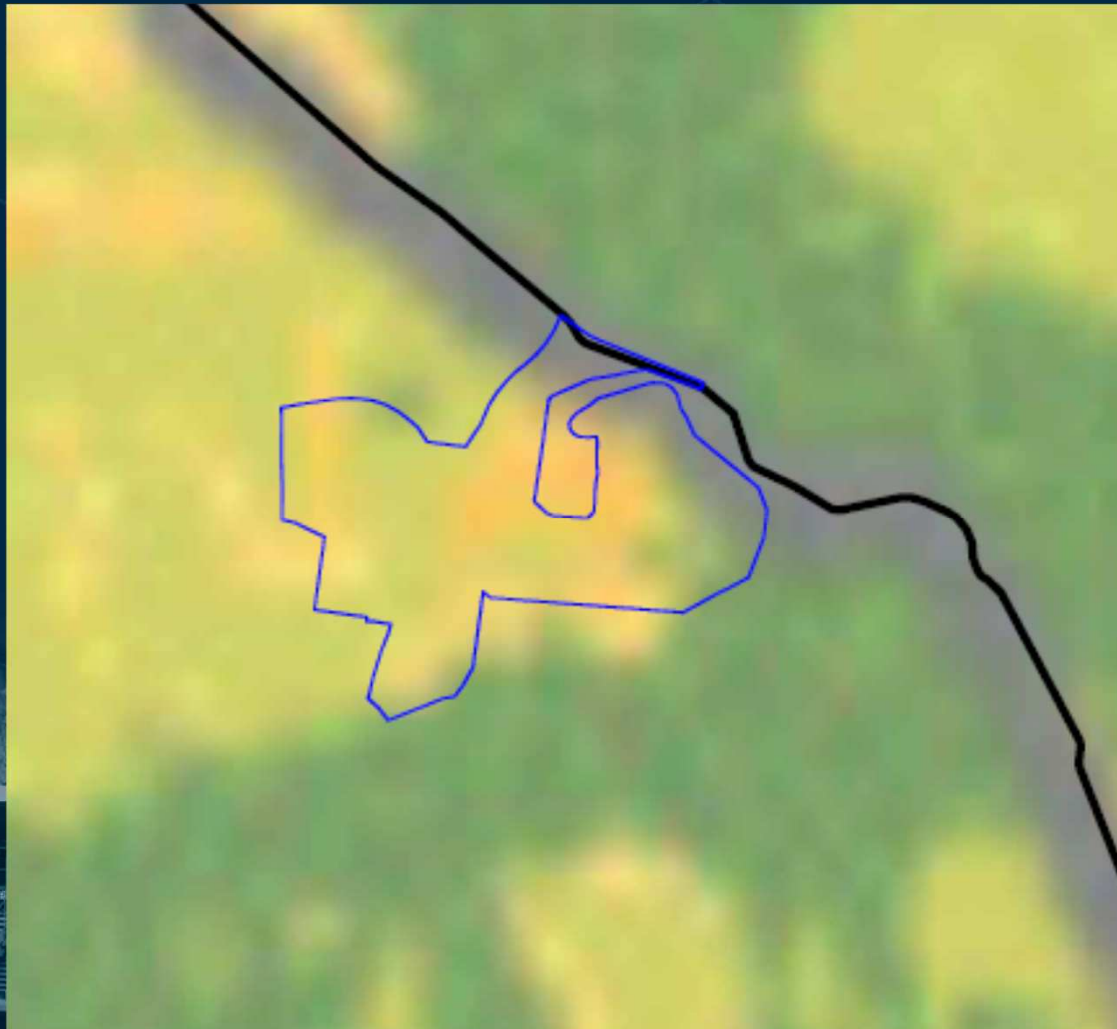
1. Correct Identification and Protection of BSAL

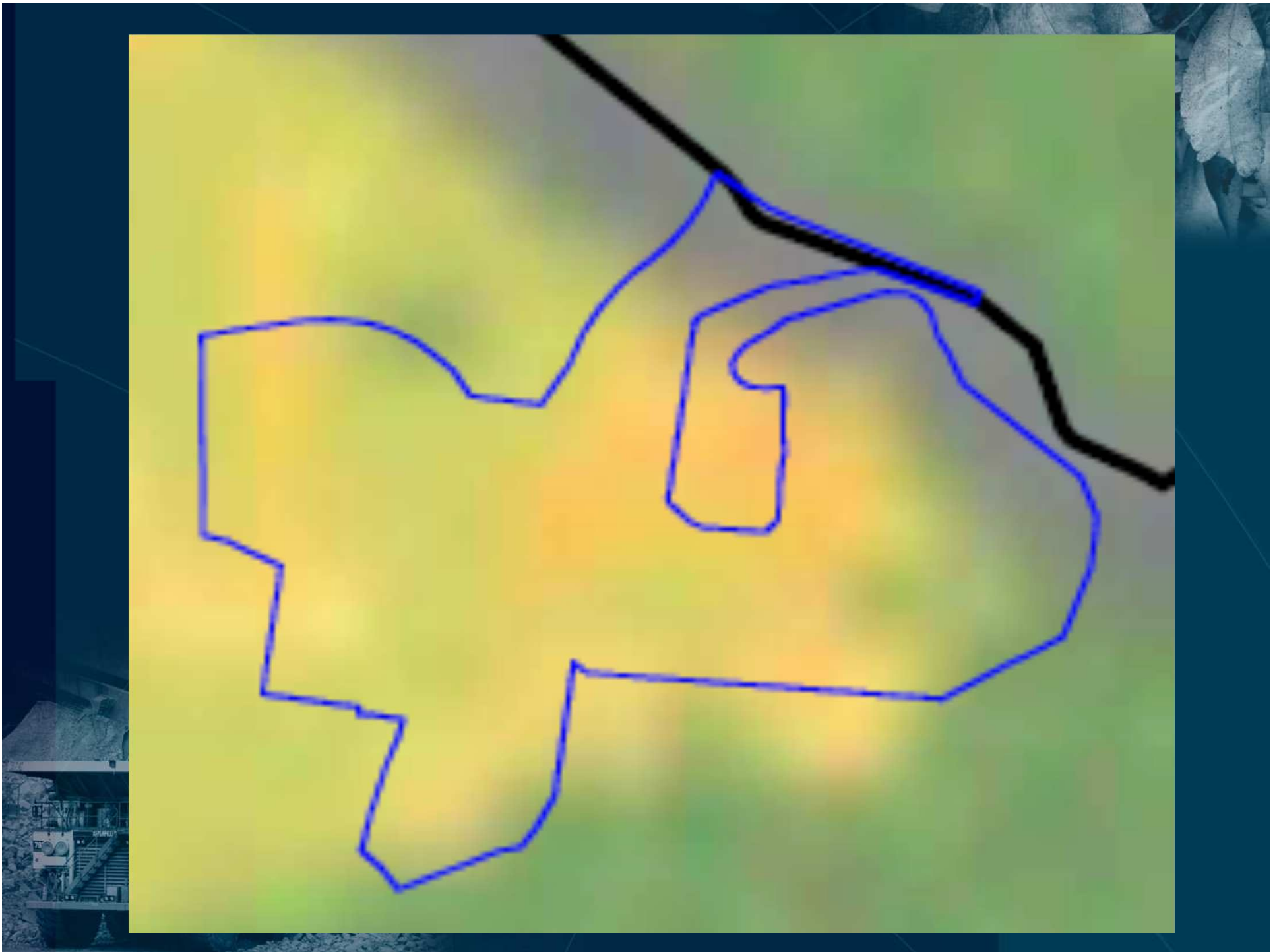
Draft Inherent General Fertility Mapping

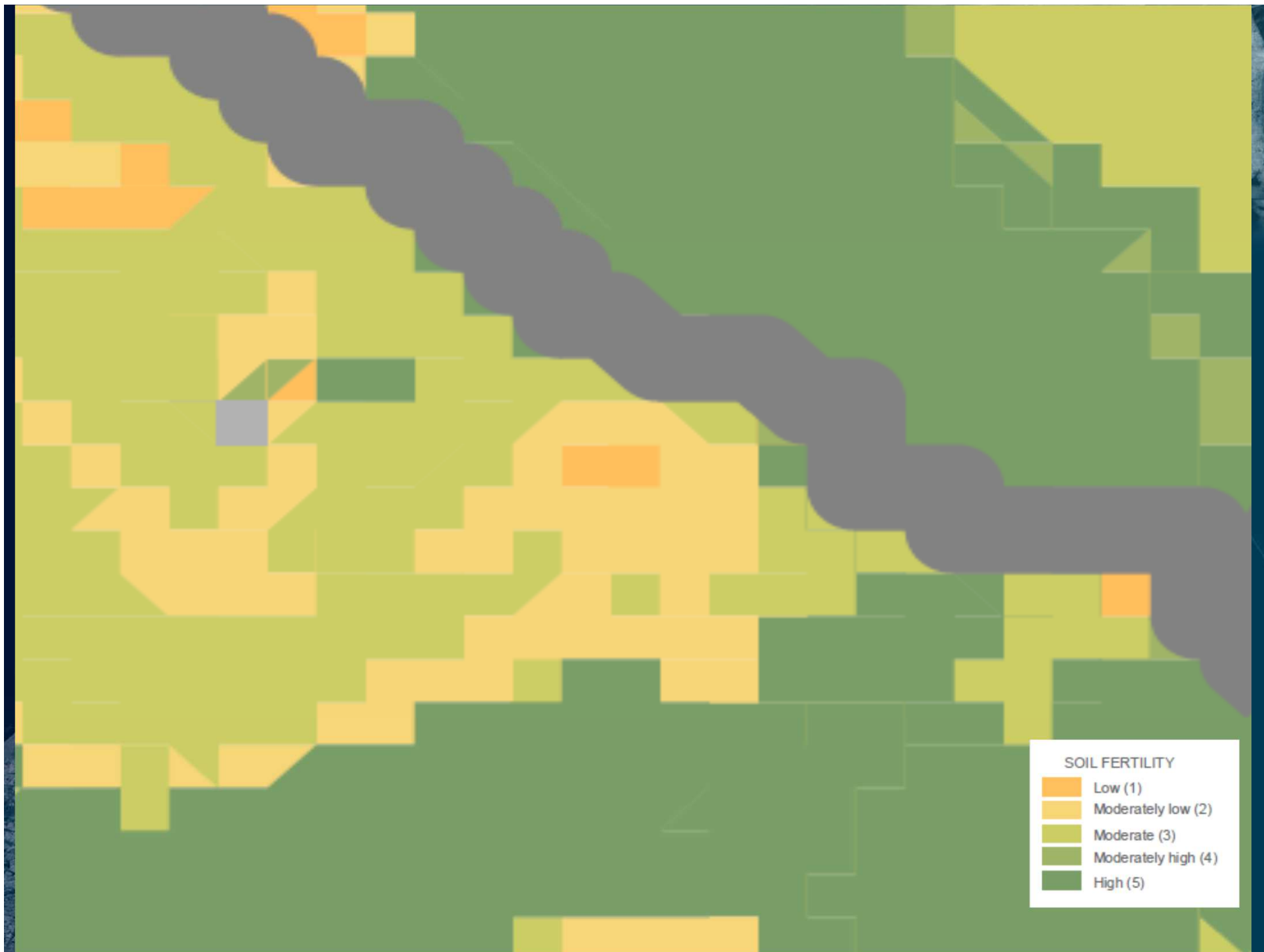


1. Correct Identification and Protection of BSAL

Draft Inherent General Fertility Mapping

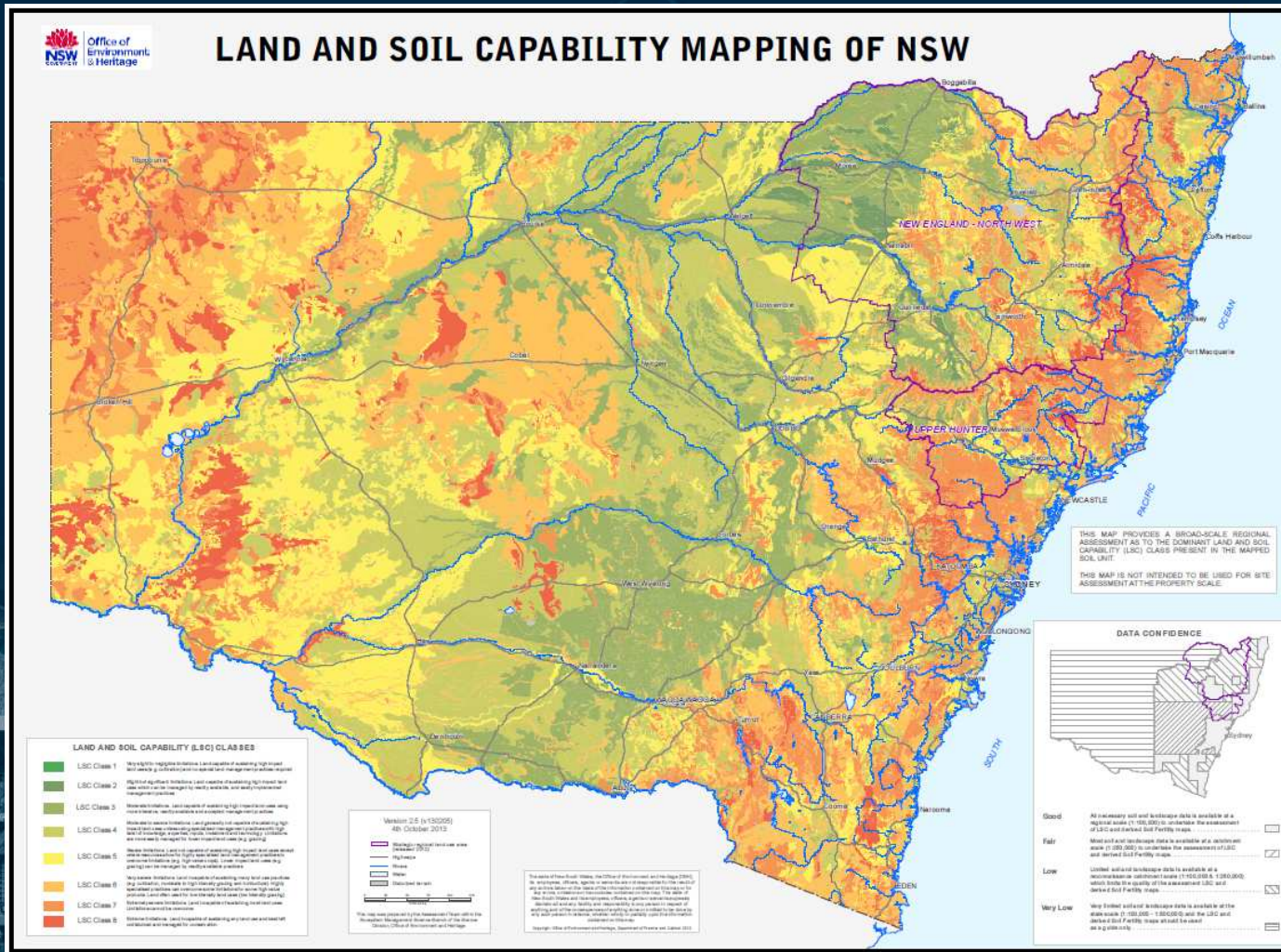






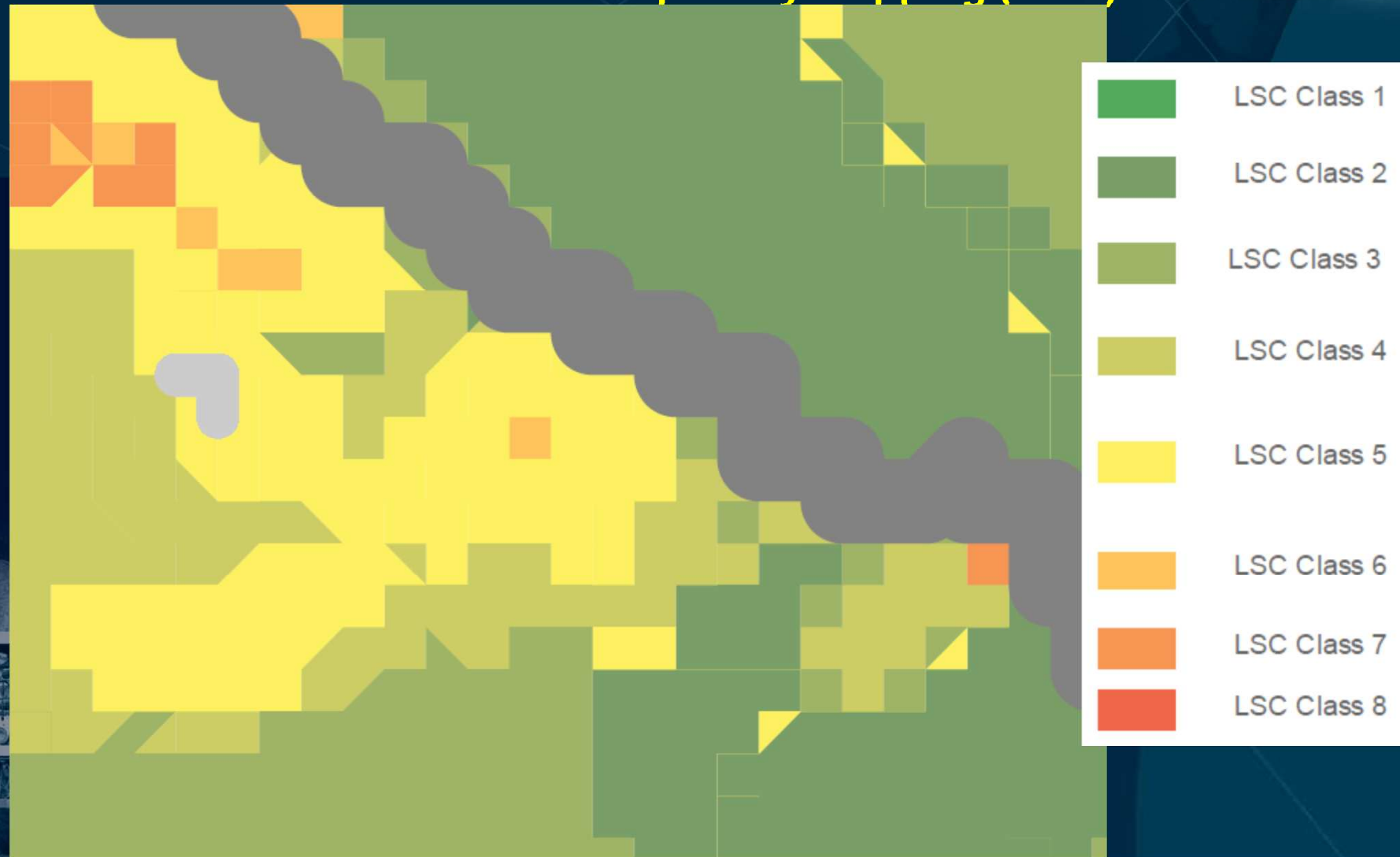
1. Correct Identification and Protection of BSAL

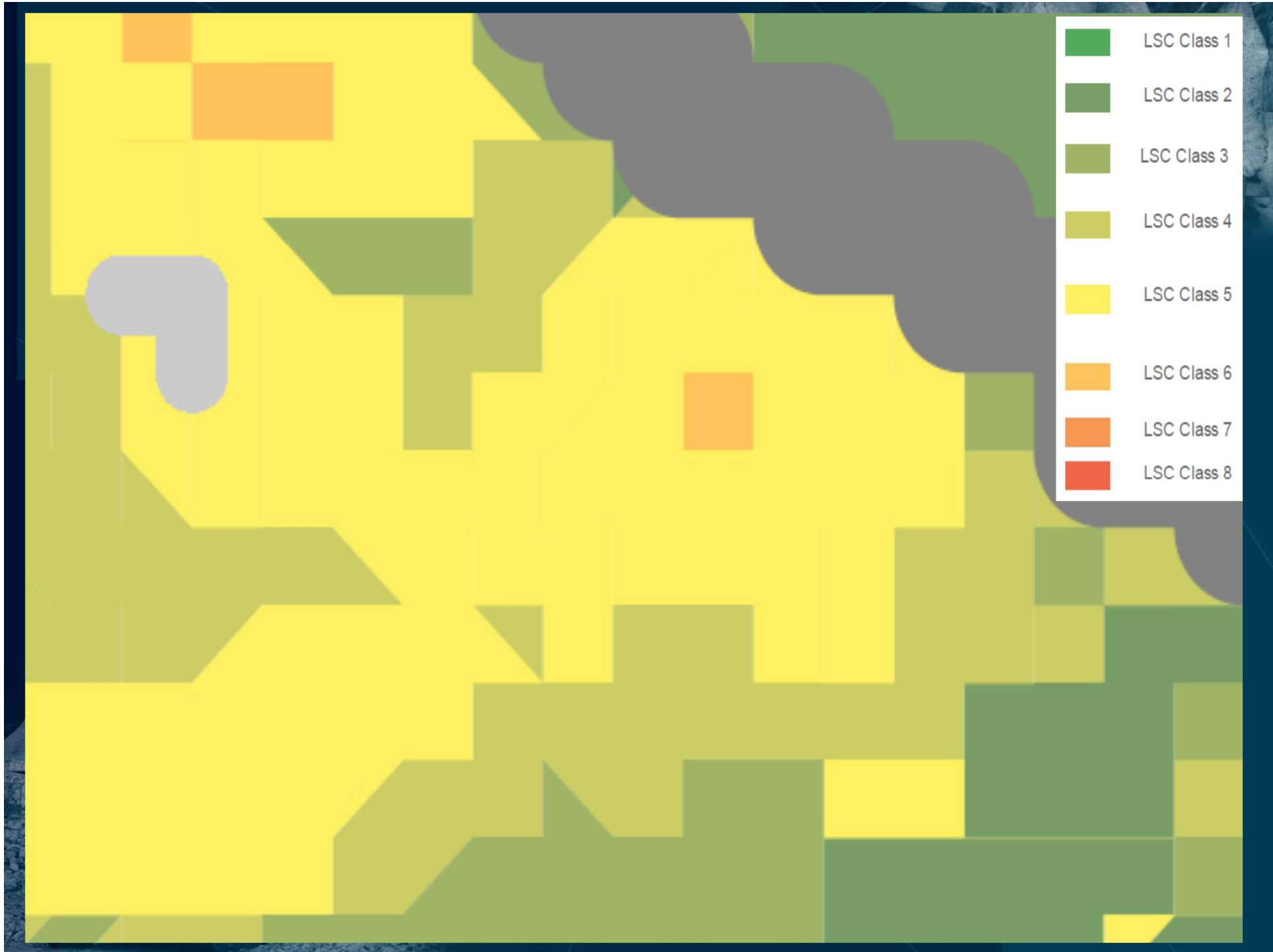
Land and Soil Capability Mapping (OEH)



1. Correct Identification and Protection of BSAL

Land and Soil Capability Mapping (OEH)





1. Correct Identification and Protection of BSAL

SRLUP Details

- land that falls under soil fertility classes 'high' or 'moderately high' under the Draft Inherent General Fertility of NSW (OEH), and
- land capability classes I, II or III under the Land and Soil Capability Mapping of NSW (OEH), and

OR

- land that falls under soil fertility classes 'moderate' under the Draft Inherent General Fertility of NSW (OEH), and
 - and capability classes I or II under the Land and Soil Capability Mapping of NSW (OEH), and
- **Therefore based on the SRLUP requirements the only areas that have the potential to be BSAL are the Ponderosa Soil Landscape (96 ha impacted by mining) and the Conadilly Soil Landscape (0 ha impacted by mining)**

2. Characterisation of Soil for Stripping and Rehabilitation

Elliot and Reynolds – Banks 1995

- Elliot and Reynolds scheme for assessment of topsoil was applied as a guide to determining the suitable material for re-use as topdressing.
- Banks (1995), along with field observations were used to ensure adequate and conservative depth of soil is available to strip down to 1.2m for subsoil.
- Geology cores may be available to assist in confirmation of soil depths.



Soil Balance (Topsoil) Cont.

Soil Type		Soil Landscape	EIS Stripping depths for soil volume calculations (m)	OAS&FS stripping depth used for soil volume calculations (m)	OAS&FS Comments	Soil Details and Management
1	Brown Sodosol	Fullwoods Road	0.20	0.15	Stated pH and EC exceed criteria (ph 4.5-8.4 & ECe <1.5dS/m) below 15cm.	pH = 9.2 (Very Strongly Alkaline) in Layer 2: 0.15 to 0.55m To be mixed with upper layer pH 7.1 (Neutral) ECe = 2.2 dS/m (Slightly Saline) in Layer 2: 0.15 to 0.55m To be mixed with upper layer ECe 0.5 dS/m (Non Saline)
4a	Brown Sodosol	Watermark	0.25	0.15	Stated pH exceed criteria (ph 4.5-8.4) below 15cm.	pH = 9.3 (Very Strongly Alkaline) in Layer 2: 0.15 to 0.45m To be mixed with upper layer pH 6.8 (Neutral)
6b	Brown vertosol	Booloocooroo	0.35	0.15	Stated pH and EC exceed criteria (ph 4.5-8.4 & ECe <1.5dS/m) below 15cm.	pH = 9.1 (Very Strongly Alkaline) in Layer 2: 0.15 to 0.35m To be mixed with upper layer pH 6.9 (Neutral) ECe = 1.81 dS/m (Non-Saline) in Layer 2: 0.15 to 0.35m To be mixed with upper layer ECe 0.95 dS/m (Non Saline)
7	Red Ferrosol	Ponderosa	0.60	0.15	Stated pH exceed criteria (ph 4.5-8.4) below 15cm.	pH = 8.6 (Strongly Alkaline) in Layer 2: 0.15 to 0.60m To be mixed with upper layer pH 7.1 (Neutral) Note this soil is BSAL and should be retained for Rehabilitation.

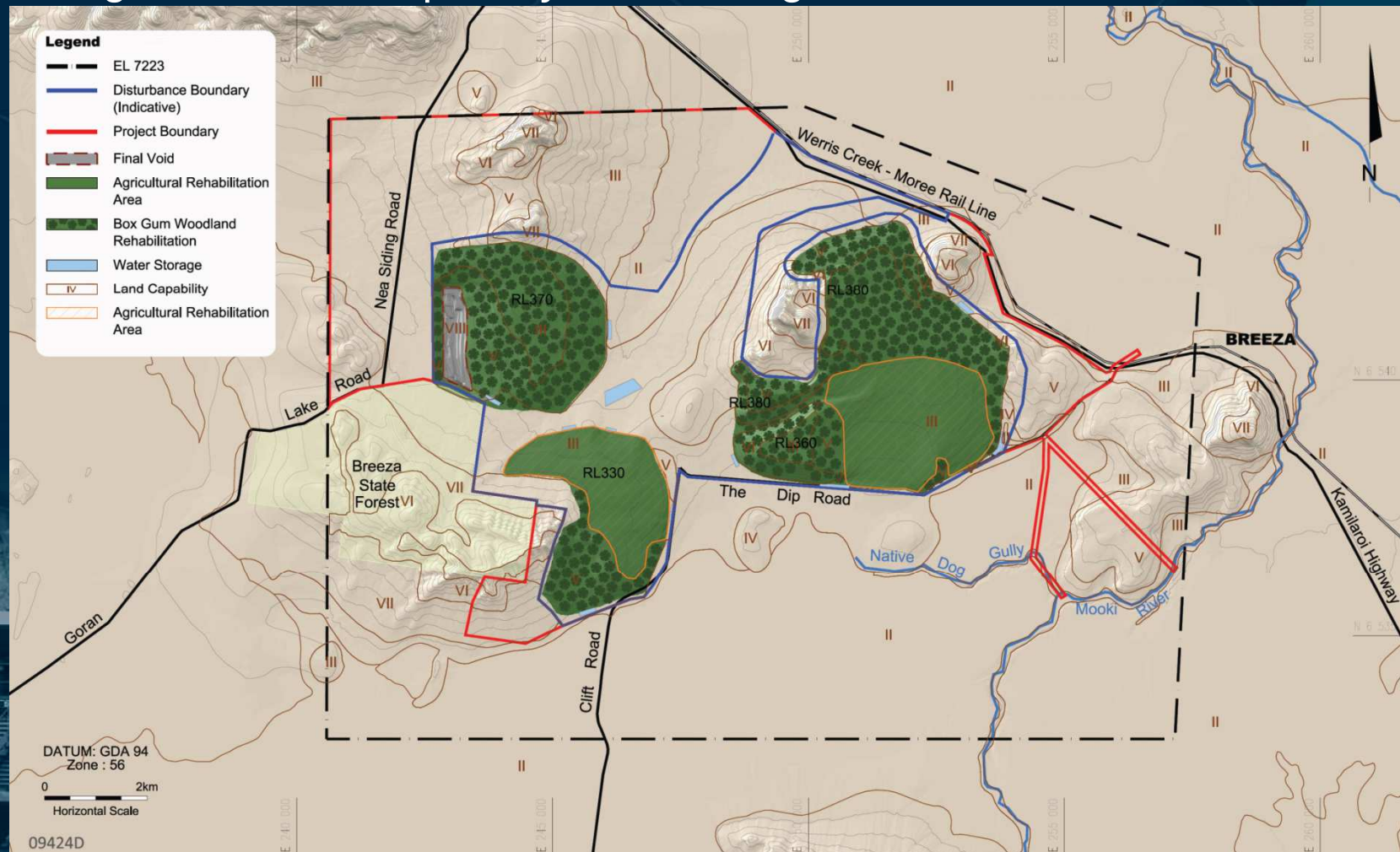
Soil Balance (Subsoil) Cont.

Soil Type		Soil Landscape	EIS Stripping depths for soil volume calculations (m)	OAS&FS stripping depth used for soil volume calculations (m)	Curlewis Soil Landscapes	Final Comment
1	Brown Sodosol	Fullwoods Road	1.20	0.90	Topsoil depths range from 0.10 - 0.30m with total soil depth ranging from 1.00-3.00m as many profiles are underlain by unconsolidated sediments or buried soil profiles on lower slopes and fans.	Strip to 1.20m is quite conservative.
3a	Brown Sodosol	Goscombes Rd	1.20	0.60	Topsoils are up to 0.60m deep, with total soil depth often exceeding 3.00m, but predominantly deep 1.50m.	Strip to 1.20m is quite conservative.
3b	Brown Chromosol		1.20	0.95		
4a	Brown Sodosol	Watermark	1.20	0.25	Extremely variable: 0.50-1.50m on crests and up to 1.50m on sideslopes, occasionally up to 3.00m	Not sure why OAS&FS chose 0.25m. Variable but strip to 1.20m average is fair.
4b	Brown Kandosol		1.20	0.80		
5	Red Chromosol	Stafford Gap	1.20	1.00	Highly variable: 0.40-1.50m on crests and upper sideslopes. 0.60-2.00m on lower sideslopes and drainage lines.	Variable but strip to 1.20m average is fair.
6a	Brown Dermosol	Booloocoroo	1.20	0.00	Typically very deep between 1.50m and 3.00m	Not sure why OAS&FS chose not to strip this at all. But 1.20m is very conservative.
6b	Brown vertosol		1.20	0.80		
7	Red Ferrosol	Ponderosa	1.20	0.60	Predominantly moderately deep (0.50-1.50m) to deep (>1.50m) on upper and mid footslopes, with deep (>1.50m) on mid and lower footslopes.	Variable but 1.20m average is fair. Plus this soil landscape is BSAL.
8	Brown vertosol	Carinya	1.20	0.65	Shallow (<0.50cm) to deep (>1.50m) on sideslopes, with moderately deep (1.50m) on benches and in fans along drainage lines and on lower sideslopes.	Variable but 1.20m average is fair.

3. Rehabilitation of Agricultural Land

Location of BSAL

- Watermark propose to include the 100ha of BSAL into the 1,000ha of designated Land Capability Class III Agricultural Land.



3. Rehabilitation of Agricultural Land

Detailed Methodology for Rehabilitation

- Described in the EIS: Soil stripping, material handling, re-instatement of subsoil and topsoil.
- As discussed on 10th Feb 2013, the detailed rehabilitation plan (currently first draft stage) will be finalised in consultation with relevant departments.
- Details in this document will provide the requested information.



4. Monitoring of Agricultural Land

Detailed Rehabilitation Plan

- As discussed on 10th Feb 2013, the detailed rehabilitation plan (currently first draft stage) will be finalised in consultation with relevant departments.
- Details in this document will provide the requested information.



Thank You



15 April 2014

WATERMARK COAL PROJECT

BRIEFING NOTE: AIR QUALITY MODELLING OF OPTIMISED EQUIPMENT FLEET

1 Background

Shenhua Watermark Coal Pty Ltd (Shenhua Watermark) is seeking State Significant Development Consent under Division 4.1 of Part 4 of the *Environmental Planning and Assessment Act 1979* for the Watermark Coal Project (the Project).

The *Watermark Coal Project Environmental Impact Statement* (EIS) (2013) and *Watermark Coal Project Response to Submissions* (RTS) was prepared by Hansen Bailey Environmental Consultants (Hansen Bailey, 2013) on behalf of Shenhua Watermark to support the application for State Significant Development Consent (SSD 4975).

An Air Quality and Greenhouse Gas Impact Assessment was completed by PAEHolmes (now Pacific Environment Limited) for the EIS (Appendix G). The purpose of the assessment, in part, was to predict the Project's air quality impacts on receivers in the vicinity of the Project.

Dispersion modelling was undertaken for Years 1, 2, 5, 10, 15, 21, 25 and 30 of the Project. These representative years were identified as the periods most likely to contain the worst case dust levels from a range of mining activities in various locations within the Project Boundary.

The Air Quality and Greenhouse Gas Impact Assessment demonstrated that the Project (considered alone and cumulatively with other sources) is not predicted to contribute to exceedances of the annual average assessment criteria for Total Suspended Particulates (TSP), dust deposition and Particulate Matter with a diameter of less than 10 µm (PM₁₀), or the National Environment Protection Measure (NEPM) Advisory Reporting Standard for Particulate Matter with a diameter of less than 2.5 micrometres (µm) (PM_{2.5}) at any of the privately-owned or Shenhua Watermark-owned receivers over the life of the Project.

However, there are five private receivers that are predicted to experience exceedances of the 24-hour average PM₁₀ assessment criterion for between one and 36 days per year. These maximum impacts represent the worst case operation of the Project under adverse prevailing weather conditions in the event that no pro-active management measures to modify or curtail offending activities are taken. It is expected that the proactive management of operations will result in modifications to operations so that these impacts will not be experienced at the suggested receivers.

As a component of the RTS, a mine planning optimisation review completed by Shenhua Watermark identified that it is feasible to modify (i.e. reduce) the equipment fleet to that presented in the EIS by utilizing a smaller number of larger trucks. As such, a new emissions inventory was calculated for the optimised equipment fleet during the year with the highest modelled TSP emissions and compared to the EIS. However, no dispersion modelling was undertaken. This comparison highlighted that the optimised equipment fleet will further reduce dust emissions from mining operations and thus reflects the conservative nature of emissions calculated for the EIS.

To offer stakeholders greater confidence in the RTS predictions for the optimized equipment fleet, Shenhua Watermark engaged Pacific Environment Limited to undertake dispersion modelling and Monte Carlo analysis for Year 21 of the Project. This briefing note presents the relevant changes to the optimized equipment fleet and the results of the air dispersion modelling.

2 Optimised Equipment Fleet

A comparison of the equipment fleet assessed in the EIS and the indicative fleet that is now proposed for the Project (as per the RTS) is provided below in **Table 1**. While these figures are based on the fleet modelled, Shenhua Watermark notes that this is an indicative fleet that may change with changing demands, technology and mining methods.

Table 1: Indicative equipment fleet optimisation

Mobile Equipment Item	Maximum Fleet Provided in the EIS	Optimised Indicative Maximum Fleet Required
Shovel Large	2	2
Shovel Small	2	2
Excavator Large	2	4
Excavator Small	1	0
Loader	4	2
Truck Large (approx.226 t)	52	0
Truck Large (approx.292 t)	0	21
Truck Small (approx.136 t)	17	0
Truck Small (approx. 220t)	0	24
Drill Waste	3	3
Drill Coal	3	3
Track Dozer	6	6
Wheel Dozer	2	2
Grader	3	3
Watercart	3	3
Fuel Truck	3	3
Tyre Handler	2	2

Air quality emissions due to the Project are calculated from equations and inputs (e.g. silt content, moisture and truck capacity etc.) that are consistent with the EIS. The only change that the optimised equipment fleet will have on the air quality emissions compared to the EIS is an increase in truck haulage capacities and the resultant decrease in haulage dust emissions. Differences in other mobile equipment items between the EIS and optimised equipment fleets does not result in any changes to emission estimations made in the Air Quality and Greenhouse Gas Impact Assessment (Appendix G of the EIS).

3 Results of Air Dispersion Modelling

3.1 Summary of Results

Air dispersion modelling for the Project in Year 21 utilizing the optimised equipment fleet was completed to determine the potential air quality impacts at residences and properties. A summary of the results for Year 21 are below:

- No exceedances of the annual average PM₁₀, TSP, dust deposition assessment criteria at residences (for both EIS and revised) for the Project alone or Project plus other sources.
- Exceedances of the 24-hour average PM₁₀ criterion of 50 µg/m³ at selected residences. Some residences will experience exceedances of the criterion for more than 5 days. However, the number of days over the 24-hour average PM₁₀ criterion has reduced as a result of the change in mining fleet compared to the EIS.
- At residence 60, the revised results (for Project alone) indicate that there will be less than 5 days where the predicted concentration is above the 24-hour average PM₁₀ criterion. It is expected that the proactive management of operations will result in modifications to operations so that impacts will not be experienced at this residence.
- For residence 115, there are no exceedances (for Project alone) of the 24-hour average PM₁₀ criterion.
- Consideration of the 25% rule indicates that residences 115 and 116 are no longer affected when the 98.6th percentile (6th highest) is considered as a result of the change to the mining fleet.

A summary comparing the revised modelling of the optimized equipment fleet and the EIS at selected receptors are presented in **Table 2**. Items in bold indicate an exceedance of the assessment criterion.

Table 2: Summary of predicted 24-hour average PM₁₀ from the Project alone and Annual average PM₁₀ from the Project with other sources in Year 21 (µg/m³)

Residence	Project Alone		Project and Other Sources	
	24-hour average PM ₁₀ (50 µg/m ³)		Annual average PM ₁₀ (30 µg/m ³)	
	Revised	EIS	Revised	EIS
60	71	80	18	18
62a	152	172	24	25
62b	131	148	22	24
113	21	24	14	14
115	41	48	14	15
122a	9	10	13	13
122b	9	10	13	13
125	86	107	21	23

Detailed modelling results are provided in the following subsections.

3.2 Modelling Results – Watermark Coal Project Alone and Other Sources

There are no exceedances of annual average PM₁₀, PM_{2.5}, TSP and dust deposition assessment criteria at the residences as a result of the change to the mining fleet due the 1) Project alone or 2) Project and other sources.

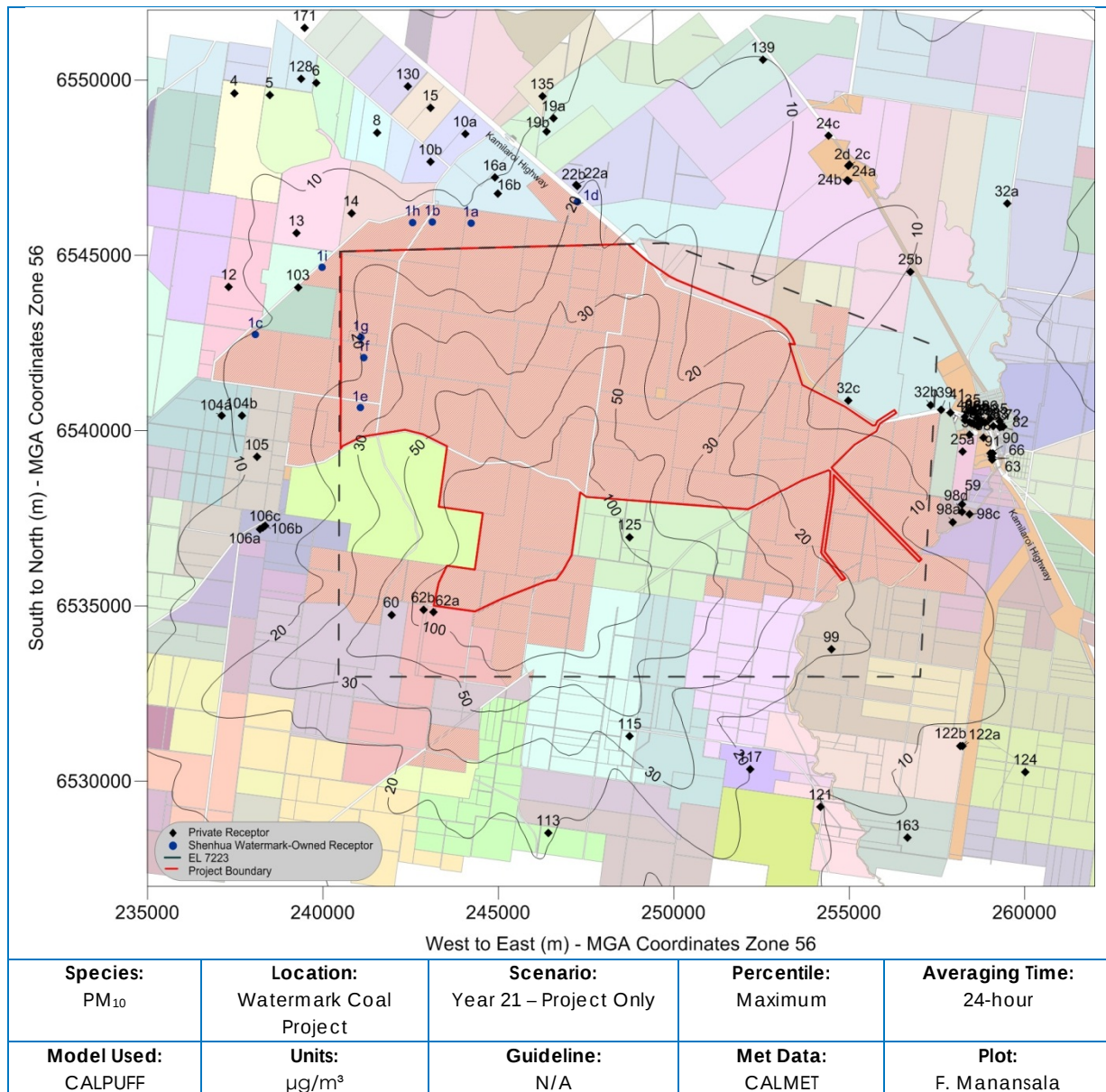
There are four residences above the 24-hour average PM₁₀ criterion due to operations of the Project alone, these residences are consistent with the EIS. There are also no exceedances of the 24-hour average PM_{2.5} criterion as a result of the change in the mining fleet.

The predicted PM₁₀, PM_{2.5} and TSP concentrations and dust deposition levels from the Project alone and Project with other sources in Year 21 are provided in **Table 3** and the contours are presented in **Figure 1** to **Figure 10**.

Table 3: Summary of predicted PM₁₀, PM_{2.5} and TSP concentrations and dust deposition levels from the Project alone and the Project and other sources in Year 21 (µg/m³)

ID	Project Alone						Project and Other Sources			
	Maximum 24-hour average PM ₁₀	Maximum 24-hour average PM _{2.5}	Annual average PM ₁₀	Annual average PM _{2.5}	Annual average TSP	Annual average dust deposition	Annual average PM ₁₀	Annual average PM _{2.5}	Annual average TSP	Annual average dust deposition
	Impact Assessment Criteria/Guideline									
	N/A	N/A	N/A	N/A	N/A	2 g/m ² /month	30 µg/m ³	8 µg/m ³	90 µg/m ³	4 g/m ² /month
Private receptors										
2a	7	1	0.5	0.1	1	0.01	12	6	26	1.9
2b	7	1	0.5	0.1	1	0.01	12	6	26	1.9
2c	6	1	0.5	0.1	1	0.01	12	6	26	1.9
2d	6	1	0.5	0.1	1	0.01	12	6	26	1.9
3	7	1	0.5	0.1	1	0.01	13	6	26	1.9
4	7	1	0.8	0.1	1	0.04	13	6	26	1.9
5	6	1	0.8	0.1	1	0.04	13	6	26	1.9
6	7	1	0.7	0.1	1	0.03	13	6	26	1.9
8	8	1	0.8	0.1	1	0.03	13	6	26	1.9
10a	7	1	1.0	0.1	2	0.03	13	6	27	1.9
10b	9	1	1.0	0.1	2	0.04	13	6	27	1.9
12	8	1	1.4	0.2	2	0.04	13	6	27	1.9
13	13	2	1.9	0.2	3	0.07	14	6	28	2.0
14	13	2	1.5	0.2	2	0.06	14	6	27	2.0
15	7	1	0.9	0.1	1	0.03	13	6	26	1.9
16a	10	1	1.3	0.2	2	0.04	13	6	27	1.9
16b	11	1	1.4	0.2	2	0.05	13	6	27	1.9
19a	10	1	1.1	0.1	2	0.02	13	6	27	1.9
19b	10	1	1.1	0.1	2	0.03	13	6	27	1.9
22a	18	2	1.5	0.2	2	0.03	13	6	27	1.9
22b	19	2	1.5	0.2	2	0.03	13	6	27	1.9
24a	7	1	0.5	0.1	1	0.01	12	6	26	1.9
24b	7	1	0.5	0.1	1	0.01	12	6	26	1.9
24c	7	1	0.4	0.1	1	0.01	12	6	26	1.9
25a	8	1	0.5	0.1	1	0.01	13	6	26	1.9
25b	10	1	0.5	0.1	1	0.01	12	6	26	1.9
32a	7	1	0.3	0.0	0	0.01	12	6	25	1.9
32b	7	1	0.5	0.1	1	0.02	13	6	26	1.9
32c	7	1	0.8	0.1	1	0.02	13	6	26	1.9
35	7	1	0.5	0.1	1	0.01	12	6	26	1.9
36a	7	1	0.5	0.1	1	0.01	12	6	26	1.9
36b	7	1	0.5	0.1	1	0.01	12	6	26	1.9
38	7	1	0.5	0.1	1	0.01	12	6	26	1.9
39	7	1	0.5	0.1	1	0.01	13	6	26	1.9
40	7	1	0.5	0.1	1	0.01	12	6	26	1.9
41	7	1	0.5	0.1	1	0.01	13	6	26	1.9
44	7	1	0.5	0.1	1	0.01	12	6	26	1.9
45	7	1	0.5	0.1	1	0.01	12	6	26	1.9
47	7	1	0.5	0.1	1	0.01	12	6	26	1.9
48	7	1	0.5	0.1	1	0.01	12	6	26	1.9
51	7	1	0.5	0.1	1	0.01	12	6	26	1.9
52	7	1	0.5	0.1	1	0.01	12	6	26	1.9

ID	Project Alone						Project and Other Sources			
	Maximum 24-hour average PM ₁₀	Maximum 24-hour average PM _{2.5}	Annual average PM ₁₀	Annual average PM _{2.5}	Annual average TSP	Annual average dust deposition	Annual average PM ₁₀	Annual average PM _{2.5}	Annual average TSP	Annual average dust deposition
	Impact Assessment Criteria/Guideline									
	N/A	N/A	N/A	N/A	N/A	2 g/m ² /month	30 µg/m ³	8 µg/m ³	90 µg/m ³	4 g/m ² /month
54	7	1	0.5	0.1	1	0.01	13	6	26	1.9
59	9	1	0.6	0.1	1	0.02	13	6	26	1.9
60	71	9	5.5	0.7	8	0.11	18	7	33	2.0
62a	152	20	11.7	1.6	17	0.25	24	8	42	2.1
62b	131	17	10.2	1.4	15	0.21	22	7	40	2.1
63	7	1	0.5	0.1	1	0.01	12	6	26	1.9
66	7	1	0.5	0.1	1	0.01	12	6	26	1.9
72	6	1	0.4	0.1	1	0.01	12	6	26	1.9
78	6	1	0.5	0.1	1	0.01	12	6	26	1.9
82	6	1	0.4	0.1	1	0.01	12	6	26	1.9
83	6	1	0.4	0.1	1	0.01	12	6	26	1.9
85	6	1	0.4	0.1	1	0.01	12	6	26	1.9
86	6	1	0.5	0.1	1	0.01	12	6	26	1.9
88	7	1	0.5	0.1	1	0.01	12	6	26	1.9
90	7	1	0.5	0.1	1	0.01	12	6	26	1.9
91	7	1	0.5	0.1	1	0.01	12	6	26	1.9
93	6	1	0.4	0.1	1	0.01	12	6	26	1.9
98a	8	1	0.7	0.1	1	0.02	13	6	26	1.9
98b	8	1	0.7	0.1	1	0.02	13	6	26	1.9
98c	8	1	0.6	0.1	1	0.02	13	6	26	1.9
98d	8	1	0.6	0.1	1	0.02	13	6	26	1.9
99	21	3	1.9	0.3	3	0.04	14	6	28	1.9
103	14	2	2.4	0.3	4	0.08	14	6	29	2.0
104a	9	1	1.1	0.2	1	0.02	13	6	26	1.9
104b	11	2	1.3	0.2	2	0.03	13	6	27	1.9
105	12	2	1.2	0.2	2	0.03	13	6	27	1.9
106a	15	2	1.3	0.2	2	0.03	13	6	27	1.9
106b	15	2	1.3	0.2	2	0.03	13	6	27	1.9
106c	15	2	1.3	0.2	2	0.03	13	6	27	1.9
113	21	3	1.6	0.2	2	0.04	14	6	27	1.9
115	41	5	2.2	0.3	3	0.07	14	6	28	2.0
117	20	2	1.4	0.2	2	0.04	13	6	27	1.9
121	11	1	0.9	0.1	1	0.03	13	6	26	1.9
122a	9	1	0.8	0.1	1	0.02	13	6	26	1.9
122b	9	1	0.8	0.1	1	0.02	13	6	26	1.9
124	7	1	0.6	0.1	1	0.01	13	6	26	1.9
125	86	12	9.2	1.2	15	0.32	21	7	40	2.2
128	7	1	0.7	0.1	1	0.03	13	6	26	1.9
130	6	1	0.8	0.1	1	0.03	13	6	26	1.9
135	9	1	0.9	0.1	1	0.02	13	6	26	1.9
139	10	1	0.4	0.1	1	0.01	12	6	26	1.9
163	9	1	0.7	0.1	1	0.02	13	6	26	1.9
171	7	1	0.9	0.1	1	0.03	13	6	26	1.9
Shenhua Watermark-owned receptors										
1a	10	1	1.5	0.2	2	0.1	13	6	27	2.0
1b	12	2	1.3	0.2	2	0.0	13	6	27	1.9
1c	10	1	1.6	0.2	2	0.1	14	6	27	2.0
1d	21	3	1.6	0.2	2	0.0	14	6	27	1.9
1e	26	4	4.0	0.5	6	0.1	16	7	31	2.0
1f	21	3	4.2	0.5	6	0.2	16	7	31	2.1
1g	21	3	3.9	0.5	6	0.2	16	7	31	2.1
1h	11	1	1.3	0.2	2	0.0	13	6	27	1.9
1i	16	2	2.5	0.3	4	0.1	14	6	29	2.0



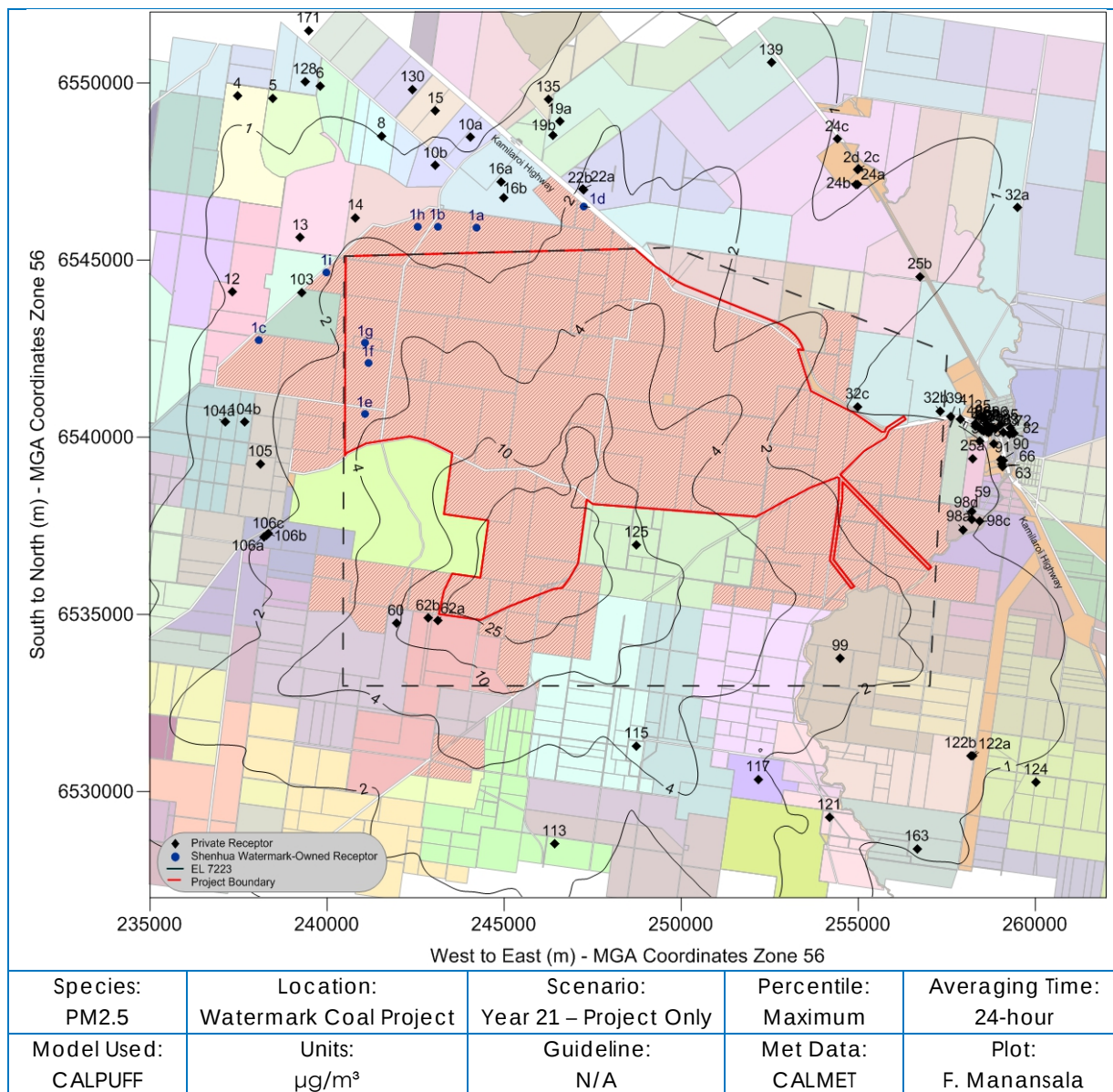


Figure 2 : Predicted maximum 24-hour average PM_{2.5} concentrations due to emissions from the Project only in Year 21

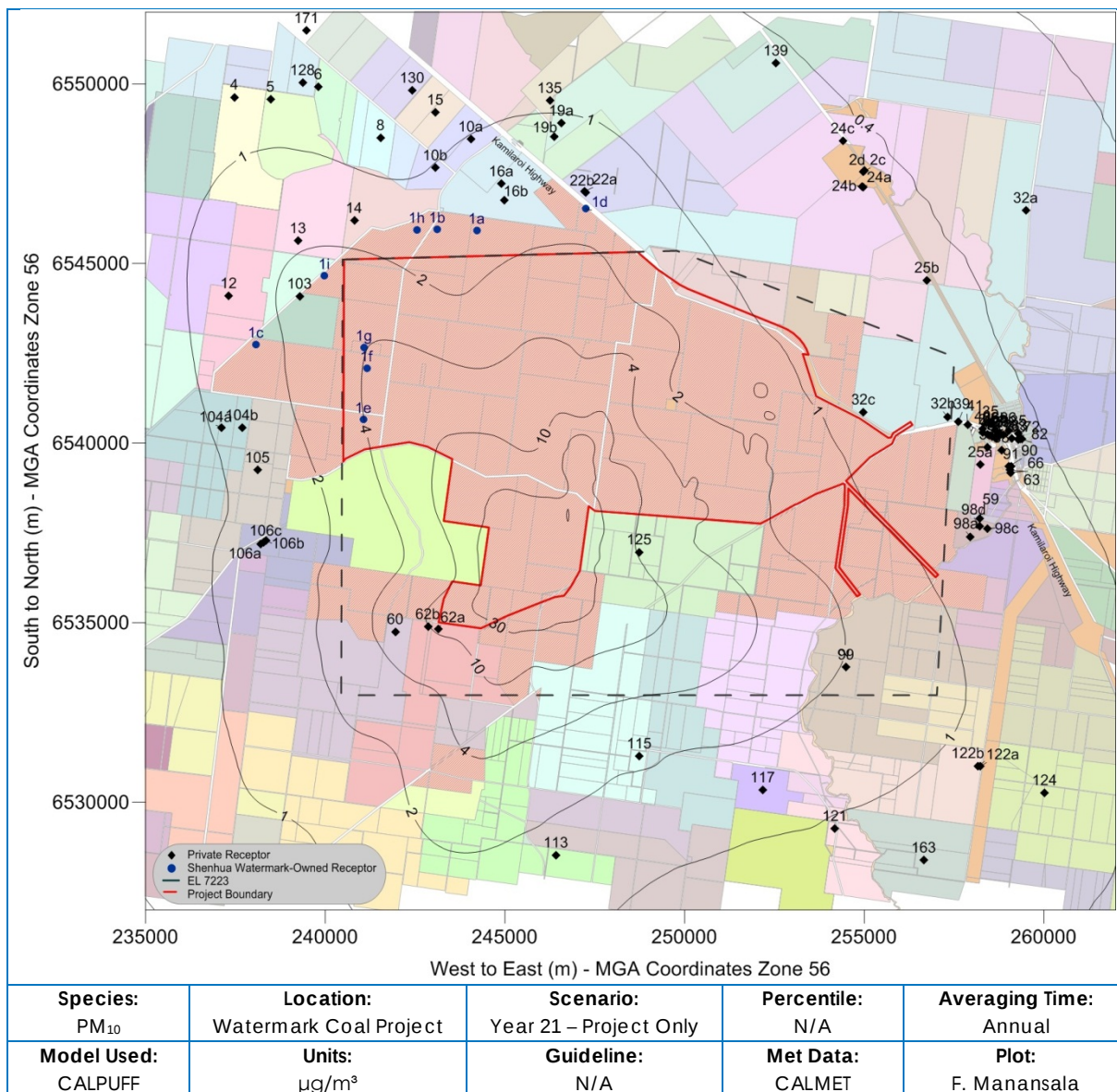


Figure 3 : Predicted maximum annual average PM₁₀ concentrations due to emissions from the Project only in Year 21

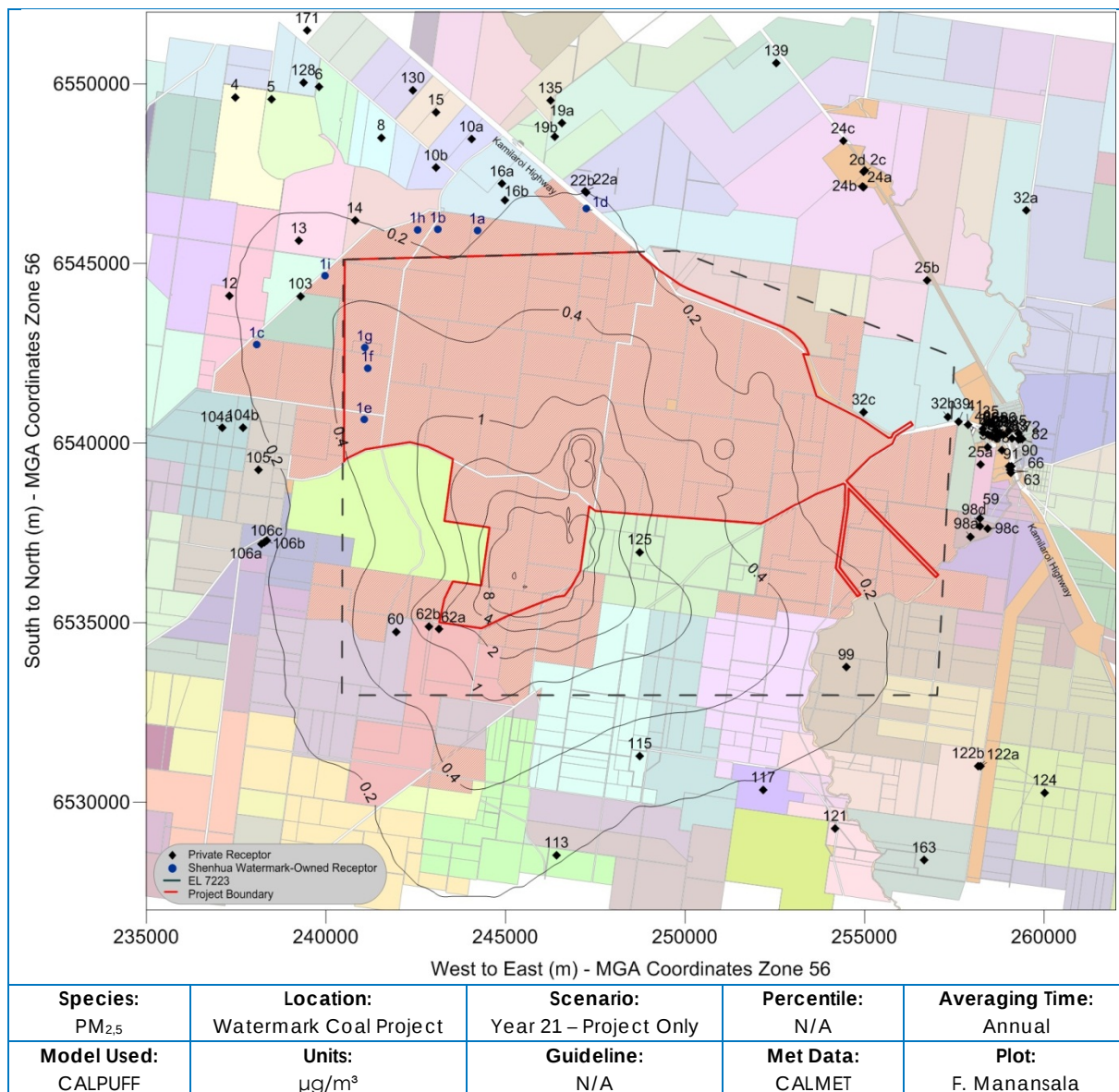


Figure 4 : Predicted maximum annual average PM_{2.5} concentrations due to emissions from the Project only in Year 21

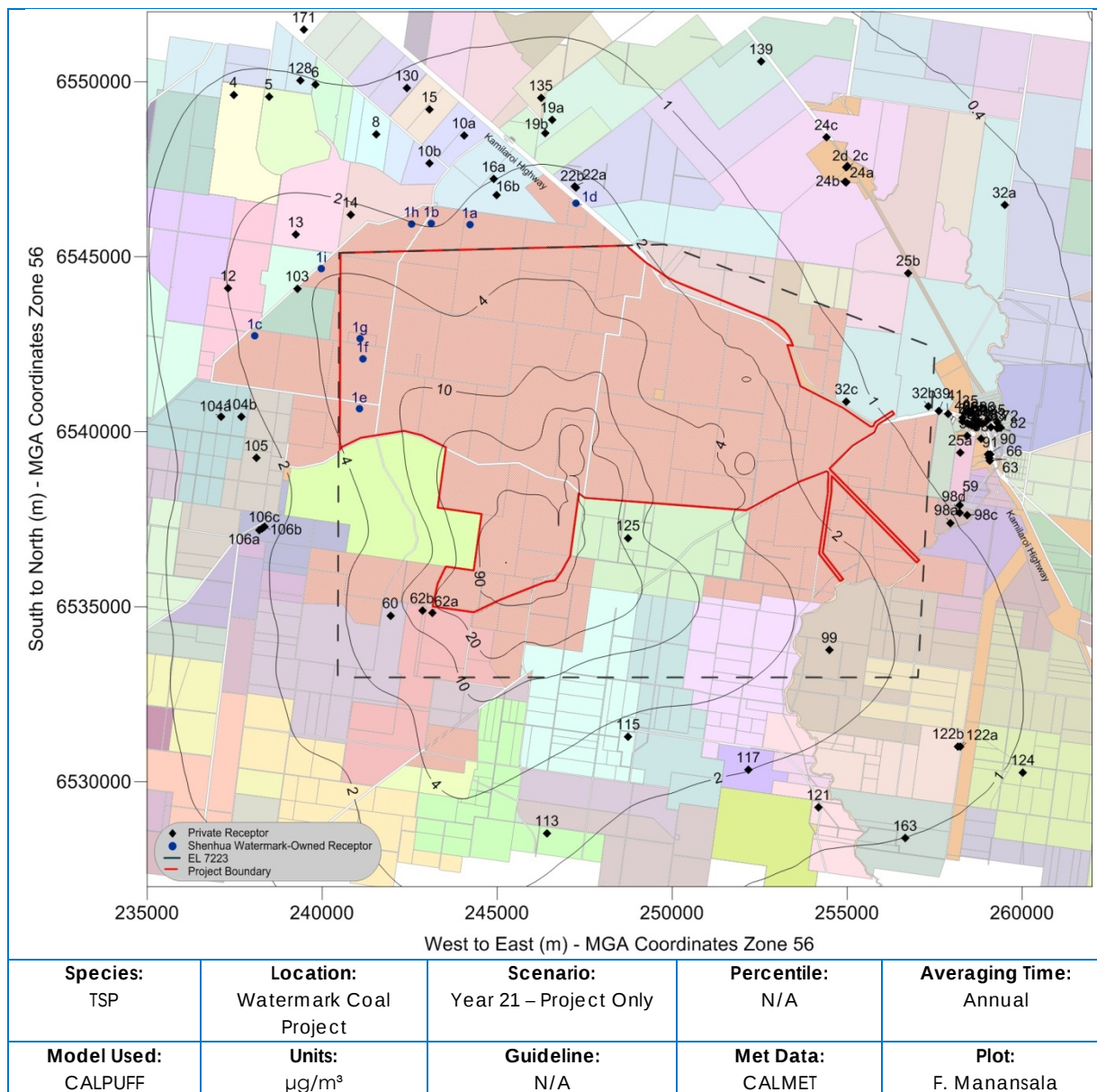


Figure 5 : Predicted maximum annual average TSP concentrations due to emissions from the Project only in Year 21

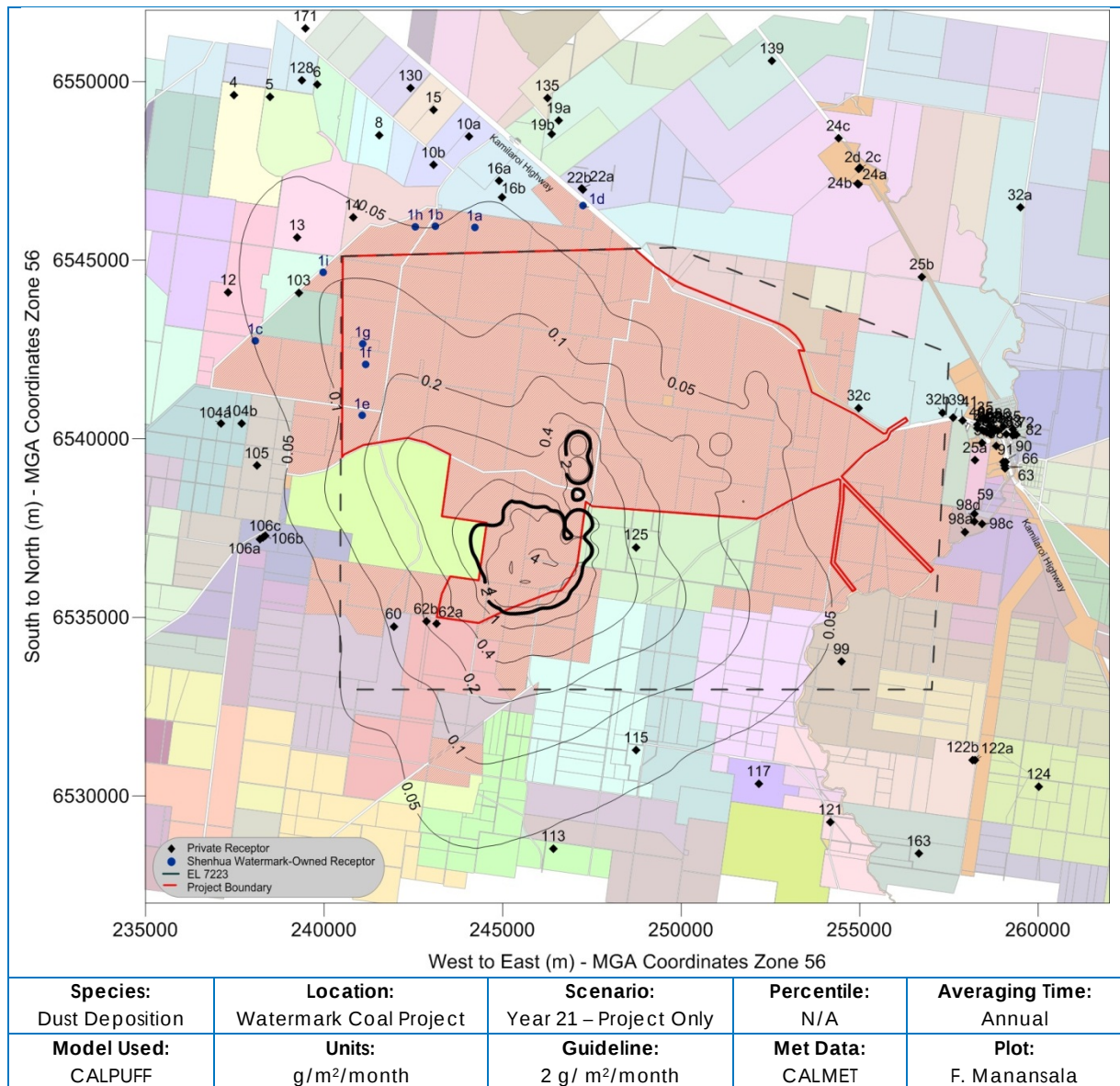


Figure 6 : Predicted maximum annual average dust deposition levels due to emissions from the Project only in Year 21

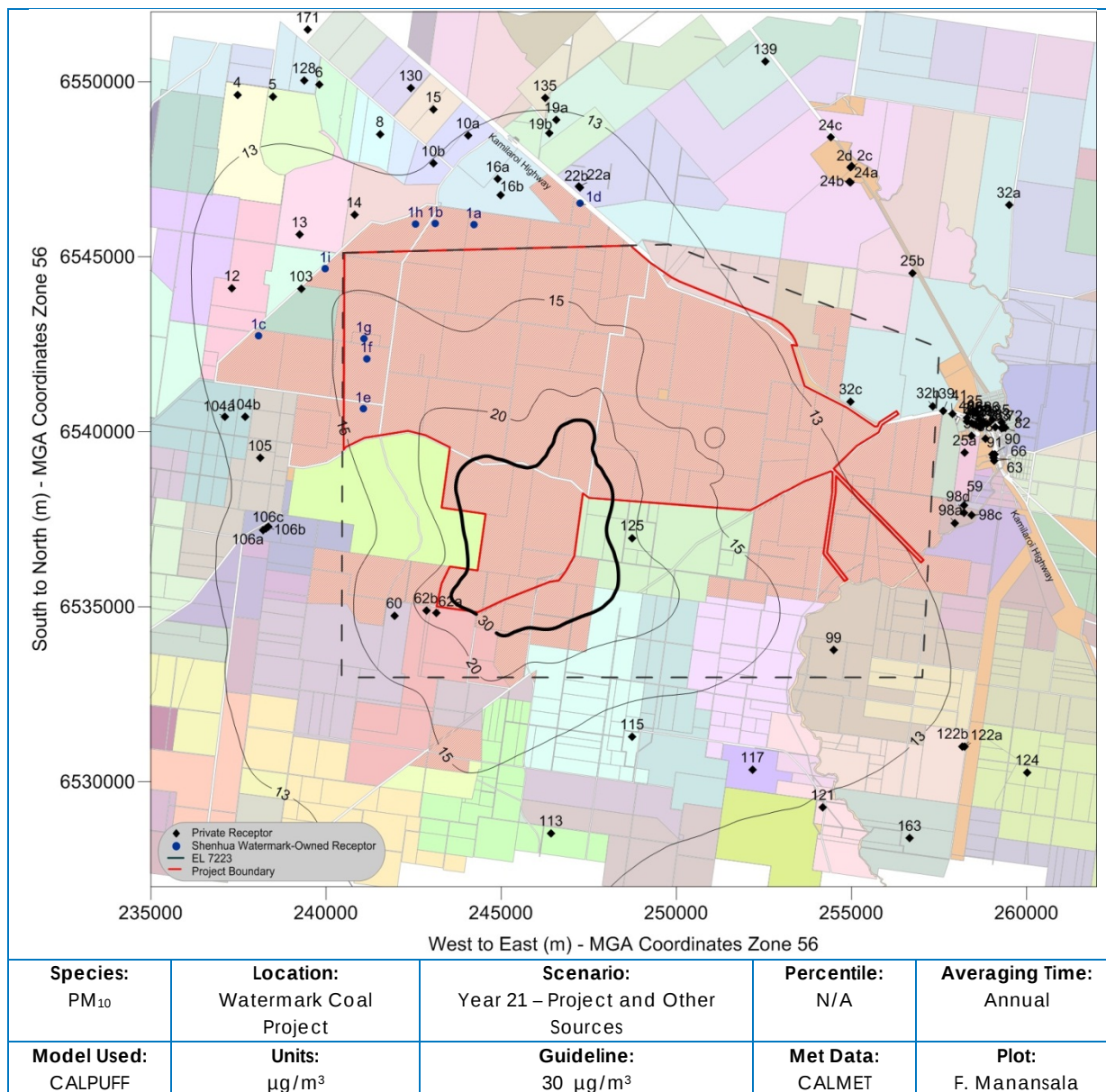


Figure 7 : Predicted maximum annual average PM₁₀ concentrations due to emissions from the Project and other sources in Year 21

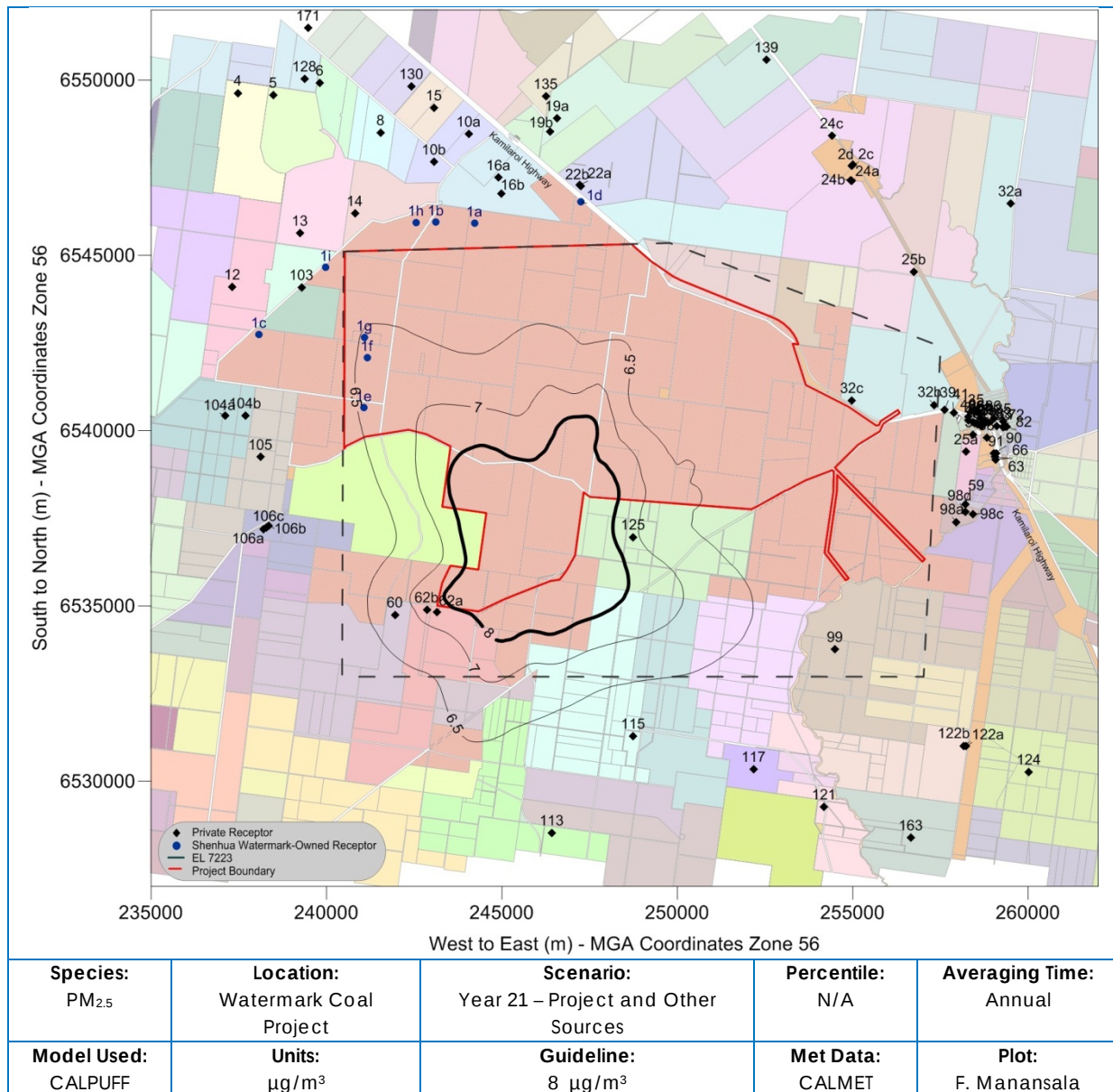


Figure 8 : Predicted maximum annual average PM_{2.5} concentrations due to emissions from the Project and other sources in Year 21

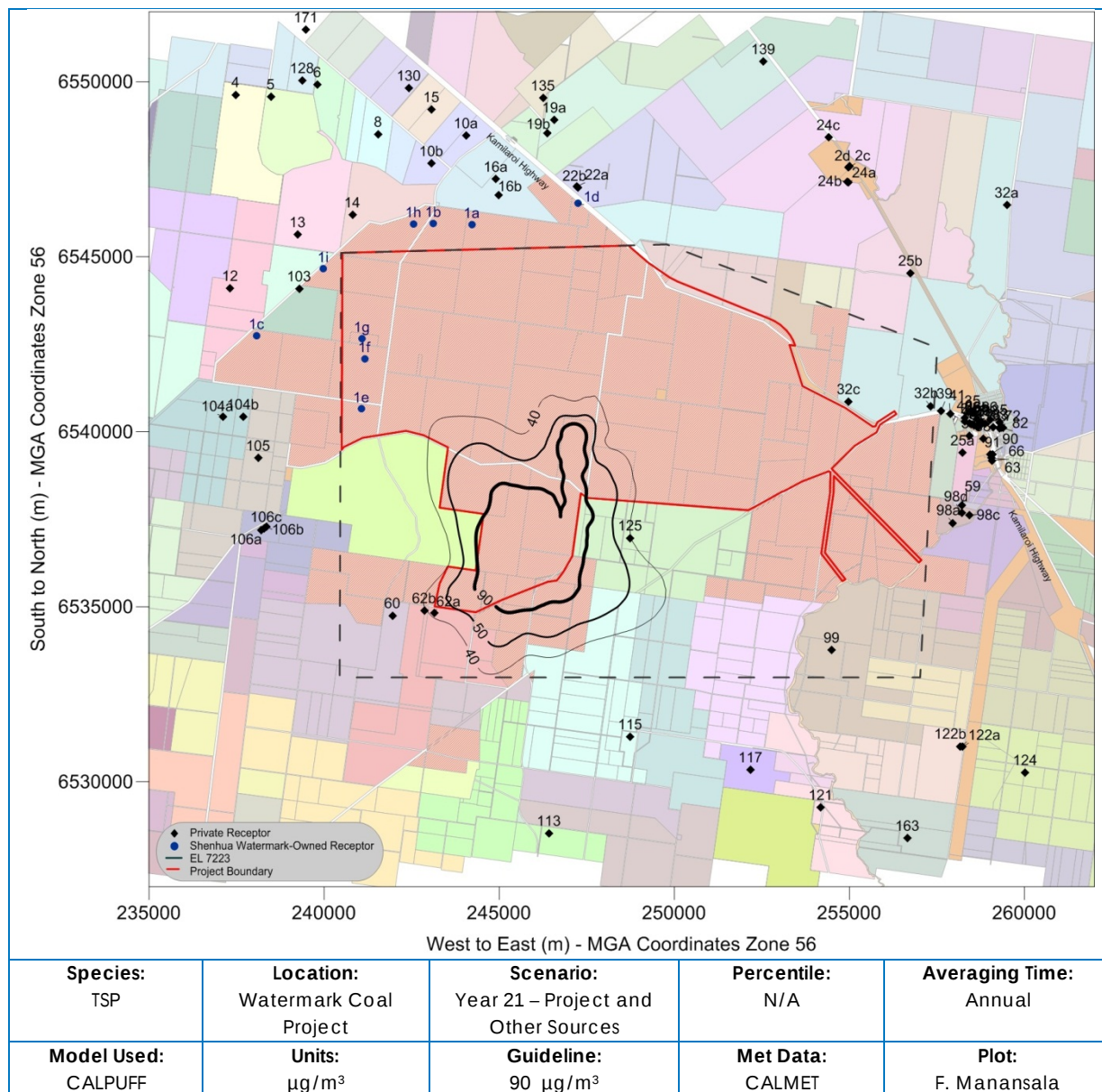


Figure 9 : Predicted maximum annual average TSP concentrations due to emissions from the Project and other sources in Year 21

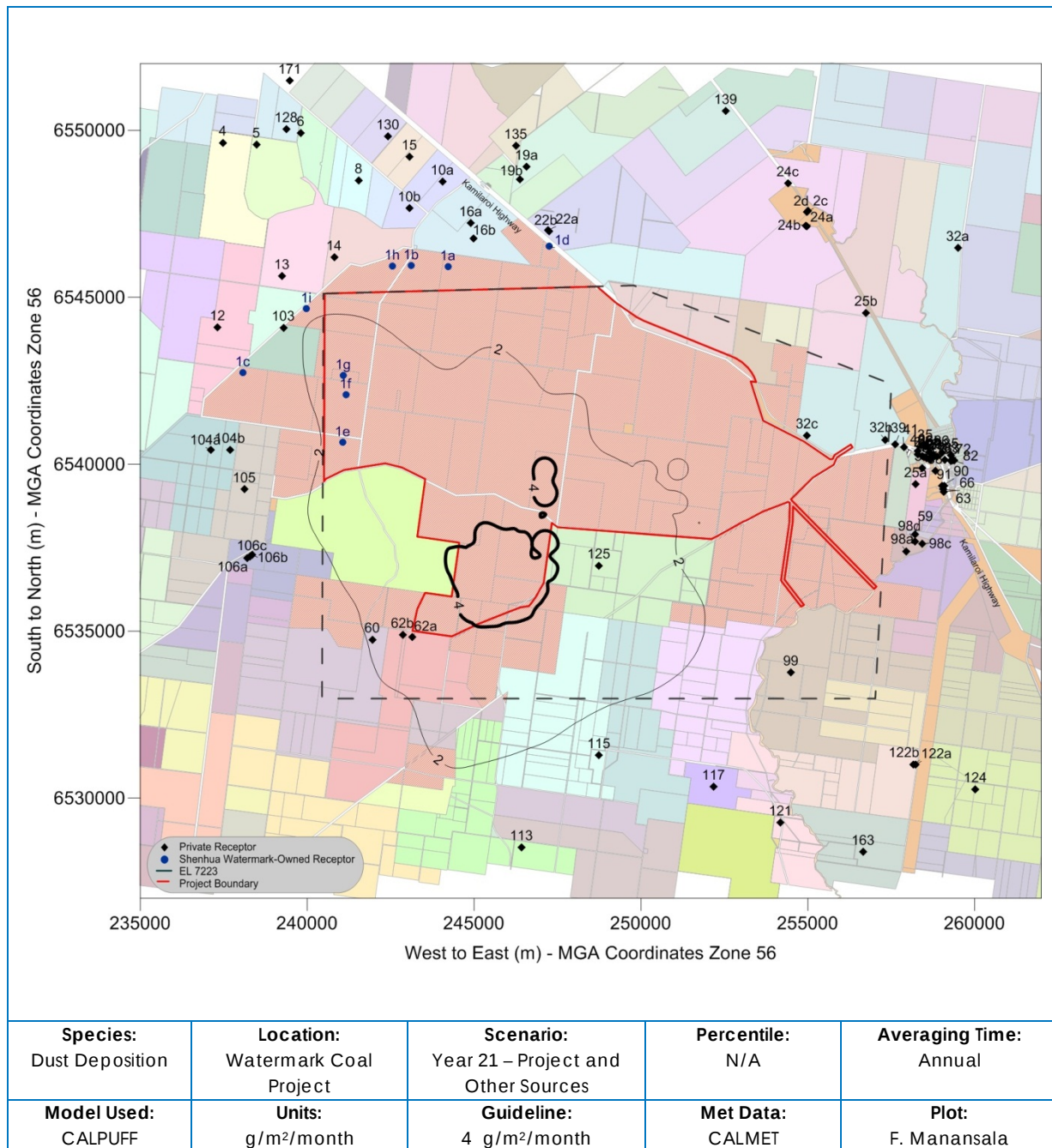


Figure 10 : Predicted maximum annual average dust deposition levels due to emissions from the Project and other sources in Year 21

3.3 Modelling Results – Watermark Coal Project with Other Sources and the Carroona Coal Project

There are no exceedances of annual average PM₁₀, PM_{2.5}, TSP and dust deposition assessment criteria at residences as a result of the change to the mining fleet when the results are considered with other sources and the Carroona Coal Project.

The predicted PM₁₀, PM_{2.5} and TSP concentrations and dust deposition levels from the Project alone and Project, other sources and the Carroona Coal Project in Year 21 are provided in **Table 4** and the contours are presented in **Figure 11** to **Figure 14**.

Table 4: Summary of predicted PM₁₀, PM_{2.5} and TSP concentrations and dust deposition levels from the Project alone and Project, other sources and Carroona Coal Project in Year 21 (µg/m³)

ID	Project and other sources (including CCP)			
	Annual average PM ₁₀	Annual average PM _{2.5}	Annual average TSP	Annual average dust deposition
	Impact Assessment Criteria/Guidelines			
	30 µg/m ³	8 µg/m ³	90 µg/m ³	4 g/m ² /month
Private receptors				
2a	13	6	26	1.9
2b	13	6	26	1.9
2c	13	6	26	1.9
2d	13	6	26	1.9
3	13	6	26	1.9
4	13	6	26	1.9
5	13	6	26	1.9
6	13	6	26	1.9
8	13	6	27	1.9
10a	13	6	27	1.9
10b	13	6	27	1.9
12	14	6	27	2.0
13	14	6	28	2.0
14	14	6	28	2.0
15	13	6	27	1.9
16a	14	6	27	2.0
16b	14	6	28	2.0
19a	13	6	27	1.9
19b	13	6	27	1.9
22a	14	6	27	1.9
22b	14	6	27	1.9
24a	13	6	26	1.9
24b	13	6	26	1.9
24c	13	6	26	1.9
25a	13	6	26	1.9
25b	13	6	26	1.9
32a	12	6	26	1.9
32b	13	6	26	1.9
32c	13	6	26	1.9
35	13	6	26	1.9
36a	13	6	26	1.9
36b	13	6	26	1.9
38	13	6	26	1.9
39	13	6	26	1.9
40	13	6	26	1.9
41	13	6	26	1.9
44	13	6	26	1.9
45	13	6	26	1.9
47	13	6	26	1.9
48	13	6	26	1.9
51	13	6	26	1.9
52	13	6	26	1.9
54	13	6	26	1.9
59	13	6	26	1.9
60	18	7	34	2.0
62a	25	8	44	2.2
62b	23	8	41	2.1
63	13	6	26	1.9

ID	Project and other sources (including CCP)			
	Annual average PM ₁₀	Annual average PM _{2.5}	Annual average TSP	Annual average dust deposition
	Impact Assessment Criteria/Guidelines			
	30 µg/m ³	8 µg/m ³	90 µg/m ³	4 g/m ² /month
66	13	6	26	1.9
72	13	6	26	1.9
78	13	6	26	1.9
82	13	6	26	1.9
83	13	6	26	1.9
85	13	6	26	1.9
86	13	6	26	1.9
88	13	6	26	1.9
90	13	6	26	1.9
91	13	6	26	1.9
93	13	6	26	1.9
98a	13	6	26	1.9
98b	13	6	26	1.9
98c	13	6	26	1.9
98d	13	6	26	1.9
99	15	6	29	2.0
103	15	6	29	2.0
104a	13	6	27	1.9
104b	14	6	27	1.9
105	14	6	27	1.9
106a	14	6	27	1.9
106b	14	6	27	1.9
106c	14	6	27	1.9
113	15	6	30	2.0
115	19	7	36	2.1
117	17	7	33	2.0
121	15	6	30	2.0
122a	14	6	27	1.9
122b	14	6	27	1.9
124	13	6	27	1.9
125	23	7	42	2.2
128	13	6	26	1.9
130	13	6	26	1.9
135	13	6	27	1.9
139	13	6	26	1.9
163	14	6	29	2.0
171	13	6	27	1.9
Shenhua Watermark-owned receptors				
1a	14	6	28	2.0
1b	14	6	27	2.0
1c	14	6	28	2.0
1d	14	6	28	1.9
1e	17	7	32	2.1
1f	17	7	32	2.1
1g	16	7	32	2.1
1h	14	6	27	2.0
1i	15	6	29	2.0

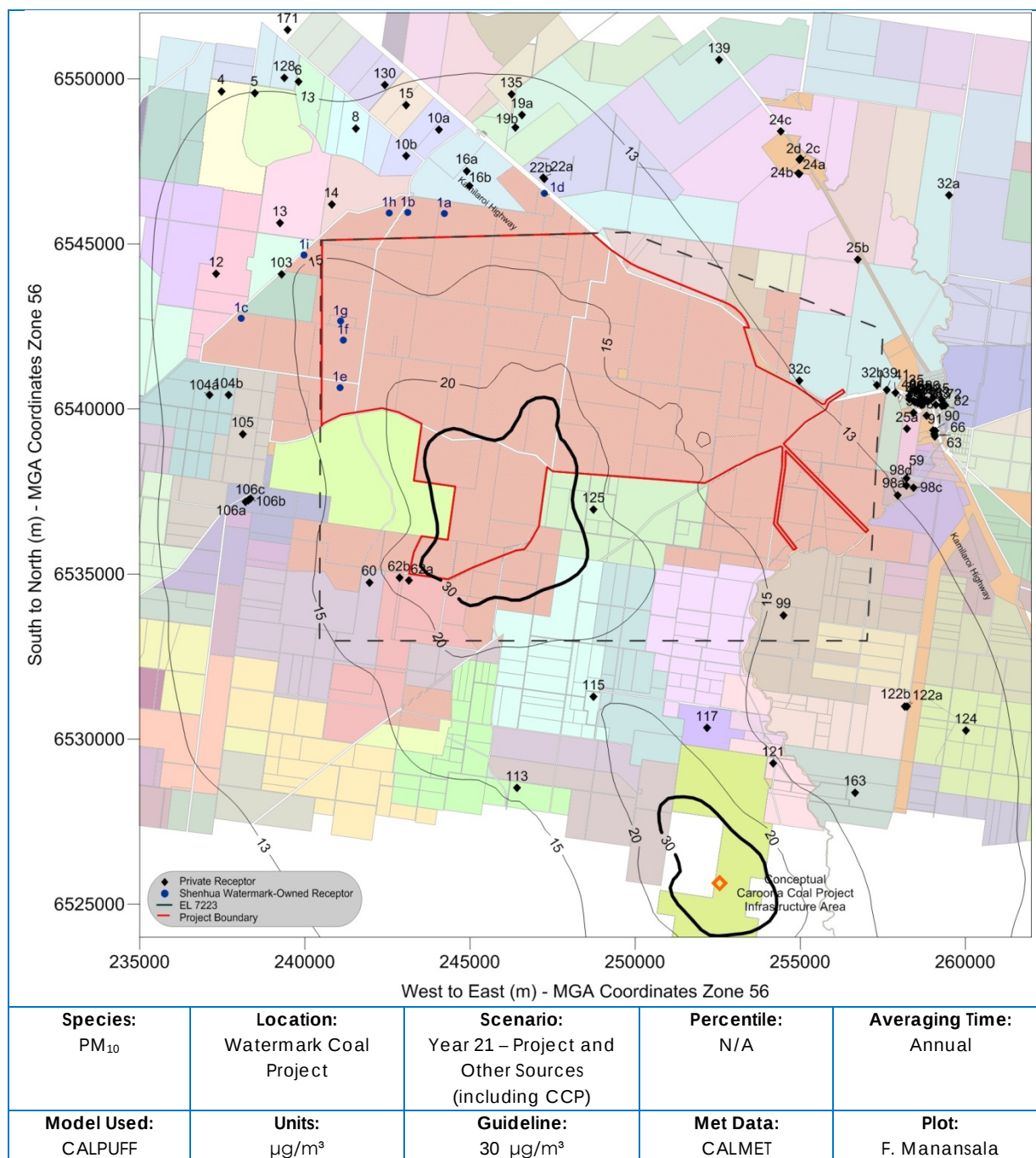


Figure 11 : Predicted annual average PM₁₀ concentrations due to emissions from the Project and other sources (including CCP) in Year 21

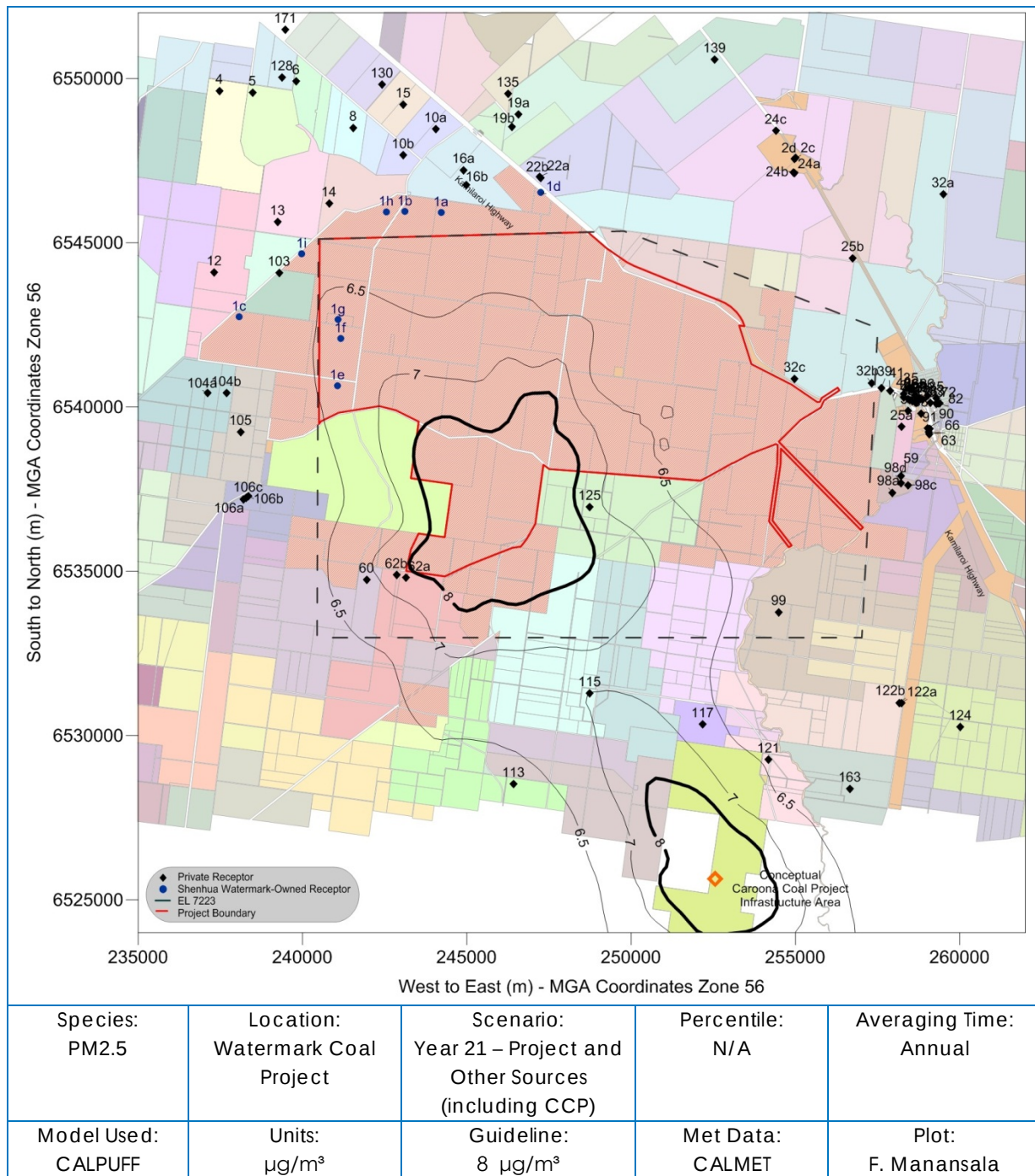


Figure 12 : Predicted annual average PM_{2.5} concentrations due to emissions from the Project and other sources (including CCP) in Year 21

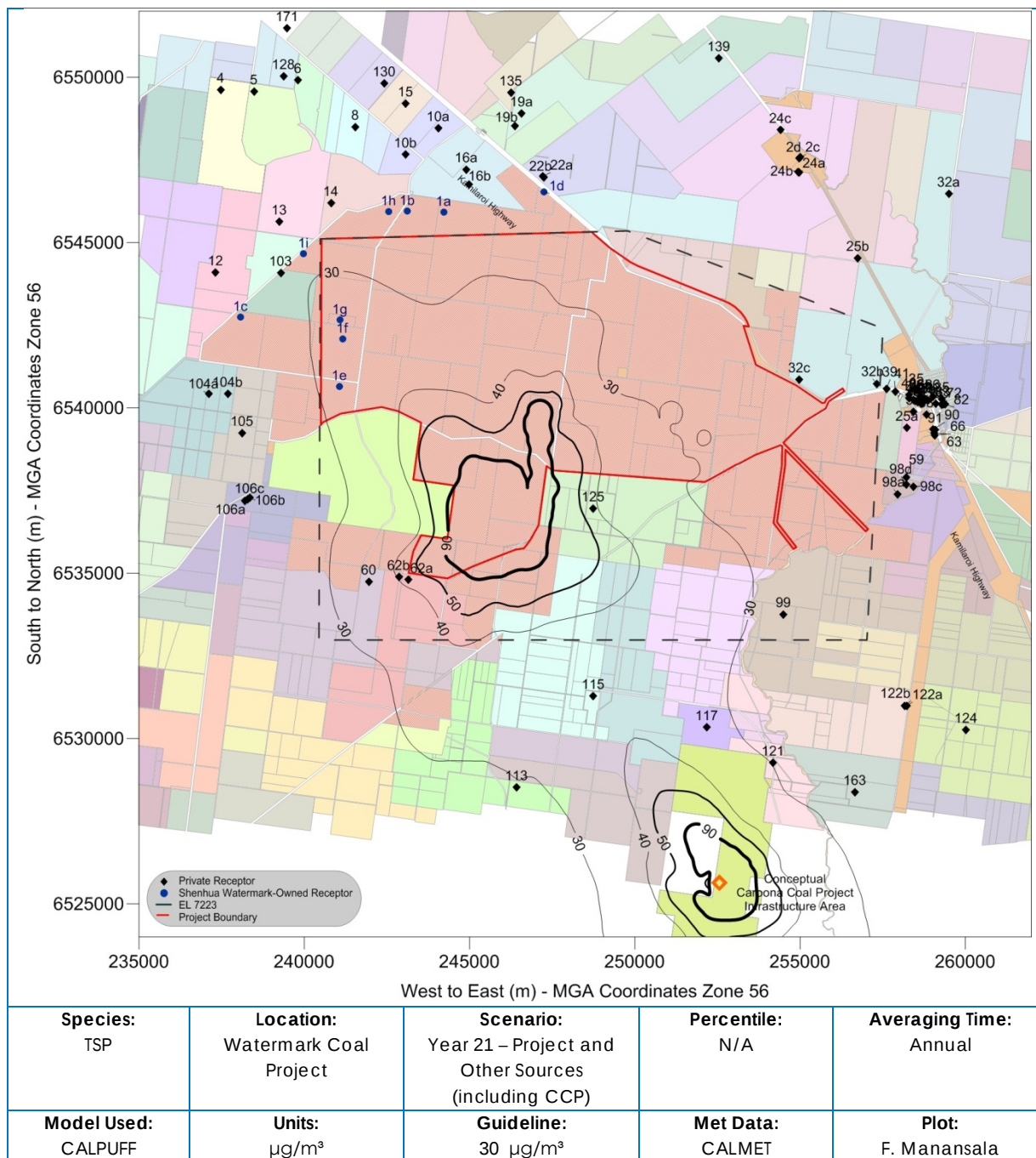


Figure 13 : Predicted annual average TSP concentrations due to emissions from the Project and other sources (including CCP) in Year 21

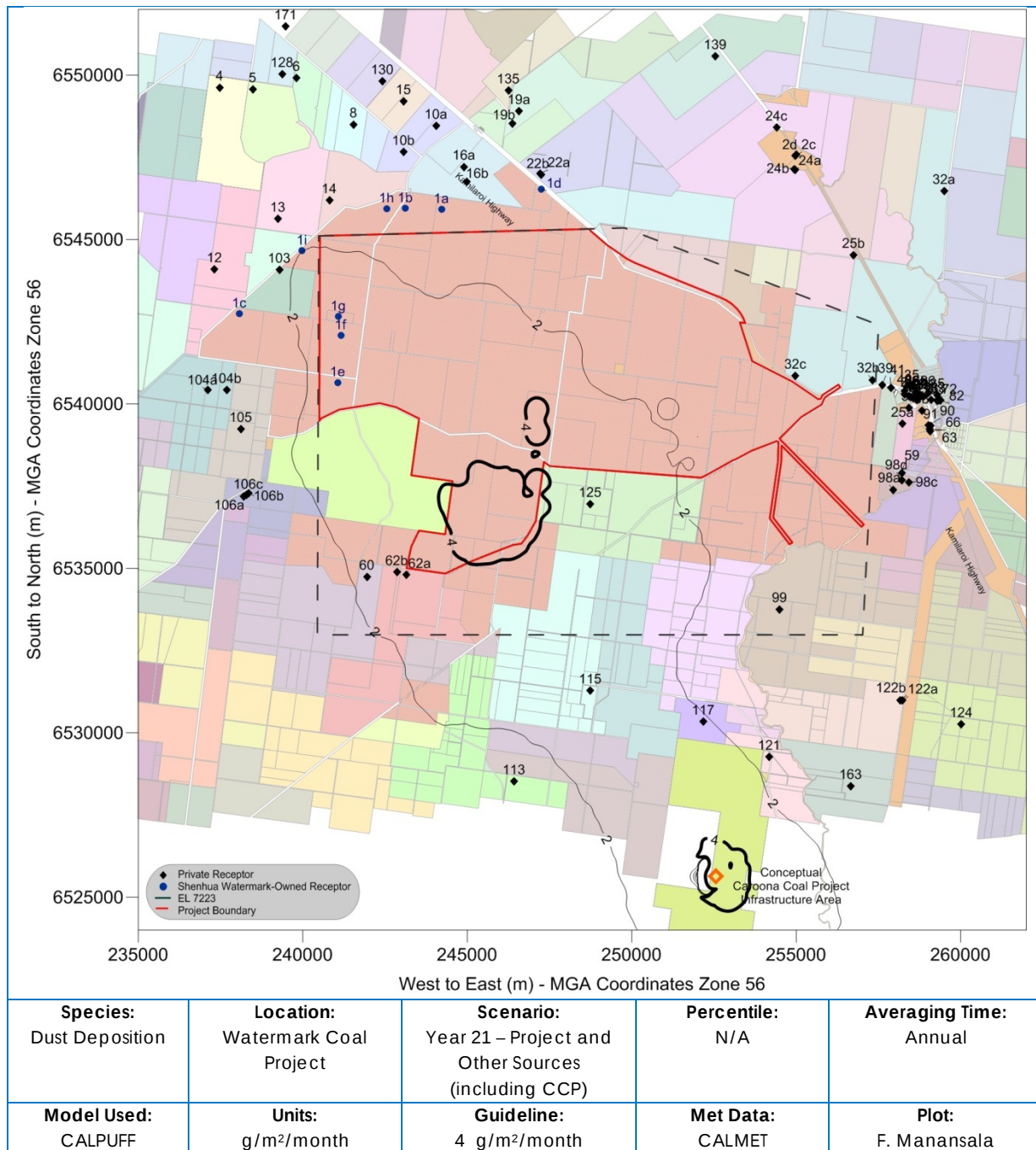


Figure 14 : Predicted annual average dust deposition levels due to emissions from the Project and other sources (including CCP) in Year 21

3.4 Monte Carlo Analysis

The revised Monte Carlo analysis using the predicted impacts from optimised equipment fleet in Year 21 and other sources indicates that the number of days exceeding the 24-hour average PM₁₀ criterion has reduced compared to the EIS (refer to **Table 5**).

Table 5: Summary of days over 50 µg/m³ for Project alone and Project and other source scenarios

Residence	Project Alone		Project and Other Sources				Project, Caroona and Other Sources	
	50 µg/m³		50 µg/m³		150 µg/m³ (acquisition only)		50 µg/m³	
	Predicted number of days above 24-hour average PM ₁₀ criterion							
	Revised	EIS	Revised	EIS	Revised	EIS	Revised	EIS
60	4	7	11	15	-	-	12	17
62a	26	36	44	52	-	1	46	54
62b	20	26	34	41	-	1	37	46
113	-	-	-	-	-	-	1	2
115	-	-	1	2	-	-	3	4
122a/b	-	-	-	-	-	-	1	1
125	6	19	23	37	-	-	25	39

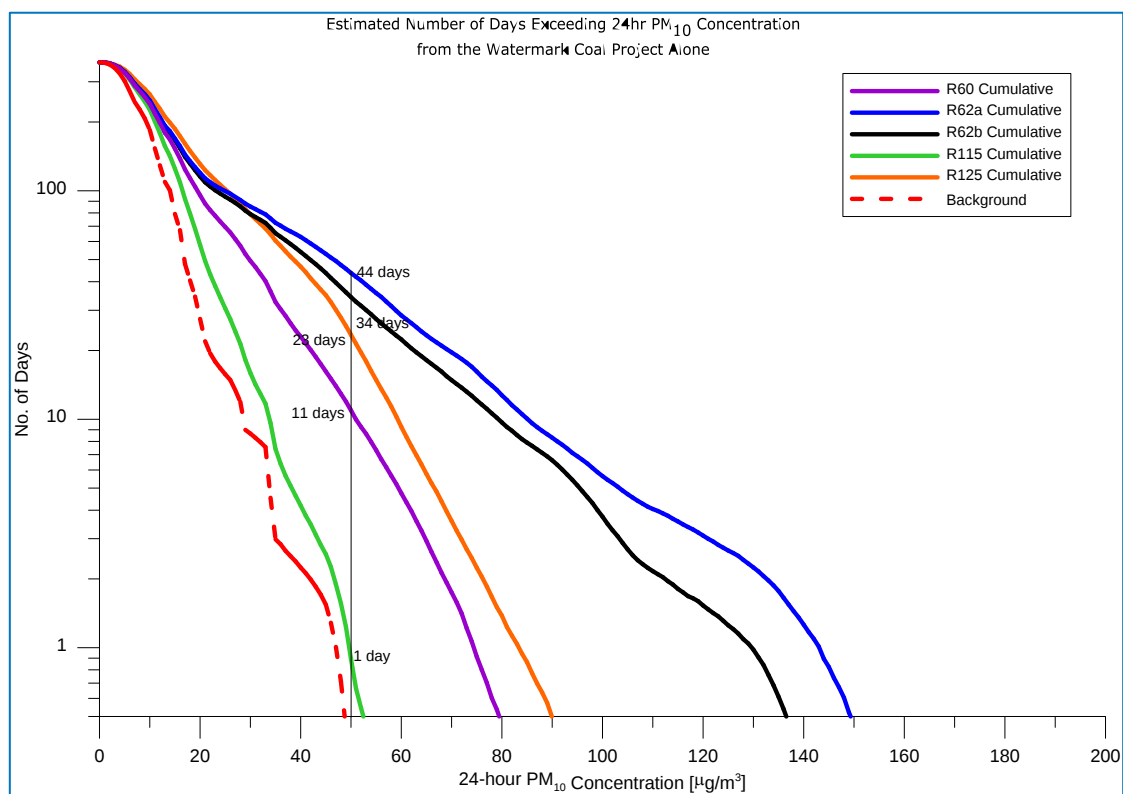


Figure 15: Year 21 Receptors 60, 62a, 62b, 115 and 125 – Frequency distribution of cumulative 24-hr PM₁₀ concentration using Monte Carlo Simulation for the Project and other sources

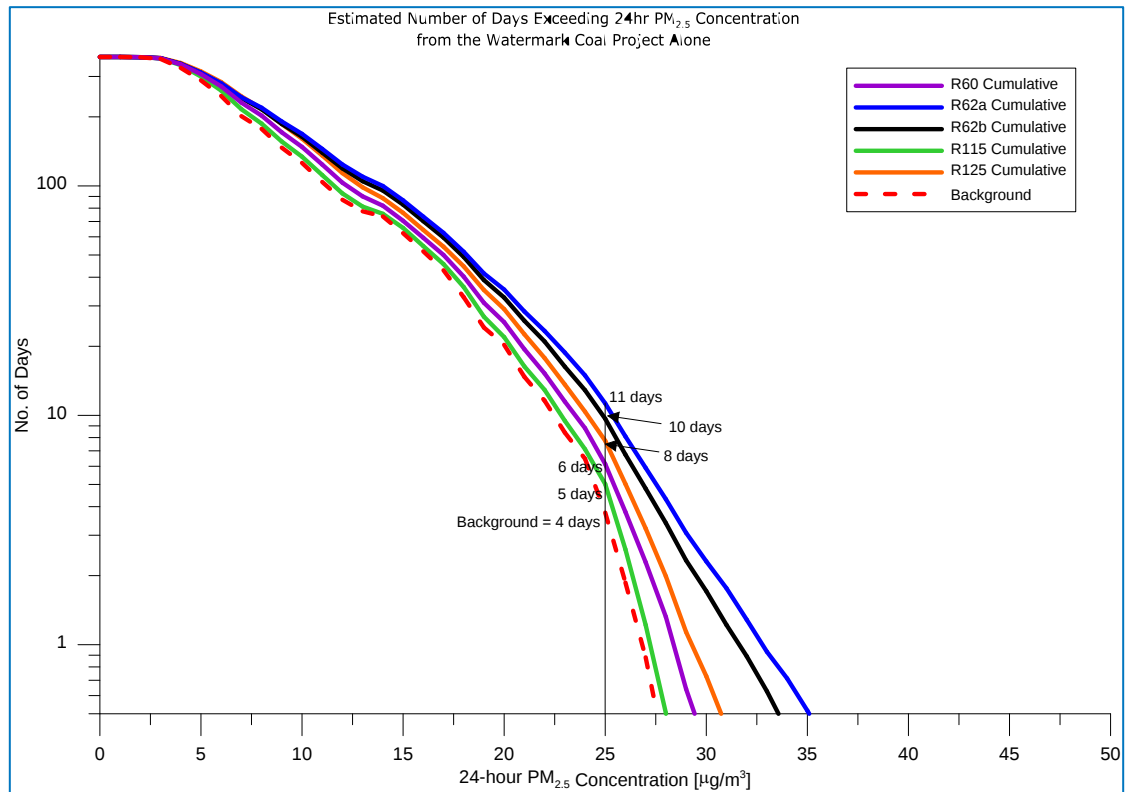


Figure 16: Year 21 Receptors 60, 62a, 62b, 115 and 125 – Frequency distribution of cumulative 24-hr PM_{2.5} concentration using Monte Carlo Simulation for the Project and other sources

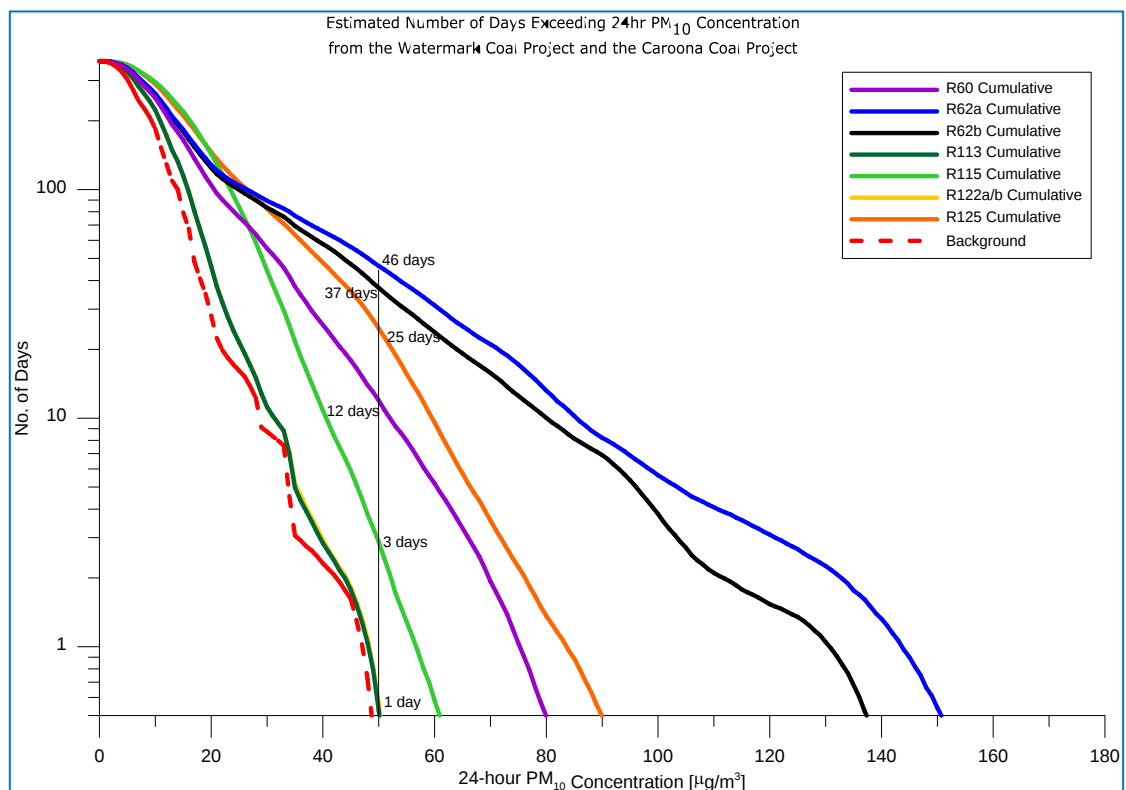


Figure 17: Year 21 Receptors 60, 62a, 62b, 113, 115, 122a/b and 125 – Frequency distribution of cumulative 24-hr PM₁₀ concentration using Monte Carlo Simulation for the Project, other sources and the Carroona Coal Project

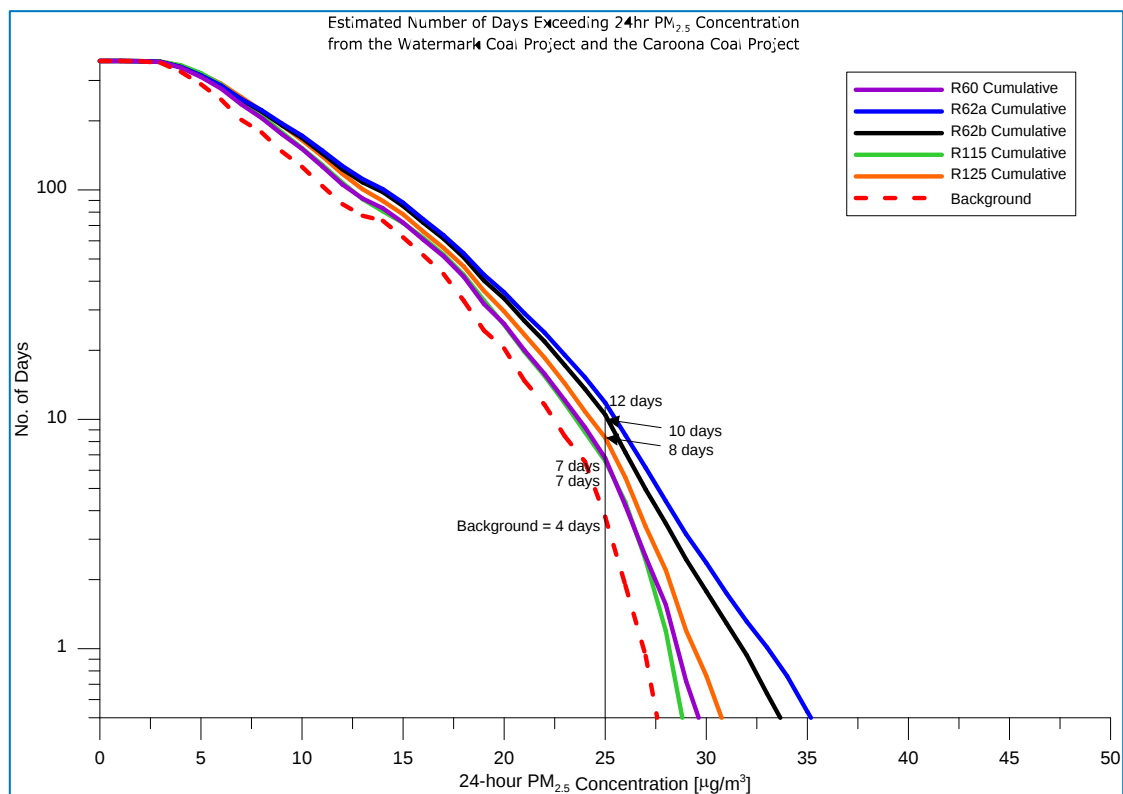


Figure 18: Year 21 Receptors 60, 62a, 62b, 113, 115, 122a/b and 125 – Frequency distribution of cumulative 24-hr PM_{2.5} concentration using Monte Carlo Simulation for the Project, other sources and the Carroona Coal Project

3.5 Consideration of 25% Rule

Additional assessment has been conducted to identify privately-owned land, including vacant land, where more than 25% of the land is predicted to experience dust levels above the relevant criteria (refer **Table 4**). Both the maximum and the 98.6th percentile (6th highest) 24-hour average PM₁₀ were investigated.

Impacts have reduced at residences 115 and 116 compared to the EIS as a result of the change to the mining fleet and these residences are predicted to have less than 25% of the land over 50 µg/m³ when considered at the 98.6th percentile.

It is noted that there are no predicted exceedances of the PM₁₀, TSP, dust deposition or PM_{2.5} assessment criteria on any privately-owned land and therefore these have not been assessed as part of the 25% rule.

Table 6: Privately-owned land area predicted to be impacted greater than 25%

Receptor ID	Land Owner	24-hour Average PM ₁₀ (µg/m³)	
		Assessment criteria = 50 µg/m³	
		Revised	EIS
Maximum 24-hour average PM ₁₀ concentration			
25	RE & BM Baker	N	N
26	GJ Baker	N	N
27	JD , NM & DJ Tudgey	N	N
28	DJ Tudgey	N	N
61	RS Clift	Y	Y
62	M Clift	Y	Y
103	AF & J Wise	N	N
115	Birrawa Pastoral Co Pty Ltd	Y	Y
116	CJ & PA Duddy Pty Ltd	Y	Y
125	G Clift	Y	Y
98.6th percentile 24-hour average PM ₁₀ concentration			
26	GJ Baker	N	N
27	JD , NM & DJ Tudgey	N	N
28	DJ Tudgey	N	N
62	M Clift	Y	Y
115	Birrawa Pastoral Co Pty Ltd	N	Y
116	CJ & PA Duddy Pty Ltd	N	Y
125	G Clift	Y	Y

1 NSW OFFICE OF ENVIRONMENT AND HERITAGE

This document responds to the residual matters outlined in the submission dated 6 December 2013 from the NSW Office of Environment and Heritage (OEH) to the NSW Department of Planning and Infrastructure (DP&I) regarding the review of the *Watermark Coal Project – Response to Submissions* (RTS) (Hansen Bailey, 2013b).

1.1 BIODIVERSITY IMPACTS

1.1.1 FORMALISATION OF AVOIDANCE AND MITIGATION MEASURES

Submission Issue 1

The principles state that impacts from a development must be first avoided, mitigated, and finally offset. OEH notes that a number of measures have been proposed within the EIA to ameliorate the impacts of the Project on flora and fauna species and their habitats. Given that these measures have been undertaken to reduce the impact of the Project on biodiversity, OEH requested that some surety be provided within any Project approval conditions to ensure that these biodiversity values are not impacted by future mining operations. OEH supports the following commitments in the RTS:

- *no disturbance of the Breeza State Forest, and*
- *no disturbance of the Mt Watermark Offset Area and a commitment that biodiversity offset areas will be conserved in perpetuity.*

The retention of EECs between the mining infrastructure area and the overburden emplacement area associated with the eastern mining area, outlined in the EIS in section 7.10.5, does not appear to have been referred to in the RTS. OEH requests that any Project approval conditions provide surety that this area is protected.

Biodiversity avoidance and mitigation measures as discussed above should be formalised within any project approval granted by the Department of Planning and Infrastructure.

Response

As provided in Section 3.12.8 of the *Watermark Coal Project – Environmental Impact Statement* (EIS) (Hansen Bailey, 2013a) and Section 3.3.3 of the RTS, Shenhua Watermark Pty Limited (Shenhua Watermark) will ensure no disturbance of:

- Breeza State Forest; and
- Mt Watermark Offset Area with a commitment that biodiversity offset areas will be conserved in perpetuity.

As outlined in Section 3.12.8 and 7.10.5 of the EIS, approximately 143 ha of Critically Endangered Ecological Communities (CEECs) between the Mine Infrastructure Area and the Overburden Emplacement Area (OEA) associated with the Eastern Mining Area will not be disturbed by the Project (see Figure 39 of the EIS and Figure 3.1 of the Ecological Impact Assessment).

Further, the small area of Inland Grey Box Grassy Woodland (Endangered Ecological Community (EEC)) situated outside of the Disturbance Footprint between the Mine Infrastructure Area and the OEA associated with the Eastern Mining Area will not be disturbed by the Project (see Figure 39 of the EIS and Figure 3.1 of the Ecological Impact Assessment).

Shenhua Watermark will comply with conditions of Development Consent consistent with the aforementioned commitments.

Submission Issue 2

OEH notes the monitoring program outlined in the RTS Appendix F Biodiversity Offsets Report and that this contains, amongst other aspects:

- *monitoring of vegetation and threatened species and the establishment of reference sites as detailed in or Appendix F section 4.4 of the RTS;*
- *the development of a biodiversity management plan; and*
- *regular independent audits conducted on the BOP.*

If these biodiversity values were impacted upon, or commitments to monitoring and the development of a biodiversity management plan were not upheld, the basis for this assessment of the impacts of the Project on biodiversity values would be compromised.

Biodiversity avoidance and mitigation measures as discussed above should be formalised within any project approval granted by the Department of Planning and Infrastructure.

Response

As provided in Section 4.4 of the Biodiversity Offset Report prepared as part of the RTS (see Appendix F), Shenhua Watermark will monitor the progress of biodiversity offsets by means of:

- Surveys to verify that the relevant threatened species are using offsets and increasing in their use of offsets; and
- Surveys to verify that C/EECs and other vegetation communities are being maintained and improved by reference to quantitative, standard biometric benchmark data.

In order to provide a comprehensive framework for the implementation of the proposed biodiversity impact mitigation and offset measures, Shenhua Watermark committed to the preparation of Biodiversity and Offset Management Plan (BOMP) in the EIS and in Section 4.3 of the Biodiversity Offset Report. The BOMP has been commenced by Cumberland Ecology for Shenhua Watermark and will be prepared in consultation with Commonwealth Department of the Environment (DoE) and OEH to the approval of the DP&I.

The success of the biodiversity offsets may be determined by means of an independent audit undertaken by an appropriately qualified person as appointed by the Director General (in consultation with OEH and DoE) at regular intervals. This audit would assess progress of the biodiversity offsets against key performance criteria.

Shenhua Watermark will comply with conditions of the Development Consent consistent with the aforementioned commitments.

1.1.2 ADQEDUACY OF BIODIVERSITY OFFSETS

Submission Issue

Differences of opinion between OEH and the proponent regarding the mapping and classification of vegetation types at the project site and the offset sites have not been fully resolved.

In addition OEH is not confident that mine rehabilitation will result in the creation of EECs. Reference to mine rehabilitation for all biodiversity offset calculations should be removed and offset ratios should be recalculated accordingly.

Notwithstanding the above comments, the status of the BOP has been enhanced since the EIS by the inclusion of the Additional Offsite Offset Area near Tambar Springs. OEH considers that the quantity and quality of the offset package now proposed by the proponent in the RTS is sufficient to overcome the aforementioned deficiencies.

Response

Section 4.11 of the RTS addresses OEH's concerns regarding the verification of mapping provided for grassland within the Project Boundary, specifically agricultural areas.

A supplementary assessment of different grassland communities within the Project Boundary, specifically areas within the Disturbance Boundary and agricultural areas, was undertaken (see Appendix D of the RTS). This did not result in any changes to the mapped extent of Derived Native Grassland, which is listed under the *Threatened Species Conservation Act 1995* or *Environment Protection and Biodiversity Conservation Act 1999*. In this regard, no further biodiversity offsets beyond that proposed within the Ecological Impact Assessment for Derived Native Grassland are required.

As provided in the Biodiversity Offsets Report (see Table 5.2, Appendix F of the RTS) the Project requires 54,652 ecosystem credits when assessed using the Biobanking Assessment method. Of this, 43,722 ecosystem credits (59 credits/ha) are required for Box Gum Woodland and Derived Native Grassland, 3,104 ecosystem credits (61 credits/ha) are required for other EECs and 7,826 ecosystem credits (53 credits/ha) are required for other native vegetation.

The Biodiversity Offset Package provides 124,079 ecosystem credits. This is a substantial amount of ecosystem credits beyond the total required for the Project (see Table 5.7, Appendix F of the RTS). The results of the BioBanking assessment indicate that the Biodiversity Offset Package provides:

- 42,182 more ecosystem credits for Box Gum Woodland and Derived Native Grassland than is required;
- 1,210 less ecosystem credits for other EECs than is required; and
- 28,455 more ecosystem credits for other woodland vegetation than is required.

When mine rehabilitation is removed from the Biobanking Assessment calculations, the Biodiversity Offset Package provides a total of 102,261 ecosystem credits. This result continues to afford a substantial amount of ecosystem credits beyond the total required for the Project.

None the less, OEH acknowledges the Biodiversity Offset Package (as currently proposed with the inclusion of the Additional Offsite Offset Area) is sufficient to overcome deficiencies identified by the Office.

1.1.3 SECURITY OF BIODIVERSITY OFFSETS

Submission Issue

Security of the proposed biodiversity offsets remains unresolved. The future management of proposed offsets should be secured in accordance with the NSW OEH interim policy on assessing and offsetting biodiversity impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI) projects.

Response

Shenhua Watermark will seek to secure the biodiversity offsets for the Project in accordance with the *NSW OEH Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI) Projects* (OEH, 2011). The policy recommends the following options for securing biodiversity offsets:

- Dedication of land under the *National Parks and Wildlife Act 1974*;
- BioBanking Agreements under the *Threatened Species Conservation Act 1995*;
- Conservation Agreements;

- Trust Agreements under the *Nature Conservation Trust Act 2001*;
- A Property Vegetation Plan registered on title under the *Native Vegetation Act 2003*; or
- A planning agreement under s93F of the *Environmental Planning and Assessment Act 1979*.

Shenhua Watermark will consult with OEH and DP&I as to the most appropriate option for securing the Project's biodiversity offsets in perpetuity following determination.

1.1.4 CONSIDERATION OF INDIRECT IMPACTS IN ASSESSMENT OF SIGNIFICANCE

Submission Issue

The EIA does not demonstrate that indirect impacts on remaining vegetation and habitat have been effectively accounted for in either the assessment of significance or in calculating offsets. OEH notes the additional information supplied by the proponent and clarification that the buffer areas are within the disturbance area.

Response

Submission noted. No further action required.

1.1.5 BIODIVERSITY MANAGEMENT PLAN

Submission Issue

The following information should be provided in the Biodiversity Offset Management Plan for Offset Area 6:

- *A map indicating where each EEC/CEEC will be restored.*
- *The proposed species composition of the Koala habitat plantings.*

Response

The BOMP has been commenced by Cumberland Ecology for Shenhua Watermark and will be prepared in consultation with DoE and OEH to the approval of the DP&I. The plan will include but not be limited to:

- A figure illustrating where EEC/CEECs will be revegetated within onsite Offset Area 6; and
- List of indicative species relevant to the provision of Koala habitat within onsite Offset Area 6.

1.1.6 BIOPHYSICAL STRATEGIC AGRICULTURAL LAND

Submission Issue

The identification of Biophysical Strategic Agricultural Land (BSAL) within the onsite offset areas may alter the final biodiversity offset ratios. OEH notes the further information supplied by the proponent and that BSAL has been removed from Offset Area 6. In the case of the Additional Offset area areas of current and previous cultivation have been excised from the offset area to avoid possible conflicts with BSAL.

Response

Submission noted. No further action required.

1.1.7 GROUNDWATER DEPENDENT ECOSYSTEMS

Submission Issue

The assessment of the occurrence of groundwater dependent ecosystems (GDEs) within the Project site, and potential impacts from the Project is inadequate. OEH notes the further information supplied by the proponent.

Response

Submission noted. No further action required.

1.2 ISSUES SPECIFIC TO THE KOALA

Submission Issue

Items 10 to 12 of Attachment A in the OEH submission to DP&I regarding the review of the Watermark Coal Project – Response to Submissions.

Response

Shenhua Watermark is currently reviewing the Koala Plan of Management (Koala PoM) and other relevant documentation in consideration of OEH's comments ('Issues Specific to the Koala' as provided in items 10 to 12 of Attachment A). Shenhua Watermark will consult with OEH in the near future regarding residual matters specific to the Koala in relation to the revised Koala PoM.

1.3 CULTURAL HERITAGE IMPACTS

Submission Issue

OEH has examined and accepts the proponent's responses to each of the matters raised in the OEH submission of the Aboriginal cultural heritage assessment for the Project. The development of the Aboriginal Cultural Heritage Management Plan (ACHMP) post approval is viewed by OEH as critical for ensuring that mitigation for Aboriginal objects and values is appropriate and managed effectively. It is recommended that with the proponent contact OEH to discuss the scope of mitigation and proposed management strategies in the ACHMP.

Response

Shenhua Watermark will prepare an Aboriginal Cultural Heritage Management Plan upon determination of Development Consent. We look forward to developing the plan in consultation with OEH in the near future.

1.4 ABBREVIATIONS

Abbreviation	Description
BOMP	Biodiversity and Offset Management Plan
CEEC	Critically Endangered Ecological Communities
DoE	Commonwealth Department of the Environment
DP&I	NSW Department of Planning and Infrastructure
EEC	Endangered Ecological Communities
EIS	<i>Watermark Coal Project – Environmental Impact Statement</i> (Hansen Bailey, 2013a)
Koala PoM	Koala Plan of Management
OEA	Overburden Emplacement Area
OEH	NSW Office of Environment and Heritage
RTS	<i>Watermark Coal Project – Response to Submissions</i> (Hansen Bailey, 2013b)
Shenhua Watermark	Shenhua Watermark Pty Limited

1.5 REFERENCES

Hansen Bailey (2013a) *Watermark Coal Project – Environmental Impact Statement*.

Hansen Bailey (2013b) *Watermark Coal Project – Response to Submissions*.

NSW Office of Environment and Heritage (OEH) (2011) *NSW OEH Interim Policy on Assessing and Offsetting Biodiversity Impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI) Projects*.

1 DEPARTMENT OF THE ENVIRONMENT

This document responds to the residual matters outlined in the submission dated 11 December 2013 from the Department of the Environment (DoE) to the NSW Department of Planning and Infrastructure (DP&I) regarding the review of the *Watermark Coal Project – Response to Submissions* (RTS) (Hansen Bailey, 2013).

1.1 BIODIVERSITY MANAGEMENT PLAN

Submission Issue

Please provide a schedule of ongoing management commitments to be incorporated into a Biodiversity Management Plan, expected conservation outcomes, timeframes for achieving conservation goals and contingency measures if expected outcomes cannot be achieved. Please also identify the person/company/agency responsible for delivering the Plan, and commitments to ongoing funding and resourcing.

Response

A Biodiversity and Offsets Management Plan (BOMP) has been commenced by Cumberland Ecology for Shenhua Watermark Pty Limited (Shenhua Watermark) and will be prepared in consultation with DoE and NSW Office of Environment and Heritage (OEH) to the approval of the DP&I. Ongoing funding and resourcing will be the responsibility of the applicant, Shenhua Watermark.

The BOMP will contain details of the management procedures to be implemented within the onsite and offsite biodiversity offset areas, including the conservation and ongoing management of existing vegetation, revegetation and rehabilitation of mined areas. The development of the BOMP will take into consideration the recommendations by DoE outlined above.

1.2 DIRECT OFFSET

Submission Issue

...proposed offsets for White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Native Grasslands ecological community fall short of the direct offset requirement. The proposed offset for Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-eastern Australia ecological community does not include any existing remnants and the resulting assessment shows the offset is insufficient as a direct offset. The department recommends further discussion in relation to compensatory measures for these ecological communities prior to an approval decision.

Response

Table 1 presents the results of the Offsets Assessment Guide undertaken by Cumberland Ecology for the Project. These results indicate that for “White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland” (Box Gum Woodland) and “Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia” (Grey Box Woodland) the Project provides greater than 100% of the requirement for offsets through direct offsets. The result of the assessment also indicates that the Biodiversity Offsets Package provides greater than 100% of the required direct offset for each of the other Matters of National Environmental Significance (MNES) assessed.

Table 1
Offsets Assessment Guide Results for the Project

MNES	Total Quantum of Impact (ha)	Total				Grand Total (incl. RH)		Grand Total (excl. RH)	
		RT (W)	RT (G-W)	RV	RH	ha	%	ha	%
White Box-Yellow Box-Blakely’s Red Gum Grassy Woodland and Derived Native Grassland	428.20 (W = 399.00, G = 29.20)	271.06	79.94	110.10	149.89	610.99	143	461.10	108
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	15.00	-	-	15.76	10.25	26.01	173	15.76	105
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	592.90	923.64	1012.76	-	640.68	2,577.08	435	1,936.40	327
Regent Honeyeater (<i>Anthochaeraphrygia</i>)	432.00	702.97	660.09	-	442.74	1,805.80	418	1,363.06	316
Swift Parrot (<i>Lathamusdiscolor</i>)	432.00	440.00	600.65	-	442.74	1,483.39	343	1,040.65	241
Corben’s Long-eared Bat (<i>Nyctophiluscorbeni</i>)	518.40	742.21	870.46	-	648.01	2,260.68	436	1,612.67	311

Notes:

RT (W) = Retained and Managed (Woodland)

RT (G-W) = Retained and Managed (Grassland to Woodland)

RV = Revegetated (Grassland/Cropland/Exotic Pasture to Woodland)

RH = Rehabilitation

As outlined within the *EPBC Act Environmental Offsets Policy* (SEWPAC, 2012), the minimum requirement for direct offsets is 90%. Direct offsets are defined as actions that provide a measureable conservation gain for the impacted MNES. Direct offsets for the Project that result in a conservation gain include:

- Improving existing habitat for MNES;
- Creating new habitat for MNES;
- Reducing threats to MNES; and
- Averting the loss of a MNES or its habitat.

DoE independently applied the Offsets Assessment Guide and the results were lower than those determined for the Project. However, consultation with DoE on 6 February 2014 clarified that the Department's result found the offsets were insufficient only in relation to proposed revegetation of Box Gum Woodland and Grey Box Woodland within one of the onsite biodiversity offsets (Offset Area 6).

The DoE assessment results were more conservative than those calculated for the Project for Box Gum Woodland and Grey Box Woodland in Offset Area 6 for the following reasons:

- The department had limited information on the ground stratum condition. The Department assumed grassland areas were "*improved pasture*" when it in fact conforms to Low Diversity Native Grassland; and
- Insufficient literature had been provided to satisfy the Department that revegetation work could be undertaken successfully in the Namoi catchment.

In order to address the Department's submission issue, the feasibility of revegetating and regenerating Box Gum Woodland and Grey Box Woodland in Offset Area 6 and its contribution to direct offsets for the Project was researched further (see **Section 1.3**).

1.3 REVEGETATION

Submission Issue

Due to the lack of certainty around revegetation of ecological communities on improved pasture and the expected long time period to achieving a functional ecological community, these areas have not been able to demonstrate significant conservation gains in the department's offset assessment.

Response

As provided in **Section 1.2**, the feasibility of revegetating and regenerating a functional form of Box Gum Woodland and Grey Box Woodland in Offset Area 6 and its contribution to direct offsets for the Project was researched further to address DoE's submission issue. For both communities concern was raised regarding the condition of the "*improved pasture*" in areas proposed for revegetation. The following subsections focus on the revegetation of these vegetation communities within Offset Area 6. Further, it provides additional details on the current condition of Offset Area 6 and the likely success of revegetation works.

Condition of Offset Area 6

As outlined in **Section 1.2**, DoE raised concerns regarding the revegetation of Box Gum Woodland and Grey Box Woodland on "*improved pasture*" within Offset Area 6. To clarify, the areas to be revegetated are not predominantly comprised of this type of vegetation. Rather, these areas are comprised of Low Diversity Native Grassland (967 ha) and Cropland / Exotic Pasture (139 ha).

A detailed Grassland Assessment Report was provided as an appendix to the RTS (see Appendix D), which assessed and summarised extensive data on grasslands in the Project Boundary and described the condition of each of the relevant grassland and agricultural map units. Key descriptors for the relevant map units are summarised in **Table 2**.

The Grassland Assessment Report explained that over time Cropland / Exotic Pasture could be left fallow and return (over a period of one or more years) to allow diversity form of grassland. There are many examples of this in the Project Boundary and if left fallow the grassland becomes dominated by such native species as *Bothriochloa spp.* and *Aristida spp.* Research on a 214 ha property in Gunnedah has also indicated that a diversity of native grasses can re-colonise a previously cropped site relatively quickly (Nadolny, 2004 #5557).

Table 2
Key Descriptors for Relevant Grassland/Agricultural Map Units

Low Diversity Native Grassland	Cropland/Exotic Pasture
• Cultivated land that has been left fallow in recent years • Land currently used for grazing • Dominated by native grasses such as <i>Bothriochloa</i> spp and <i>Aristida</i> spp. • Few native understorey species and often in low abundances • Canopy only present in the form of widely scattered paddock trees • Few locations where midstorey or canopy regeneration present • Few logs and cut stumps	• Currently cultivated land • Ploughed land • Dominated by exotic species (especially cereal crops) • Very few native species present in the ground layer

Revegetation Studies

Numerous revegetation studies have been undertaken within Box Gum Woodland in south-eastern Australia, particularly within Victoria. Grey Box Woodland is relatively less well studied in comparison with other grassy woodland systems in south-eastern Australia (Threatened Species Scientific Committee, 2010 #5004). However, it is very similar ecologically to Box Gum Woodland and so almost responds to revegetation and management activities in the same way.

Box Gum Woodland is a flagship community for grassy woodlands in eastern Australia, of which Grey Box Woodland form a part of. In NSW, Grey Box Woodland can be transitional between the temperate lower slopes and tablelands occupied by a number of communities including Box Gum Woodland (Threatened Species Scientific Committee, 2010 #5004). In addition to landscape position, there are also many floristic similarities between Box Gum Woodland and Grey Box Woodland, including canopy species. As such, the research undertaken on Box Gum Woodland is highly relevant to Grey Box Woodland.

Revegetation studies of Box Gum Woodland have indicated that the recovery of this community is dependent upon enhancing the woodland form of the community from grassland. The Derived Native Grassland component of this community has been created artificially by tree clearance and grazing for agriculture within and surrounding the Project Boundary. The *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland National Recovery Plan* (DECCW, 2010) recognises that there will be a need to regenerate grasslands to woodlands for recovery of sufficient areas of the community. Therefore, the proposal to regenerate grasslands in Offset Area 6 is consistent with this concept, and, as is demonstrated below, a feasible practice throughout much of the original range of Box Gum Woodland, including the Namoi Catchment.

Where farming and clearing of regenerating trees and shrubs ceases and livestock are removed, grassland becomes colonised by native trees and shrubs. This is a natural process called secondary succession. There are many examples of where farming properties have a "back paddock" that has been "let go" and has reverted from grassland to woodland. The proposed regeneration of Offset Area 6 grasslands will entail active replanting of trees and also encouragement of natural regeneration over time.

Grassland and grassy woodland restoration has been a focus of conservation efforts since the mid-1970s. Since then, many research trials have been undertaken which have subsequently informed much of the restoration work carried out in areas of grassy woodlands in NSW, such as has occurred on Sydney's Cumberland Plain (see editorial by McDonald, 2005). Research has also been undertaken within Gunnedah to assess the rehabilitation of severely degraded and eroded farmland including the use of direct seeding and plantings (see Lemon, 2012 #5556).

Revegetation success is influenced by the state of grassland and groundcover generally. The results of a number of studies show that the key factors influencing the condition of low diversity native grassland are grazing, increased soil fertility due to fertilisation using superphosphates and competition from exotic perennial grasses and weeds (Prober et al., 2002; Jusaitis, 2005; McDougall and Morgan, 2005; McIntyre and Tongway, 2005; Prober and Thiele, 2005; Smallbone et al., 2007; Rawlings et al., 2010; Trees for Life, 2014).

Some of the general findings are consistent with contemporary grassy woodland restoration guidelines and include the following:

- Unfertilised, lightly-grazed native pastures are typically dominated by plants with tough, long-lived and slow growing leaves. These pastures tend to be less palatable to stock but are highly resilient to drought, provide soil protection and animal habitat, and resist weed invasion (Dorrough et al., 2008). However, continued grazing and use of fertilisers will encourage weed species and perennial exotic grasses and inhibit regeneration of trees and shrub species;

- Very light grazing in combination with resting spells can maintain fauna and flora species diversity, with some perennial native grasses (such as Weeping Meadow Grass) being very responsive to grazing management (Dorrough et al., 2008);
- The likelihood of eucalypt regeneration is higher in paddocks with no or little-fertiliser history (Dorrough et al., 2008). In the long-term, fertility levels will decline in native pastures once fertiliser applications cease (Dorrough et al., 2008). Thus the relative success of tree planting is expected to increase from the time that fertiliser applications cease; and
- Relevant canopy species (including Inland Grey Box, Yellow Box, White Box and Blakely's Red Gum), are known to regenerate well from direct seeding, particularly if grazing and competition from exotic grasses and weeds are controlled (MCMC and DLWC, 1998).

By reversing these changes through cessation of fertilisation, active weeding and grazing control, and with active planting of tree and shrub species, low diversity native grasslands have a good opportunity to recover at least to a modified form of their respective woodland communities (Rawlings et al., 2010).

Description of the Areas to be Revegetated within Offset Area 6

As described above, areas not mapped as low diversity native grasslands in Offset Area 6 have been cultivated in the past, left fallow and subsequently used for grazing. These areas are now dominated by native grasses such as *Bothriochloa* spp and *Aristida* spp. They contain few native understorey species and grazing sensitive species are typically absent or rare. Canopy trees are present in the form of scattered paddock trees and canopy / shrub regeneration is restricted to a few locations. Areas that are currently crop / exotic pasture could be left fallow and return (over a period of one or more years) to the low diversity form of grassland (see Grassland Assessment Report, Appendix D of the RTS).

Proposed Future Quality

When the Offsets Assessment Guide was applied to the Project's biodiversity offsets, the future quality of Box Gum Woodland and Grey Box Woodland within Offset Area 6 was reduced to take a conservative approach. It was recognised that such regenerated woodland would not form a facsimile of the original with a high diversity ground stratum. However, it was intended to serve dual functions as an offset for the restoration of Critically Endangered Ecological Communities (CEEC) and Endangered Ecological Communities (EEC) and provision of Koala habitat. The intention is to restore a low diversity, ecologically functioning woodlands from the existing grassland areas and to provide more trees for the Koala and for other threatened species, including birds and bats.

When applying the Offsets Assessment Guide, choices need to be made by the operator about future habitat condition in offsets based upon current condition and management proposed. The selection requires justification for each impacted MNES.

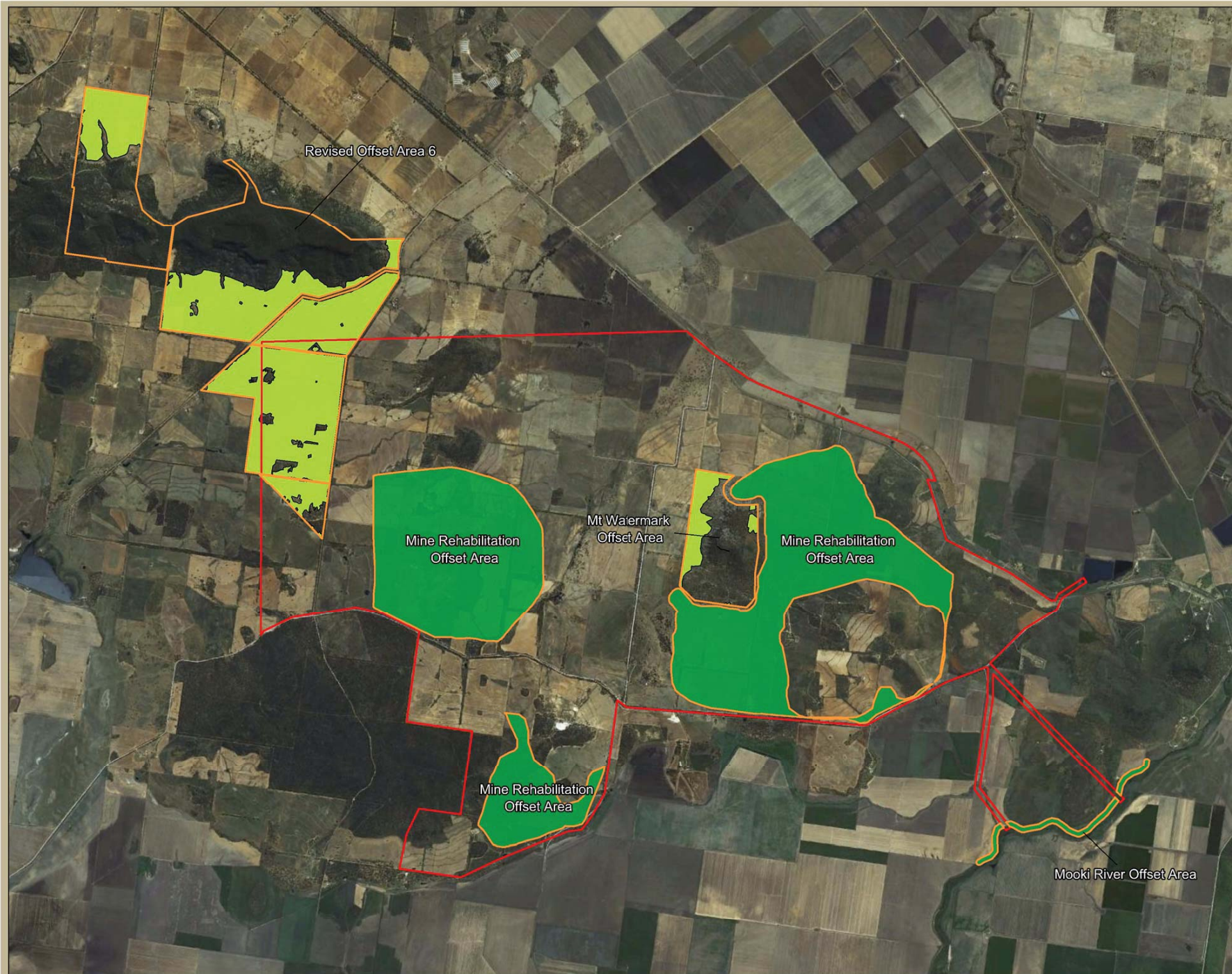
Consultation with DoE on 6 February 2014 clarified that the Department's concern regarding revegetation is primarily related to Grey Box Woodland within Offset Area 6. Further discussion is provided below for Grey Box Woodland; however the same principles would apply to Box Gum Woodland.

For Grey Box Woodland within Offset Area 6, the future site condition score adopted by Cumberland Ecology was 3/10 (for woodland biodiversity and quality) and the future site context score was 7/10 (i.e. the vegetation community would be part of a much larger woodland area in the offset and as such would contribute to future connectivity). Figure 4.1 of the Biodiversity Offsets Report (Appendix F of the RTS) and **Figure 1** shows the areas proposed for revegetation and the extensive area of connected habitat that it will form. When the two scores are averaged by the Offsets Assessment Guide, an overall score of 5/10 results for the future condition of the Grey Box Woodland (as equal weighting is applied to both components). The future site condition and context scores are considered appropriate given the requirements to produce a low diversity, ecologically functioning woodland from the existing grassland and the likely success of tree plantings, which will significant increased connectivity values. The feasibility of such plantings has been addressed in the previous subsections.

As noted within the additional information for the Offsets Assessment Guide provided to DoE, the future site condition score assigned by Cumberland Ecology appropriately reflects the proposed modified form of Grey Box Woodland that is intended for revegetation.

The proposed woodland to be regrown from grassland in Offset Area 6 can be made to fit a form of the endangered ecological community, using the definitions provided in the EPBC Act identification guidelines. The guidelines for Grey Box Woodland include condition classes ranging from intact woodland to degraded woodland (with few non-grass understorey species) and derived grasslands (Threatened Species Scientific Committee, 2010). At a minimum the proposed offset would be able to satisfy Condition Threshold 4.

Table 3 summarises how the criteria for the Condition Threshold 4 for Grey Box Woodland could be met by Offset Area 6. Revegetation works will be targeted towards meeting the proposed future quality for this community. As described above, the likely success of revegetation will increase with appropriate management activities. It is anticipated that the quality of the vegetation will continue to improve beyond 30 year life of the Project.



Legend

- Project Boundary
- Onsite Offset Areas
- Rehabilitation Area
- Revegetation Area

Image Source:
Image © 2010 GeoEye
Image © 2010 DigitalGlobe
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Figure 4.1. Location of Revegetation and Rehabilitation Areas within the Onsite Offset Areas

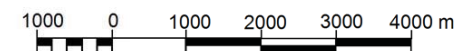


Table 3
Compliance with Condition Threshold 4 Criteria for Grey Box Woodland

Criteria Type	Criteria Detail	Future Quality Compliance
Broad Criteria	The minimum patch size is 0.5 ha;	70 ha of land is proposed to be revegetated to Grey Box Woodland.
	The canopy layer contains Grey Box (<i>Eucalyptus microcarpa</i>) as the dominant or co-dominant tree species; AND	The primary canopy species to be used within revegetation works will be <i>Eucalyptus microcarpa</i> .
	The vegetative cover of non-grass weed species in the ground layer is less than 30% at any time of the year.	Weed management will be undertaken within Offset Area 6 to ensure non-grass weed cover is < 30%.
Additional Criteria (Condition Threshold 4)	At least 20 trees/ha have a diameter at breast height of 12 cm or more; AND	Tree planting within Offset Area 6 will be undertaken at densities to meet this criterion. As revegetation works will commence in the early stages of the Project, it is expected that at least 20 trees/ha would have a diameter at breast height of 12 cm or more at the completion of the Project impact (30 years).
	At least 50% of the vegetative cover in the ground layer comprises perennial native species.	A number of management measures will be implemented to ensure the ground layer is dominated by native species. Without active management, paddocks that have been left fallow within the Project Boundary on average have 65% cover of native grasses and 12% cover of other native species.

Successful Planting

Throughout the locality, there is evidence of successful plantings of tree species known to occur within Box Gum Woodland and Grey Box Woodland in areas previously used for agriculture. **Plate 1** shows plantings within the immediate vicinity of Offset Area 6. It shows young regenerating tree cover above low diversity native grassland within an area that may have previously supported Box Gum Woodland. Given the observed nature of such plantings, it is anticipated that the extensive revegetation works proposed to be undertaken will substantially increase the connectivity and site context value of Offset Area 6 and, in the long term, provide habitat for threatened species, including bats, birds and the Koala.



Plate 1

Plantings within the Locality of Offset Area 6

1.4 MINE REHABILITATION

Submission Issue

It should also be noted that mine rehabilitation does not qualify as an offset under the EPBC Environmental Offsets Policy.

Response

Table 1 presents the results of the Offsets Assessment Guide for the Project. When mine rehabilitation is excluded, based on Cumberland Ecology's application of the Offsets Assessment Guide, the Project still provides greater than 100% of the required direct offset for each of the MNES. Although mine rehabilitation does not qualify as an offset under the *EPBC Act Environmental Offsets Policy* (SEWPAC, 2012) and as such cannot contribute to the Offset Assessment Guide for the Project, it complements the Biodiversity Offset Package through planting of extensive areas of native trees, shrubs and other plants to achieve threatened and non-listed vegetation communities.

1.5 AGRICULTURAL LAND WITHIN OFFSETS

Submission Issue

The department notes that some areas within proposed offset properties will continue to be used for agricultural purposes. The department prefers that these areas remain outside offset boundaries, rather than designated management zones within the offset.

Response

Land currently cultivated or historically cropped within the Additional Offsite Biodiversity Offset Area (514 ha) has been excluded from the Additional Offsite Offset Area and will be maintained for continued agricultural production. Due to the spatial distribution and configuration of the agricultural land, these areas are unable to be excised from the offset, such as through subdivision.

Management actions associated with the Additional Offsite Offset Area will be outlined within the BOMP, including a clear delineation of agricultural land within the offset.

1.6 ABBREVIATIONS

Abbreviation	Description
BOMP	Biodiversity and Offset Management Plan
Box Gum Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
CEEC	Critically Endangered Ecological Communities
DoE	Commonwealth Department of the Environment
DP&I	NSW Department of Planning and Infrastructure
EEC	Endangered Ecological Communities
Grey Box Woodland	Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
MNES	Matters of National Environmental Significance
OEH	NSW Office of Environment and Heritage
RTS	<i>Watermark Coal Project – Response to Submissions</i> (Hansen Bailey, 2013)
Shenhua Watermark	Shenhua Watermark Pty Limited

1.7 REFERENCES

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Hansen Bailey
PO Box 473
Singleton NSW 2330

Dear Dianne,

**SUBJECT: WATERMARK COAL PROJECT, RESIDUAL MATTERS – NSW OFFICE OF
WATER COMMENTS ON RESPONSE TO SUBMISSIONS**

1 INTRODUCTION

Following comments from the NSW Office of Water (NOW, DPI Ref. OUT13/37034, 19/12/2013) on the Response to Submissions (RTS) for the Watermark Coal Project, we met with NOW officers in Sydney on 11 February 2014, and again by telephone on 17 February 2014 to discuss surface water aspects of the RTS. Our understanding of the outcome of these discussions is that:

- NOW is satisfied with the information provided in relation to flooding impacts on the Mooki River and no further information is required.
- WRM was to provide further detail on proposed mitigation measures for flood impacts in the Watermark Gully catchment, as well as velocity impact maps.
- No further information was required on other minor issues raised in the NOW comments.

The requested further information on Watermark Gully flood impacts is documented below.

2 PROPOSED MITIGATION STRATEGY

The creation of the final landform of the western mining area will result in an increase in the catchment area of Watermark Gully. The flood modelling presented in the RTS showed that, without mitigation measures, a small increase in peak flow and flood level would occur at the Kamilaroi Highway. The initial development of the eastern and southern mining areas will have no adverse impact on flooding in Watermark Gully and as a result there will be no increase in catchment areas until after Year 25 of the Project. Detailed design of proposed mitigation measures will be undertaken at the time of development of the western mining area.

The increase in peak flow rate can be mitigated through the construction of detention storage within the disturbance boundary. The RAFTS hydrologic model of Watermark Gully described in Section 8.2 of the Surface Water Impact Assessment of the EIS was used to determine the size of required detention storage to mitigate the increase in peak flow. It was assumed that the detention storage will be incorporated in

proposed sediment dams West 1 and West 2 (see Figure 1) and that the detention storages will remain as permanent features at the completion of mining. Key design parameters of the proposed detention basins are provided in Table 1.

The TUFLOW hydraulic model of Watermark Gully, described in Section 4.3.12 of the Response to Submissions, was used to assess the flood level and velocity impacts with proposed detention basins in place.

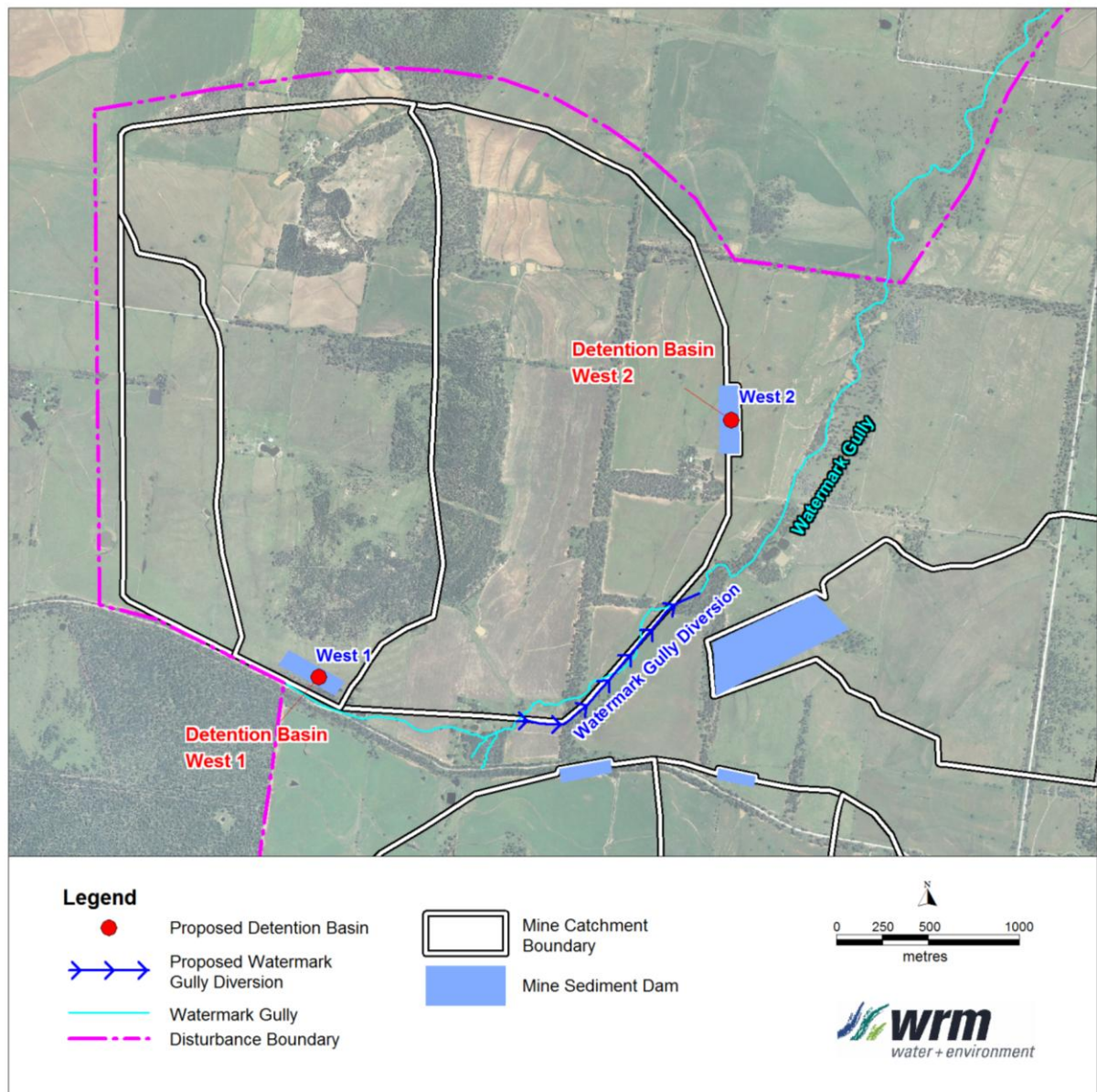


Figure 1 – Proposed Watermark Gully Detention Basin Locations

Table 1 – Adopted Detention Basin Parameters

Detention Basin Parameters	West 1	West 2
Spillway width (m)	10	10
Outlet pipe diameter (m)	1.35	1.35
Number of outlet pipes	2	2
Volume below spillway (ML)	74	84

3 MODEL RESULTS

Figure 2 and Figure 3 show the design discharge hydrographs for Watermark Gully at Kamilaroi Highway, estimated by the RAFTS model for the existing, post-mine (no mitigation) and post-mine with detention basins. The hydrographs show that with the detention basins in place there is no increase in peak discharge at the highway.

Figure 4 and Figure 5 show the peak flood level impacts with detention basins in place for the 2 year and 100 year ARI design flood events. Flood levels at the highway are not increased compared to existing conditions.

Figure 6 and Figure 7 show the peak flood velocity impacts, which demonstrate no increase in flood velocity.

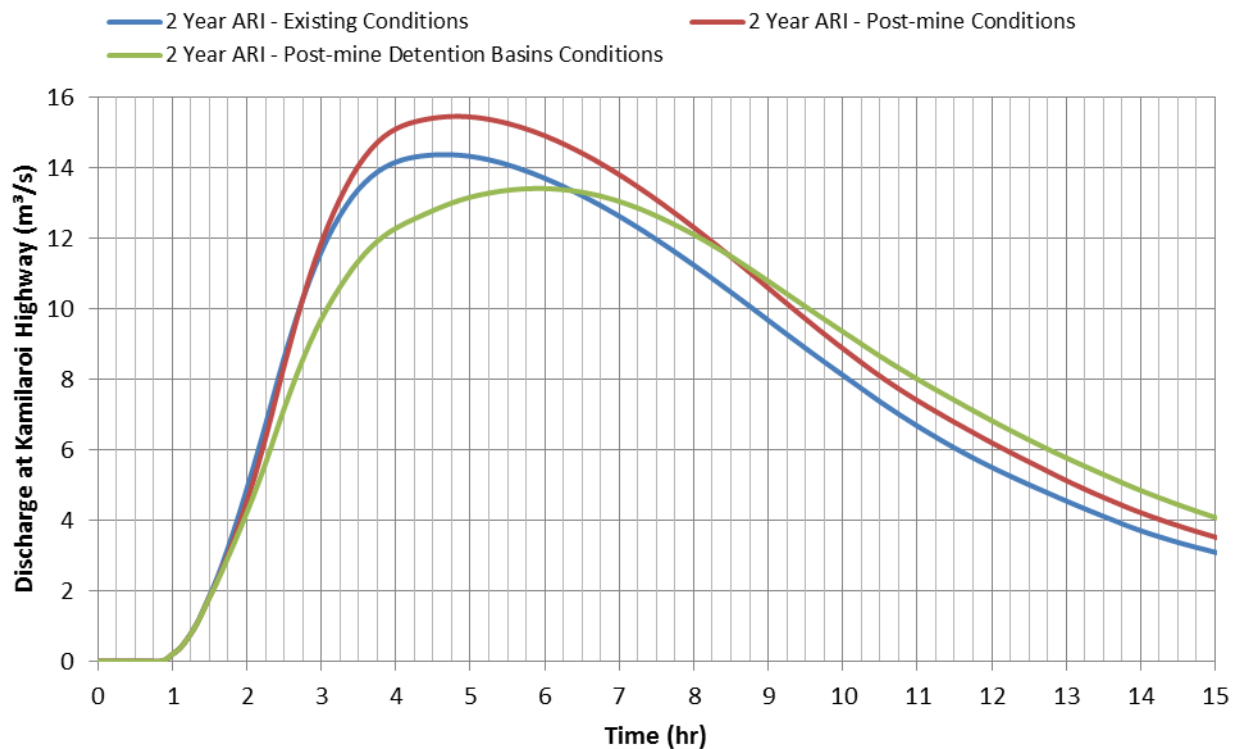


Figure 2 –Watermark Gully RAFTS Model Discharges at Kamilaroi Highway (2 Year ARI Event)

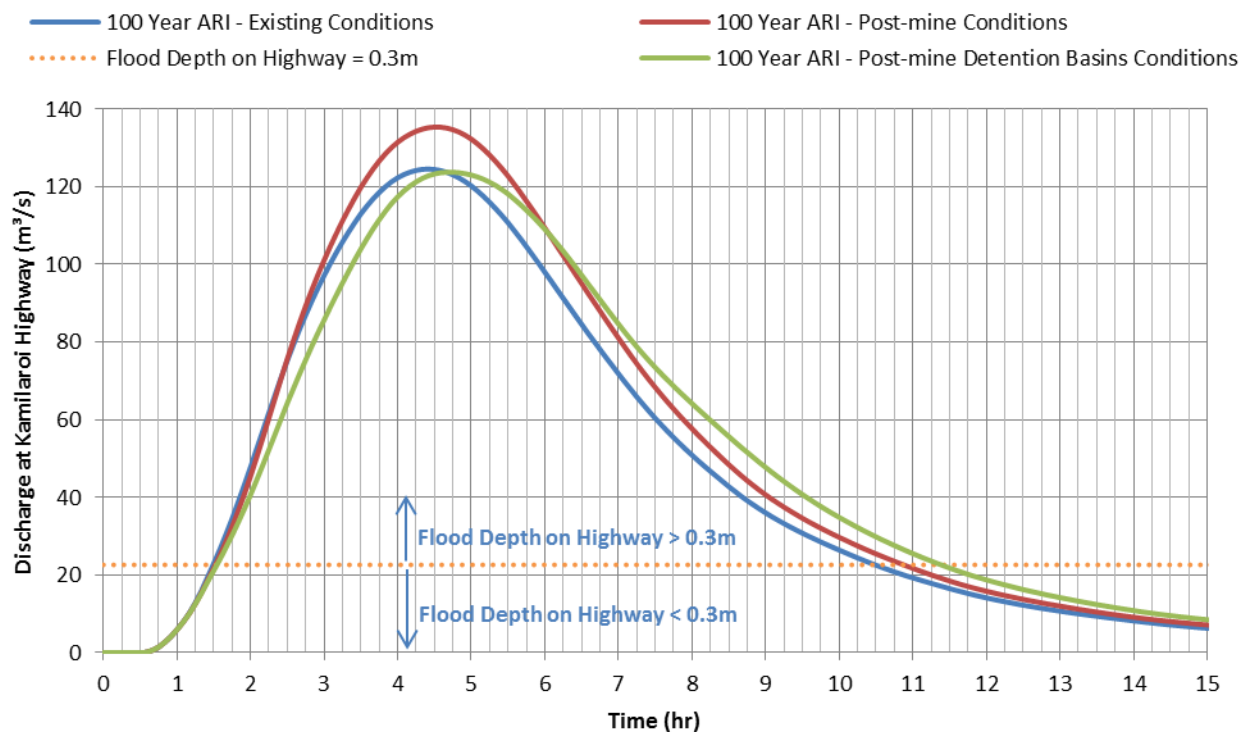


Figure 3 –Watermark Gully RAFTS Model Discharges at Kamilaroi Highway (100 Year ARI Event)

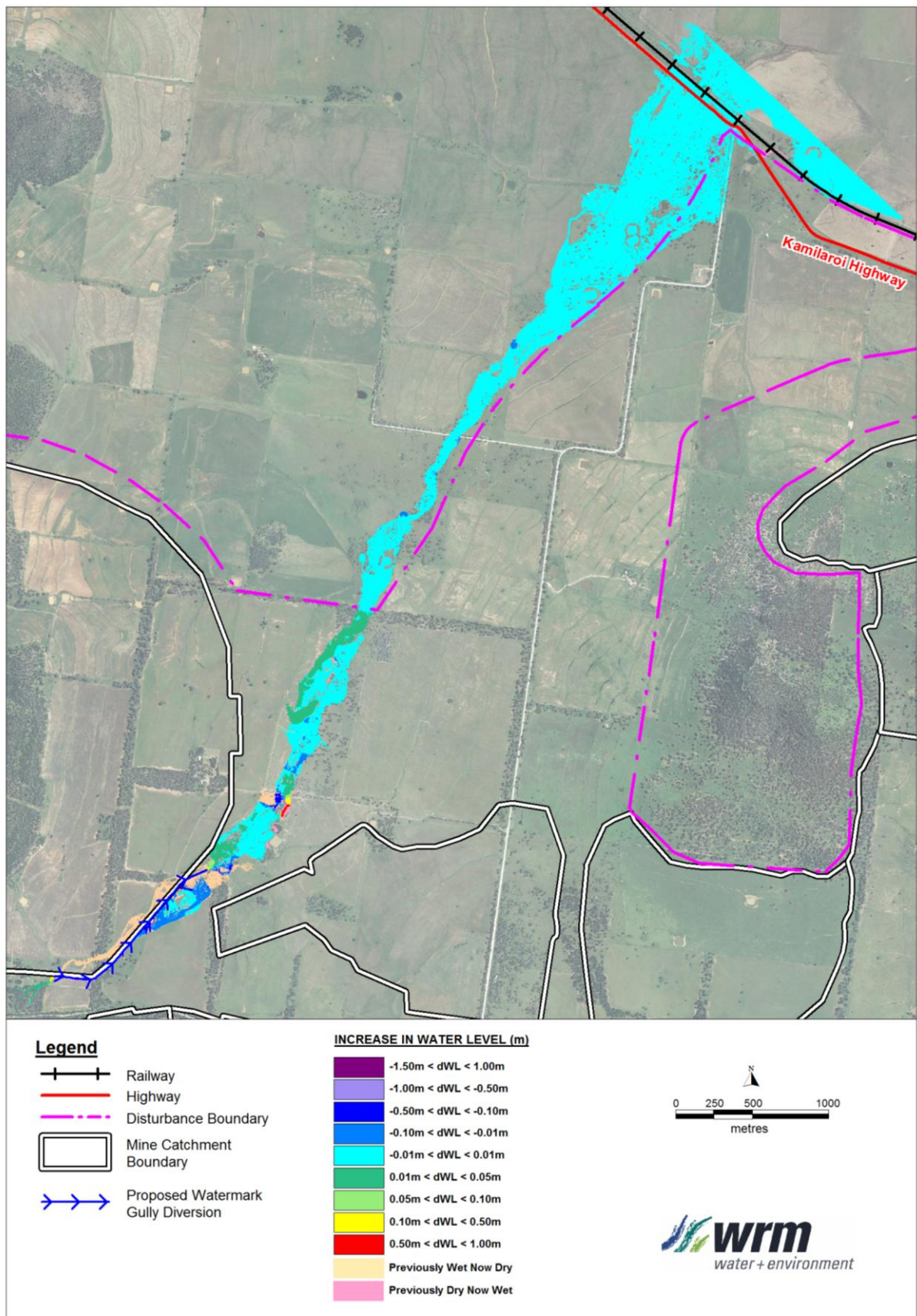


Figure 4 – Watermark Gully Post Mine Flood Level Impacts, with Detention Basins (2 Year ARI)

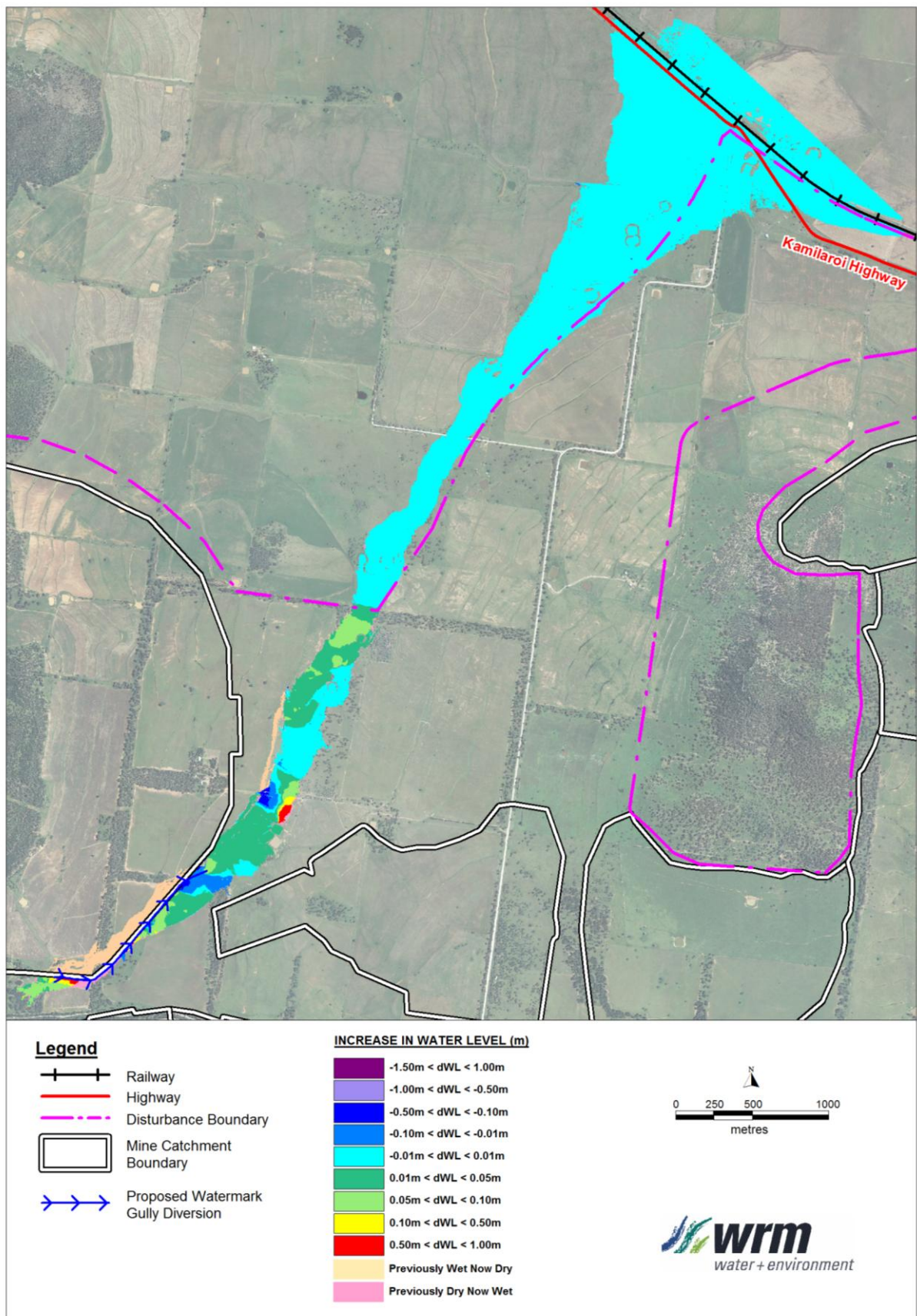


Figure 5 – Watermark Gully Post Mine Flood Level Impacts, with Detention Basins (100 Year ARI)

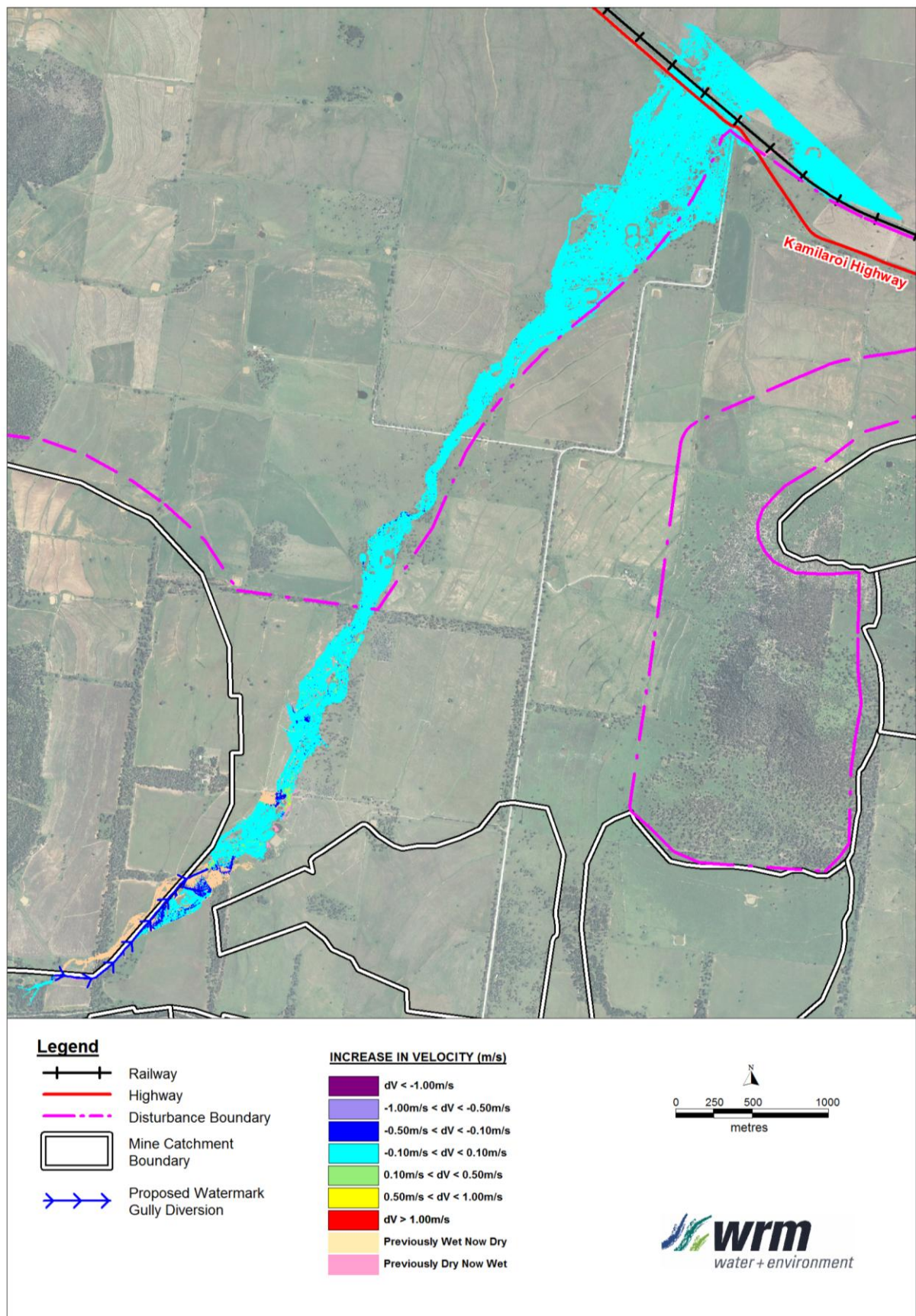


Figure 6 – Watermark Gully Post Mine Peak Velocity Impacts, with Detention Basins (2 Year ARI)

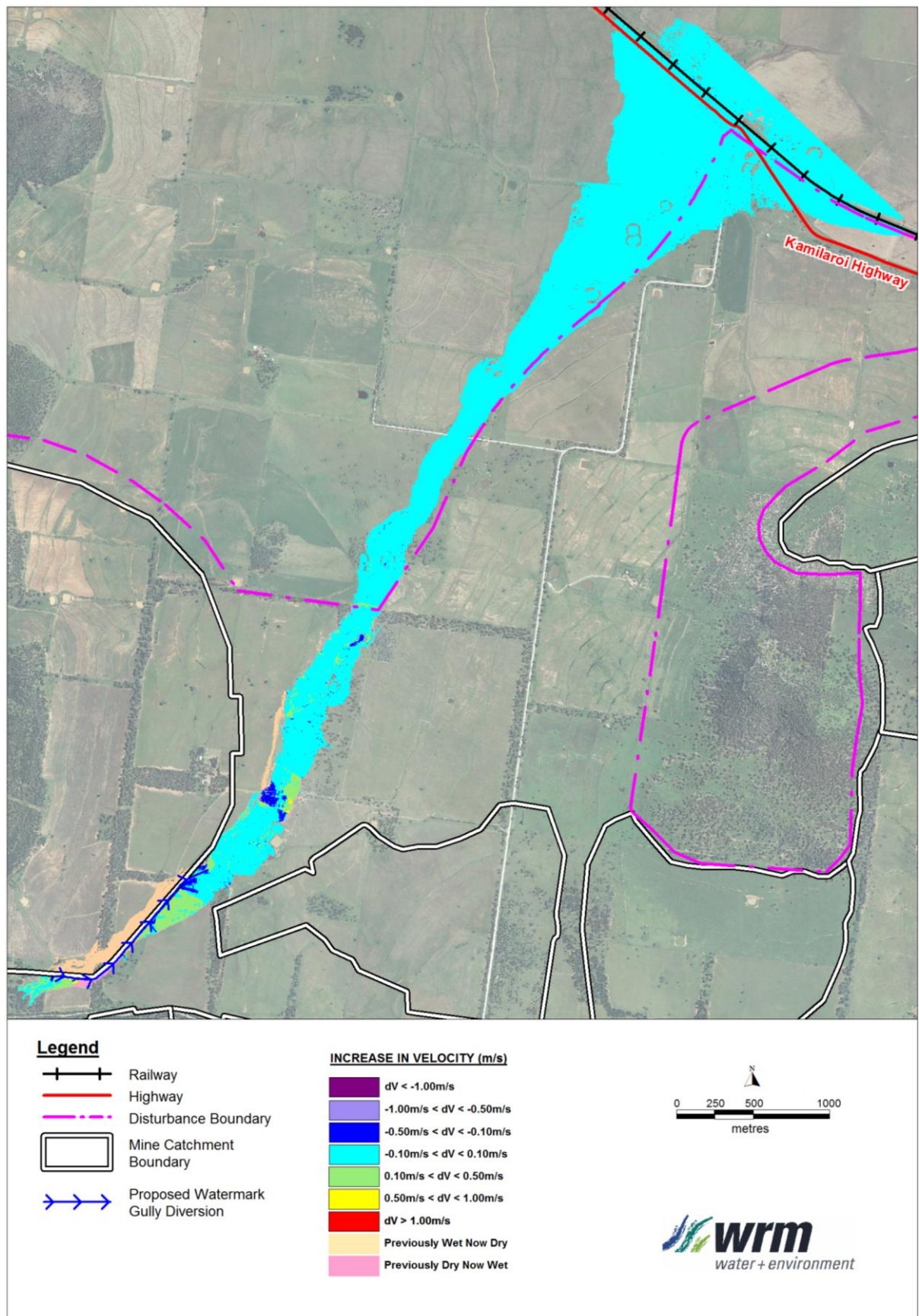


Figure 7 – Watermark Gully Post Mine Peak Velocity Impacts, with Detention Basins (100 Year ARI)

4 CONCLUSIONS

Under the proposed mine plan, any adverse impacts on flooding in Watermark Gully will not occur until after Year 25 of the Project when the proposed western mining area will increase the Watermark Gully catchment. Shenhua Watermark proposes to undertake detailed design of mitigation measures at that time.

The model results presented above demonstrate that detention basins, incorporated within the sediment control system for the Project, can be used to mitigate any increase in flood discharges or flow velocities in Watermark Gully.

Please do not hesitate to contact me if you require further information.

For and on behalf of
WRM Water & Environment Pty Ltd



David Newton
Principal Engineer

From: [Dianne Munro](#)
To: [Mitchell Isaacs](#); [Christie Jackson \(Christie.Jackson@water.nsw.gov.au\)](#)
Cc: [paul.jackson@shenhuawatermark.com](#); [mark.howes@shenhuawatermark.com](#); [Chelsea Kavanagh](#); [James Bailey](#)
Subject: FW: Watermark Coal Project - Floodplain Management
Date: Thursday, 13 February 2014 9:38:53 AM

Hi Mitchell and Christie,

Please find following a response in relation to NOW's query in relation to the Project potentially requiring an approval under Part 8 of the *Water Act 1912* and the timing of this. We trust this addresses your query.

Section 4.4.5 of the EIS states "**Water Act**

Section 180 of the Water Act provides that it is an offence to construct a "controlled work" without an approval. The "controlled work" provisions of the Water Act apply until such time as the "flood work" provisions under Part 3 of Chapter 3 of the WM Act are commenced.

Section 165A relevantly defines a "controlled work" as:

"(1)(a) an earthwork, embankment or levee that is situated, or proposed to be constructed, on land that:

(i) is, or forms part of, the bank of a river or lake, or

(ii) is within a floodplain, or ...

(c) an earthwork embankment or levee, wherever situated or proposed to be constructed, that:

(i) affects or is reasonably likely to affect the flow of water to or from a river or lake, and

(ii) is used or is to be used for, or has the likely effect of, preventing land from being flooded by water ..."

A "floodplain" means any land which is so designated by order published in the Gazette under section 166(1) of the Water Act. Any land within the Liverpool Plains that has a slope of less than 2% slope is a designated floodplain. Limited and minor flood levees will be constructed as required in potential inundation areas as part of the Project. If the levees are within a "floodplain", or will affect the flow of water to or from a river or lake and will prevent land from being flooded by water, a "controlled work" approval will be sought under Part 8 of the Water Act.

Further, Section 4.3.11 of the RTS also addresses this issues as follows:

"In practical terms, the impacts of the flood levee on Mooki River flooding would be undetectable and hence no specific mitigation measures are proposed. Notwithstanding, a

licence under Part 8 of the Water Act will be sought for the works prior to construction."

As such, it is proposed that following detailed design of the project, any final levee positioning and design will be considered in relation to its proximity to the floodplain (as defined under the Water Act) and if required, Shenhua Watermark shall seek a 'Part 8' approval at that time. As you have identified we appreciate that this will require a public consultation process at the time of application.

Regards,
Dianne.

Dianne Munro

Principal

MEnvLaw BSc

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From: Christie Jackson [<mailto:Christie.Jackson@water.nsw.gov.au>]

Sent: Wednesday, February 12, 2014 10:33 AM

To: dnewton@wrwater.com.au

Cc: Dianne Munro; Mitchell Isaacs; Robert Albert

Subject: Watermark Coal Project - Floodplain Management

Hi David,

I have discussed some of the flooding issues with Rob Albert of the Office of Water and we are going to discuss them in more detail on Monday when Rob will be in Tamworth. However I have had a look at the floodplain management plan for the area. In terms of defining a floodplain "Any land within the Liverpool Plains that has a slope of less than 2% slope is designated floodplain under Section 166 of the *Water Act 1912*". I have also attached the floodplain management plan for your information.

I will get back to you with clarification on other issues as soon as possible. Please note Rob and I will be in training for most of next week.

Kind regards,
Christie

Christie Jackson
Water Regulation Officer
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NSW Office of Water
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Part Time: Monday - Thursday

Phil Jones - Watermark Coal Project - Response to Heritage Council Residual Matters

From: Chelsea Kavanagh <ckavanagh@hansenbailey.com.au>
To: "katrina.stankowski@heritage.nsw.gov.au" <katrina.stankowski@heritage.nsw...>
Date: 7/03/2014 3:38 PM
Subject: Watermark Coal Project - Response to Heritage Council Residual Matters
CC: "Phil.Jones@planning.nsw.gov.au" <Phil.Jones@planning.nsw.gov.au>, "Paul..."

Hi Katrina,

As discussed, I refer to the Heritage Council's submission to the NSW Department of Planning and Infrastructure dated 11 December 2013 regarding the review of the Watermark Coal Project – Response to Submissions.

Shenhua Watermark provides the following responses to address the Heritage Council's comments.

Photographic and Archival Recordings

Issue

Photographic and archival recording of all affected Heritage items, as identified in the specialist reports prepared as part of the Environmental Impact Assessment for the project, is to be undertaken prior to the commencement of any construction activity. Recording is to be completed in accordance with the Guidelines issued by the Heritage Council of NSW.

Response

As provided in Section 4.16 of the Response to Submissions and 7.15 of the Environmental Impact Statement, Shenhua Watermark will undertake archival recordings, including scaled drawings and photographs prepared in accordance with 'How to Prepare Archival Records of Heritage Items' (Heritage Office, 1998) and 'Photographic Recording of Heritage Items using Film or Digital Capture' (Heritage Office, 2006), at historic heritage sites to be impacted by the Project. Such measures will be implemented at each historic heritage site prior to their disturbance (rather than an arbitrary date of the commencement of any construction activity).

The procedures for archival recordings will be outlined in a Historic Heritage Management Plan, which will be prepared upon determination of Development Consent in consultation with the Heritage Council.

Archaeological Excavations

Issue

If archaeological excavation is undertaken this must be completed in accordance with Heritage Council guidelines and a research design and methodology be submitted for the approval of the Heritage Council. Any nominated archaeologist should meet requirements of the Heritage Council excavation director criteria.

Response

As provided in Section 4.16 of the Response to Submissions and 7.15 of the Environmental Impact Statement, archaeological test excavation to determine nature, extent and significance of archaeological deposits may be undertaken (where appropriate) at historic heritage sites to be impacted by the Project. If archaeological excavation is undertaken, works will be completed at relevant historic heritage sites prior to their disturbance (rather than an arbitrary date of the commencement of any construction activity) in accordance with Heritage Council's relevant guidelines. Furthermore, a research design and methodology will be submitted for the approval of the Heritage Council with any nominated archaeologist to meet the requirements of the excavation director criteria.

The procedures for archaeological excavations will be outlined in a Historic Heritage Management Plan, which will be prepared in consultation with the Heritage Council upon the determination of Development Consent.

We look forward to receiving your response in relation to the above.

Should you have any queries, please do not hesitate to contact us.

Regards,

Chelsea Kavanagh
Environmental Scientist

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