

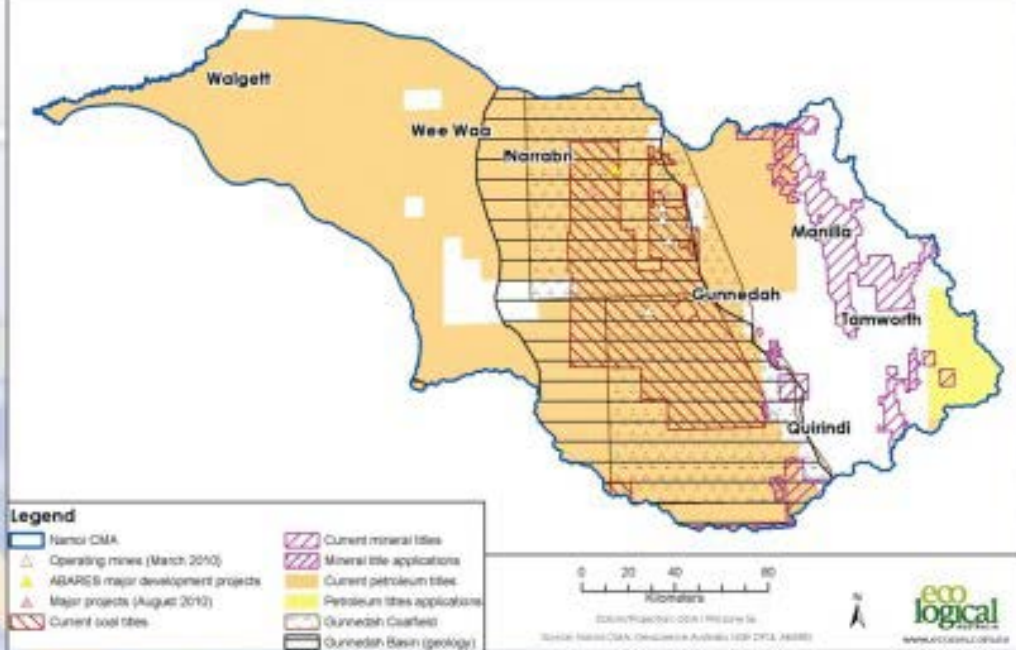
Modelling the cumulative risks of mining on NRM assets

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Why model the risks from mining?

- Extractive Industry development is set to increase in the Namoi.
- Catchment Community recognises extractive industry development as a key driver of change in the Namoi Catchment (e.g. Scenario Planning 2007, CAP Consultation & Research 2010).



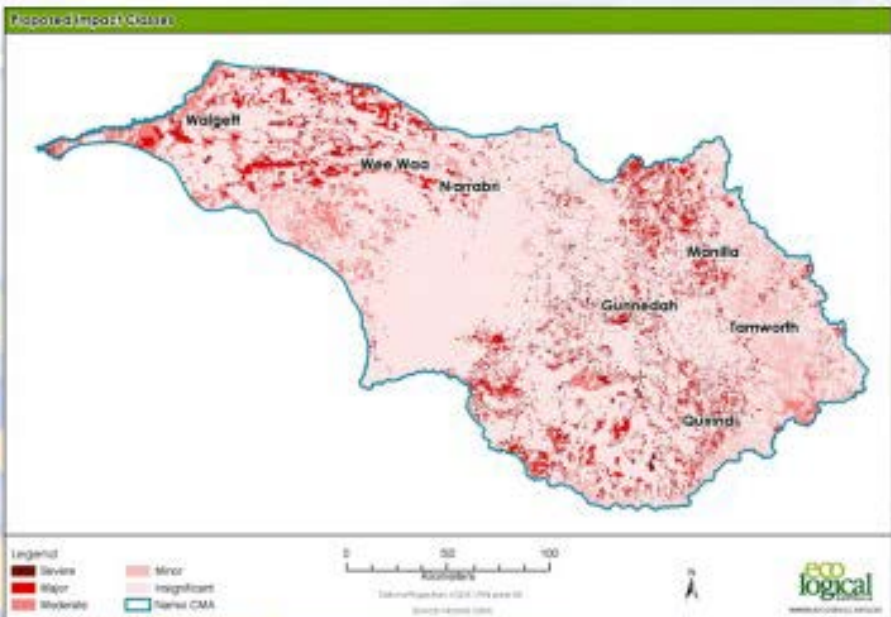
Namoi CMA response:

- NCMA Extractive Industries Policy (2009).
- New resilience-based Namoi Catchment Action Plan (CAP) 2010-2020 (*September 2011 - Ministerial approval pending*).
- Given that extractive industry development can impact on critical thresholds identified in the Namoi CAP - develop a framework for assessing cumulative impact of mining developments on Catchment Assets

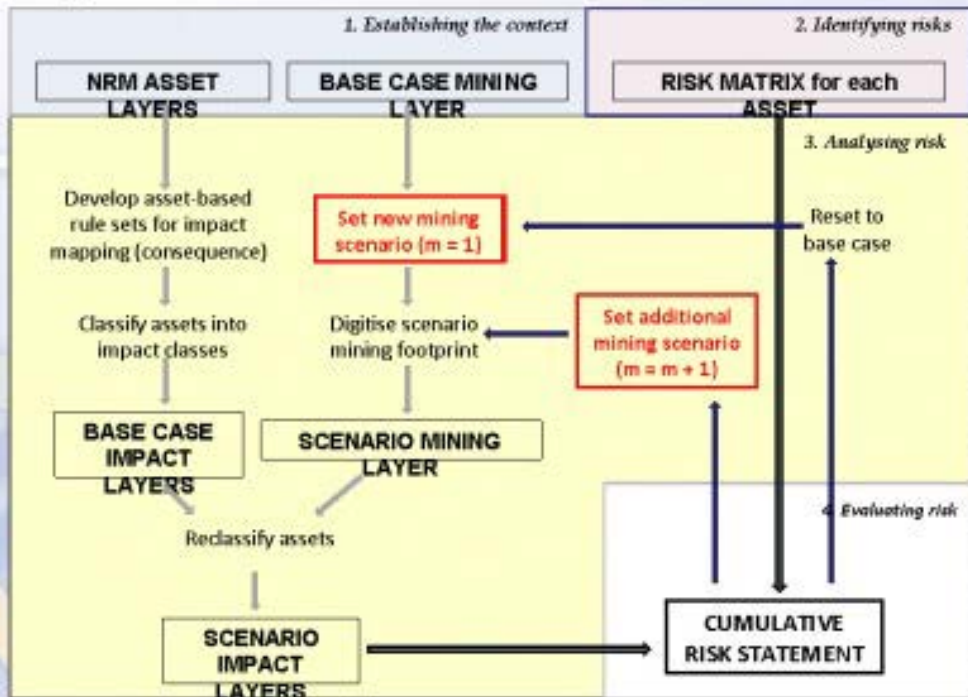
Scope of framework

- Develop a framework to assess the cumulative risk of the mining industry to NRM Assets in the Namoi Catchment
- Employ the Australian Standard for Risk Assessment (ISO 31,000:2009)
- Quantify level of impact in the context of thresholds in the Namoi Catchment Action Plan (2010-2020)

Hypothetical Example of Base Case Impact Layer - Vegetation Type



Proposed framework



Inputs

- Base case impact layer for each NRM asset
- Risk matrix for each NRM asset
- Base case mining layer
- Scenario mining layer (includes mine sizes, types)

Outputs

- Scenario impact layer (or impact change layer)
- Cumulative Risk Statement

Hypothetical Example of a "Cumulative Risk Statement" -

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SCENARIO 1

Characteristics	Mine 1	Mine 2	Mine 3	Mine 4
Type	1 x open cut	1 x open cut	1 x long wall	1 x CSG
Size	Large	Medium	Medium	Medium
Location	Specified E/N	Specified E/N	Specified E/N	Specified E/N
Sub catchment	Maules Creek sub catchment	Maules Creek sub catchment	Maules Creek sub catchment	Box Creek sub catchment

Hypothetical Example of a "Cumulative Risk Statement" -

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CUMULATIVE RISK FROM ALL MINES – SCENARIO 1

Asset	Description	Cumulative Impact	Cumulative Risk
Land Use	Areas of dryland and irrigated cropping in Maules Creek Sub-Catchment; State Forest in Box Creek Catchment	Moderate	H
Soils	Variety of soils	Minor	M
Threatened Species	22 species present; 12 likely; 22 possible; 15 unlikely; 52 absent	Moderate	H
Connectivity	Loss of 13 km functional connectivity, 860 ha viable habitat	Moderate	H
Vegetation Type	Loss of 300 ha of poplar box woodland, which is 92% cleared in the Namoi	Severe	E
Vegetation Extent	Maules Creek catchment vegetation extent into the 25%-35% threshold as a result three mines in the catchment	Severe	E
Vegetation Condition	Condition score class 60-80 impacted	Major	H
Groundwater	Aquifer and GDEs impacted by three mines	Major	H
Surface Water	Three mines connected to Maules Creek	Moderate	M

Next steps:

- Namoi CMA is now proceeding with the development of the cumulative risk assessment tool (May 2012 delivery).
- Latest information (e.g. sub catchment flow study) will be added to existing data to support the tool.

To find out more:

- Visit Namoi CMA website
www.namoi.cma.nsw.gov.au
- The full Cumulative Risk Assessment report is available under "*What's new*".
- Namoi CAP (2010-2020) and associated Resilience assessment is available under "*Planning*".
- Namoi CMA Extractive Industries Policy is available under "*Publications*".

NRM Assets

Theme	Asset	Number of Spatial Datasets
Land (Agriculture)	Land use	19
	Soil type	17
Biodiversity	Threatened species	15
	Viable populations (connectivity)	5
	Vegetation condition	21
	Vegetation extent (cover)	6
	Vegetation type #	8
Water	Groundwater	15
	Surface water	18

includes wetlands and groundwater dependent ecosystems.

Table 20. Mine Types and Sizes

Mine Type	Mine size	Specifications
Open cut	Large	Pit > 500 ha (5 km ²)
	Medium	Pit 50 – 500 ha
	Small	Pit 10 – 50 ha
	Quarry	Pit < 10 ha
Longwall	Large	Panel > 500 ha (5 km ²)
	Medium	Panel 200 – 500 ha
	Small	Panel < 200 ha
CSG	Large	> 100 wells
	Medium	20 – 100 wells
	Small	< 20 wells

Potential Impacts - Summary

Type	Primary Impact	Secondary Impact
Open Cut	Clearing, void, overburden	Loss of threatened species habitat Habitat fragmentation
	Groundwater interception	Depressured aquifer Loss of groundwater
	Surface water interception	Reduction in streamflow
Longwall	Ground 'Subsidence'	Altered surface flow
		Fracturing of aquifer – loss of water Methane release
CSG	Clearing	Loss of threatened species habitat
	Fracking	Depressurisation and/or contamination of aquifer

Table 13. Hypothetical Example of a Risk Matrix

LIKELIHOOD of IMPACT	POTENTIAL CONSEQUENCES (Level of Impact)				
	INSIGNIFICANT	MINOR	MODERATE	MAJOR	SEVERE
ALMOST CERTAIN	M	M	H	E	E
LIKELY	L	M	H	H	E
POSSIBLE	L	L	M	H	E
UNLIKELY	VL	L	M	M	H
RARE	VL	VL	L	M	H

DESCRIPTION OF RISK LEVEL CATEGORIES	
E	Extreme – mining activities are most likely to result in significant impacts to NRM asset. Avoid activities in the location.
H	High – mining activities could result in significant effect on NRM asset or cause other legislative risk. Impacts unlikely to be adequately offset, instead seek to avoid impacts to the maximum extent practicable.
M	Moderate – mining activities would require improved levels of control to prevent significant impacts, reporting and investigation. Impacts would require offsets.
L	Low – impacts can be prevented and/or managed by applying standard management controls. Offsets generally not required.
VL	Very low risk of any impact to NRM asset