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Agricultural Impact Statement technical notes

A companion to the Agricultural Impact Statement guideline

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Agricultural Impact Statement technical notes - A companion to the Agricultural Impact Statement guideline

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Cover image: Agricultural land in the upper Hunter Valley showing critical industry cluster strategic agricultural land in the foreground along with biophysical strategic agricultural land.

Job track 11977

Contents

Foreword

The purpose of an AIS is to ensure a focused assessment of the potential impacts of mining and petroleum (including coal seam gas) projects on agricultural resources or industries. Above all, the AIS needs to present information in a manner that is clear and easy to understand. These explanatory notes provide more detailed information in relation to the Strategic Regional Land Use Policy Guideline for Agricultural Impact Statements referred to in these notes as 'the guidelines'. Omission of information from these notes should not be used as an excuse to exclude other relevant information in the AIS.

Below is a suggested structure for an AIS based on the guidelines already available. This document provides more information on what is required in an AIS and is based on the same structure as the guidelines. You may wish to structure your AIS differently (for example, it may be better to provide regional information first before providing information on the specific project area). Regardless of how it is structured, it should still contain all of the information requested.

1.0 AIS introduction

The introduction should include an overview of the project and a description of the area within an agricultural context. While detailed information on the project area and on the surrounding locality will be made available in later sections, the introduction should provide an overview of where the project is planned and why the proponent thinks this is a project which will benefit the community and the state.

2.0 Detailed assessment of the agricultural resources and agricultural production of the project area

This section is concerned with the agricultural resources and agricultural production within the project area. The project area means the development application area including all land directly used for the project as well as surrounding buffer lands and offset zones which may be managed by the project. Detailed measurements are expected within the project area to ascertain the quality and quantity of the agricultural resources. At the end of this section, assessors should have the information necessary to determine the quality and quantity of the agricultural resources of the project area.

2.1 Soil information

Overview

Soil information is important in an AIS for a range of reasons: it provides information on the quality of the land and its potential for agricultural use; it identifies the current resources available for reclamation and rehabilitation and it will identify the potential future quality of the land after reclamation and rehabilitation.

Soil sampling and survey should be conducted using the following references as a guide:

> McKenzie, NJ, Grundy, MJ, Webster, R and Ringroase-Voase AJ (2008) Guidelines for Surveying Soil and Land Resources. Second Edition. CSIRO Publishing, Melbourne.

Soil types should be classified using the Australian Soil Classification:

> Isbell RF (2002) The Australian Soil Classification, Revised Edition. CSIRO Publishing Collingwood.

Soil physical measurements and interpretation should be undertaken using the following reference as a guide:

> McKenzie N, Coughlan K, and Cresswell H (eds) (2002) Soil physical measurement and interpretation for land evaluation. CSIRO Publishing Collingwood.

Soil chemical measurements and interpretation should be undertaken using the following reference as a guide:

> Rayment GE and Lyons DJ (2011) Soil chemical methods – Australasia. CSIRO Publishing Collingwood.

The project disturbance area should be sampled at a minimum scale of 1:25 000. Utilising the available 1:100 000 or 1:250 000 soil surveys would be considered useful as a guide for sampling but would not be considered sufficient information for the survey.

In depth soil observations are expensive and time consuming. They should therefore be targeted and use available information. Initial land assessment through identifying areas which are significantly different using available data layers such as aerial photographs, yield maps, electromagnetic (EM) surveys, contour maps etc. must be undertaken. Prior to sampling, characterisation of the variation and spatial variation should be assessed.

Sampling depth, frequency and number of samples throughout a profile should be clearly articulated and justified.

Soil physical measurements

Soil physical measurements should be sufficient to determine the physical status of the soils in the area of concern. These measurements should include:

- dispersion (Emerson Dispersion test)
- soil texture
- particle size analysis (measured, not estimated with a soil texture assessment) of particles less than 2mm
- gravel content
- other significant soil characteristics (such as non wetting soils, high soil strength etc).

Soil chemical measurements

Soil chemical measurements should be undertaken to provide a clear indication of the chemical characteristics of the soils in the described area. Soil chemical measurements should include:

- organic carbon – calculated through a loss on ignition process such as LECO unless there is a valid reason to use a different test
- pH (in 0.01 M $CaCl_2$unless there is a valid reason to use a different test)
- total and available nitrogen
- available phosphorus
- phosphorus buffering index
- exchangeable potassium
- cation exchange capacity
- exchangeable sodium
- exchangeable calcium
- exchangeable potassium
- exchangeable magnesium
- exchangeable aluminium
- soluble cations
- electrical conductivity (EC_e). If significant, identify total soluble salts, salt type.
- presence of carbonates and gypsum.

Soil chemical measurements will not necessarily form the baseline for rehabilitation. In many cases, soil chemical characteristics at the time of sampling will already have run below standard agricultural levels since the intent for this land to change from agricultural use will have been known for some time. Soil chemistry will be measured but rehabilitation may require chemical fertility to be brought up to a district standard rather than levels at testing.

2.2 Slope and land characteristics

Slope and land characteristics should be assessed and clearly outlined in a table (note Table 1 below), identifying agricultural land suitability and land capability classes of the pre-mining landscape. This should be combined with estimates of land classes after the project has finished. Of particular interest is land capability classes 1-3 that are well suited for regular cropping. Any land capability classes 1-3 should be identified and every effort should be made not to adversely affect or diminish these resource lands.

Where land is intended to be rehabilitated back to agricultural land in the project, sufficient evidence needs to be provided in section 3 that agricultural productivity and use can be reinstated onto this land in the long term.

Table 1: Example of land characteristics (land capability and suitability classes) comparing pre and post-mining outcomes.

Agricultural Land Suitability and/or Land Capability Class	Area Before Mining (ha)	Area After Mining (ha)	Amount lost or gained +/-….(ha)
Class 1			
Class 2			
Class 3			
Class 4			
Class 5			
Class 6			
Class 7			
Class 8			

Biophysical Strategic Agricultural Land (BSAL) should be assessed and mapped using the Interim protocol for site verification and mapping of biophysical strategic agricultural land (March 2013), available from www.planning.nsw.gov.au. BSAL needs to be verified for all land in a project including surrounding buffer zones and offset areas. Verifying BSAL in areas where Strategic Regional Land Use Plans (SRLUP) exist needs to be conducted on the whole project area, not just the area nominally mapped as BSAL in the SRLUP. If the project is within an area which has a Strategic Regional Land Use Plan, mapped Critical Industry Cluster Strategic Agricultural Land should also be included in the AIS.

2.3 History of agricultural enterprises within project areas

A minimum of ten years history of agricultural enterprises within the project area is to be provided. This should be correlated with the climatic conditions in that time to provide a picture of the use of the land and the conditions agriculture has adapted to.

The history of agricultural enterprises should include the area of the project site used for different land uses. Land use type including actual crop yields and stock numbers should be down to the same level of detail as that collected by the Australian Bureau of Statistics (ABS). For example, it would not be sufficient to state that a certain area was sown to cereal crops, it would be expected that detail on cereal crops (whether they were barley, maize, oats, sorghum, triticale or wheat etc) would be provided.

Information on ABS agricultural commodities can be found in their publication *7125.0 – Agricultural Commodities: Small Area Data, Australia, 2006 – 07,* available at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/7125.0Main+Features12006-07?OpenDocument.

Management of agricultural enterprises should also be detailed. The level of inputs (fertiliser, lime, water, pesticides etc), management styles (trading, set stocking, grazing rotation and general paddock management for livestock; levels of cultivation and herbicide use for cropping) and levels of intensity (irrigation, feeding of livestock etc) should be included. Where possible, previous soil testing results should be detailed.

2.4 Location and areas of land to be temporarily removed from agriculture

The location and areas of land to be temporarily removed from agriculture should be clearly identified on a map. The type of agriculture which will be removed needs to be identified along with the agricultural suitability and land capability classes of this land.

The type of agricultural enterprises to be identified in this section should be at the level of detail provided in the Australian Bureau of Statistics publication *7125.0 – Agricultural Commodities: Small Area Data, Australia, 2006 – 07,* available at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/7125.0Main+Features12006-07?OpenDocument

2.5 Location and area of land to be returned to agricultural use post project

Land which is planned to be returned to agriculture needs to be clearly identified on a map and documented. The land capability class of this land needs to be estimated and if the class type is to change, the change in areas need to be clearly identified, preferably in a table comparing pre and post mining outcomes for the project area (Note Table 1).

Where reclaimed land is planned for a return to agriculture, NSW DPI needs to be convinced that this is able to occur. Claims that agricultural land can be restored need to be backed up by evidence that this is has been done before and evidence that the proponent has the ability to carry out this work.

Evidence will need to be provided that the reclamation and management techniques described in Section 3 can sustain the achieved soil health and agricultural productivity levels over the longer term. Land returned to agriculture needs to be sustainably productive, with yield and stocking rates able to be maintained at levels comparable to district yields across variable seasons with similar post rehabilitation input requirements.

Bulk density should not be used as a surrogate of soil porosity and hydraulic conductivity. Pore continuity in reclaimed soils is far less at the same bulk density levels with a resulting reduction in hydraulic conductivity. Where estimates of hydraulic conductivity need to be made, this needs to be done through direct measurements rather than surrogate measurements.

If there will be an overall reduction in agricultural land and/or the productivity of the agricultural land this needs to be clearly stated and a justification for why the amount or quality of land will be reduced.

2.6 Location and area of land that will not be returned to agriculture, including areas to be used for environmental plantings or biodiversity offsets

Land which will not to be returned to agriculture needs to be clearly identified on a map. The land capability class of such lands and whether it is strategic agricultural land needs to be estimated and shown on a map. If the class type is to change, the change in areas need to be clearly identified, preferably in a table comparing pre and post mining outcomes for the project area.

If there will be an overall reduction in agricultural land and/or the productivity of the agricultural land, this needs to be shown along with the reasons why.

2.7 Agricultural enterprises to be undertaken on any buffer and/or offset zone lands for the life of the project

Buffer areas are expected to remain relatively undisturbed. Agricultural practices are expected to remain similar to what was there prior to the project commencing and comparable to what is happening in similar lands in the surrounding district.

Offset areas which have been purchased to use for agriculture should be identified and mapped.

The type of agricultural enterprises which will be undertaken should be described at the level of detail provided in the Australian Bureau of Statistics publication *7125.0 – Agricultural Commodities: Small Area Data, Australia, 2006 – 07,* available at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/7125.0Main+Features12006-07?OpenDocument

3.0 Identification of the agricultural resources and current enterprises within the surrounding locality of the project area

This section deals with the surrounding locality of the project area. Information on the surrounding locality need not be as detailed and can rely on a range of information sources. The surrounding locality of the project area should be defined as the area of the relevant parish. If the project area resides on the edge of or between two parish boundaries, the appropriate proportional area should be used.

3.1 Agricultural resources within locality

This section should describe the agricultural resources within the locality. It is primarily concerned with the resources rather than the enterprises and productions levels which should be detailed in section 2.3.

3.1.1 Soil characteristics – including soil types and depth

Soil types within land systems and soil landscapes of the surrounding locality of the project area should be identified through available soil-based maps. These are available from the NSW Office of Environment and Heritage http://www.environment.nsw.gov.au/soils/soilmaps.htm. Other information such as aerial photographs, soil surveying publications and soil databases such as the NSW Soil and Land Information System (SALIS – available on the NSW Natural Resource Atlas http://nratlas.nsw.gov.au/ should also be used.

Soil characteristics such as depth, constraints (such as erosion/erosivity, sodicity, salinity, acidity/alkalinity, fertility etc) and capabilities should be detailed.

3.1.2 Topography

Slope contours should be provided on a locality map with a minimum of 20m contour intervals.

3.1.3 Key agricultural support infrastructure

Agricultural support infrastructure covers a wide range of infrastructure. Shared infrastructure such as roads and railways are important but there may also be infrastructure specific to agriculture in the area such as regional or district irrigation schemes, regional or local processing facilities such as sale yards, abattoirs or markets.

Important regionally based industry support services and specialised supporting agribusinesses that may also be affected by changing land uses and cumulative mining impacts also need to be noted. This might include milk delivery runs, machinery sales and servicing, processing facilities and other agribusinesses such as seed and fertiliser sales merchants.

This support infrastructure needs to be identified and any effects on this infrastructure need to be estimated. Note further advice on impacts in section 4.3.1.

Examples of possible effects of the project include: roads and rail may not be able to adequately service agriculture; agriculture related services may be adversely affected because agricultural activity is reduced; or agricultural industries can no longer cope adequately because supporting agricultural businesses cannot function effectively.

Site specific (local) infrastructure includes existing farm dams and water systems, any fixed irrigation systems (such as pump sites, buried lines or pivots), fences and farm buildings. This should be documented and its location spatially mapped as a base reference to enable assessment of its import for agricultural operations on site.

Vegetation specifically established or retained to support agriculture or farm forestry purposes (for instance windbreaks, plantations or managed native forests) should also be documented and mapped.

3.1.4 Water resources and extraction locations

Please consult the NSW Office of Water for advice at information@water.nsw.gov.au.

3.1.5 Location and type of agricultural industries

Agricultural industries should be assessed on a locality basis rather than on a farm by farm enterprise basis. Agricultural industries should be classified according to the Australian and New Zealand Standard Industrial Classification (ANZIC) 2006 Australian Bureau of Statistics catalogue number 1292.0 available at http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/10AD7A6DDB4190BFCA257122001ACD9E/$File/12920_2006.pdf.

The Australian Bureau of Statistics describes agricultural industries down to statistical divisions and local government areas. While these should be used to identify general industries within these broad divisions, information should be collected at a finer scale by accessing information on a more local scale. Agricultural industries within the *locality* should be clearly described in order to be able to easily assess their relative contribution to regional and state agriculture.

Land to be temporally removed from production and permanently removed from production and their locations should be clearly articulated both on progressive maps and in text. How long the land will be removed from production, the area removed and the expected class of land when it is rehabilitated should be clearly stated.

3.1.6 Vegetation

Detailed information on vegetation is available on the Office of Environment and Heritage Vegetation Information Systems database (for more information see http://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm) and on the vegetation layer of SIX viewer (available at http://imagery.maps.nsw.gov.au/VEG/?role=veg). Vegetation type should be detailed and vegetation condition of the area should be assessed. Vegetation should be included if the existing vegetation has a bearing on the agricultural resources in the locality.

3.1.7 Climate conditions

Climatic conditions of the locality should be described in relation to agriculture. Detailed data of climatic conditions is available from the Australian Government's Bureau of Meteorology website (http://www.bom.gov.au/). At a minimum, rainfall, frost frequency, humidity, soil temperature, air temperature and wind directions / flows should be reported. These should be expressed in terms of averages, maximums and minimums and should clearly portray the representative climate regimes and expected climate variability. Climatic conditions listed in this section should be relevant to and in relation to agriculture.

3.2 Current agricultural enterprises within the surrounding locality

This section is distinct from section 3.1 in that section 3.2 is concerned with what agricultural commodities are being produced in the surrounding locality and section 3.1 is concerned with what agricultural resources are available in the surrounding locality.

The type of agricultural enterprises which undertaken in the surrounding locality should be described at the level of detail provided in the Australian Bureau of Statistics publication *7125.0 – Agricultural Commodities: Small Area Data, Australia, 2006 – 07*, available at http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/7125.0Main+Features12006-07?OpenDocument.

The proponent should identify the geographic location(s) and production levels of each commodity produced by all agricultural enterprises within the locality surrounding the project area and their local / regional significance. This should include notation as to the years that the data is relevant to and market / climatic conditions at the time. Additional information on current industry trends / development constraints would be useful.

In order to get locally relevant information, the proponent would be expected to consult with local agribusiness and/or local agricultural consultants.

4.0 Assessment of impacts

4.1 Identification and assessment of the impacts of the project on agricultural resources or industries

This section should provide clear information on the expected impacts of the project on agricultural resources or industries. It should identify lands and agricultural infrastructure that would be temporally and permanently removed from production. This should include the locations, nature of the associated agricultural resources relative to the project area as a whole and for how long it would be removed.

4.1.1 Effects on agricultural resources

Agricultural resources should include biophysical (soil, water) as well as infrastructure such as roads, railways and processing facilities. If significant increases in the use of existing infrastructure is expected, an assessment of how this increase will be accommodated without affecting existing agricultural enterprises needs to be described. The effect on farm productivity, land values, regional communities and environment also needs to be assessed.

A risk matrix of each possible consequence of the project and the likelihood of it happening should be developed. Examples of risk matrices relevant to agriculture are in Appendix 3 of the Interim protocol for site verification and mapping of BSAL. The period in which the risk is expected to remain should be stated. Management options to deal with all risks identified in the risk matrix should be detailed. Examples of such risks include:

- subsidence
- erosion
- permanent and temporary reductions in agricultural productivity

4.1.2 Consequential productivity effects on agricultural enterprises

Consequential productivity effects on agricultural enterprises should include temporary and permanent land losses to agriculture on the project area, reductions in land capability and reductions in agricultural productivity. If significant changes are to be made to the landscape and land reclamation or restoration efforts are planned, sufficient proof needs to be provided that these efforts are able to be completed to the level stated and will remain suitable for agriculture in the longer term. For example, if claims are made that land is to be restored to grazing land after the project, proof in the form of previous success in restoration from projects operating under similar conditions, along with expected long term carrying capacity of this land needs to be provided.

The use of peer reviewed literature to support these claims is encouraged when accompanied by successful case studies and essential if the claim is not accompanied by successful case studies.

4.1.3 Uncertainty associated with the predicted impacts and mitigation measures

While it is often difficult to predict with certainty what the effects of a project's impacts and mitigation measures will be, the uncertainty associated with these impacts should be articulated. The expected likelihood of these measures needs to be clearly stated, along with a plan of what would be done if the predicted impacts and mitigation measures do not occur as planned.

4.1.4 Further risks

Further risks need to be considered both in the context of what will happen on the project area and in the context of what will happen off site. Examples of further risks include:

- weeds and the expected success of weed management plans on buffer areas and within the project areas (including on spoil sites and offset sites)
- wind and water erosion and the effects both on and off site
- biosecurity issues (pests, weeds and diseases) and their possible impact on the economy, the environment and public health. Efforts to prevent new pests, diseases and weeds from entering, to manage established pests, diseases and weeds, and to ensure an appropriate preparedness and response capacity should be demonstrated
- effects of possible subsidence on infrastructure, public and private land, watertables and agricultural production. This should include risks of subsidence which may make cropping or grazing no longer possible or feasible
- effects of dust on surrounding areas and on agricultural enterprises
- the effects of noise on surrounding properties, including the effects on people living in these areas and on agricultural animals
- effects of vibration from heavy machinery or explosives on infrastructure (including farm infrastructure) and animal welfare
- the effects of any increased traffic loads on agriculture, including the ability of agriculture to remain using traffic infrastructure, increased risks of livestock mortality from increased traffic loads and the effects of increased traffic loads on the safety of agricultural workers.

Information on endemic weeds of significance in the region can be obtained from the local council weeds officers. A survey will also be required to identify site specific weeds. Any Noxious weeds should be clearly identified together with their location, the scale of infestation and regional significance.

Environmental weeds that detract from agricultural production or biodiversity rehabilitation should also be documented in order to identify site management and rehabilitation risks and requirements.

4.2 Account for any physical movement of water away from agriculture

The assessment to account for any physical movement away from agriculture will be completed by the NSW Office of Water. Please consult the NSW Office of Water for more details at information@water.nsw.gov.au.

4.3 Assessment of socio-economic impacts

Summary of points in the AIS guideline

To satisfy the requirements for a socio-economic assessment, the AIS must include a description of the project's potential impacts on:

- agricultural support services (input suppliers) for affected agricultural industries
- processing and other value-adding industries that are reliant on the outputs of affected agricultural industries
- visual amenity, landscape values and tourism infrastructure that are relied upon by any local and regional agricultural enterprises in the carrying out of on-farm businesses such as farm stay accommodation or cellar door retail sales.

The description of these impacts must include an estimate of the project's potential impact on regional and local employment in the above activities. Estimates should attempt to isolate the impact of the project from other factors (such as drought, commodity prices and exchange rates) that may have a negative (or positive) impact on agricultural lands.

Further, where a project is expected to significantly reduce the proportion of agricultural enterprises within a region (that is, a reduction greater than 5 percent), either in aggregate or within a specific category of enterprise (such as dairy, thoroughbred breeding or apple production etc), an AIS is required to estimate the critical mass threshold, in terms of enterprise numbers and output, required to at least maintain the existing level of investment in agricultural service industries and infrastructure.

4.3.1 Agricultural support services and processing and other value-adding industries

- Describe and quantify the current levels of agricultural support services, processing and value-adding industries relevant to affected agricultural enterprises. Identify if there are any recent changes that are relevant, e.g. increases or decreases in scale, especially if these are due to recent regional coal mine or gasfield expansion. An example of "agricultural support services and processing" may include the recent volumes of grain and other agricultural produce which needs to be shipped to port every year via the railway network
- Describe and quantify the expected impacts of the development on the agricultural support services, processing and value-adding industries relevant to affected agricultural enterprises, and regional and local employment during the life of the proposed project and in its closedown phase. For example, is it feasible for coal to be shipped to port using the existing railway network, that is also required to transport agricultural produce to port? Does the rail network have sufficient capacity? Cumulative impacts in the longer term, considering other developments in the region, should be considered
- In quantifying impacts consider the extent to which the mining project is the 'causal' factor for changes in current levels of agricultural support services, processing and value-adding industries relevant to affected agricultural enterprises. That is, are there other factors that are also having an impact on trends in the output, or input use, of agricultural industries (for example, the high exchange rate)
- Describe and quantify expected impact on the pool of labour available locally for agriculture, agricultural support services, processing and value-adding industries. Would it be reduced, would accommodation available for labour for agriculture and agricultural support services be reduced or become more expensive?
- Consider whether labour is being sourced from outside a locality or region. For example, will the project source its labour predominately from FIFO workers or will the workforce be acquired locally?

4.3.2 Visual amenity, landscape values and tourism infrastructure

- Describe the nature of agricultural tourism such as farm stays, farm-based B&Bs, wineries, camping areas and other agriculture-based tourism activities
- Describe the distance from the proposed development to larger agricultural tourism sites or wineries etc that would be affected, particularly line-of-sight
- Describe and quantify the expected impacts of the development, for example, loss of visual amenity, loss of tourism earnings, would the viability of any agricultural tourism business be affected. Quantification may include visits per year, reduction in accommodation available as well as the financial impact
- In quantifying the impacts of the development consideration should be given to the significance to which tourism relates to an industry (such as agriculture) and/or region, and whether other factors (in addition to the mining development) are relevant.

4.3.3 Local and regional employment impacts

- The net impact on local and regional employment in categories (a) to (c) should be estimated through the use of a suitable economic model (such as input-output)
- In determining the net impact on local and regional employment, consideration should be given to the extent to which labour will be outsourced from outside the local area or region (for example, fly-in fly-out or drive-in drive-out).
- In determining the net impact on local and regional employment, consideration should be given to the extent other factors (such as exchange rates, weather conditions) may be having on agricultural services and agricultural industries
- In estimating the net impact for local and regional employment determine whether neighbouring regions (located near a project) should be considered.

4.3.4 Critical mass thresholds

- Identify relevant critical mass thresholds of agricultural enterprises needed to attract and maintain investment in agricultural service industries and infrastructure
- Refer to the most recent ABS Community Profile Census data to determine the extent to which agricultural enterprises are significant to total employment within a locality or region
- ABS Agricultural Census data may indicate the present number of agricultural enterprises (by sub-category, where relevant) that supports current service industries and infrastructure. Where a project is likely to disproportionately affect a sub-category of agricultural enterprise (such as dairying), the analysis of critical mass thresholds should concentrate on that sub-category (such as specialist dairy input suppliers and milk processors). Some references include The Rural Society Journal (http://rsj.e-contentmanagement.com), Impact Assessment and Project Appraisal (http://www.ingentaconnect.com/content/tandf/iapa), other rural sociology journals and publications and research such as (Carpenter and Lynch 2002; Lynch and Carpenter 2002; Salt 2012).

5.0 Mitigation measures

This section should clearly identify reasons for choosing the options presented in the project in relation to minimising adverse impacts on agricultural resources. Agricultural resources should be considered in the context of agricultural lands and individual agricultural land holdings as well as in the broader context of agriculture at the local and regional level.

It should document and cost options to avoid, minimise or mitigate potential impacts on agricultural resources.

5.1 Project alternatives

The report should demonstrate that project alternatives have been considered. Project alternatives should be clearly outlined and the reasons for rejecting other alternatives should be clearly stated.

5.2 Monitoring programs to assess predicted verses actual impacts as the project progresses

Monitoring schedules and methods should be clearly outlined. The methods should justify what is being monitored and why the techniques being used are sufficient to determine the impacts. The monitoring schedules should include both the schedule for taking the measurements and also the schedule for when the measurements will have been analysed and assessed. It should be reasonable to expect at least annual assessment of these measurements which should feed into the trigger response plans and trigger points below.

Monitoring should also include monitoring of consultation and issue groups. The concerns of these groups should be addressed in a timely fashion.

5.3 Trigger response plans and trigger points at which operations will cease or be modified or remedial actions will occur to address impacts including a process to respond to unforeseen impacts

Note that in the AIS, these triggers should relate to the degrading of agricultural land within the project area or adverse effects of the project on other agricultural operations. Monitoring schedules should be able to identify adverse soil, air, water, infrastructure and economic effects on the project area and surrounding agriculture.

A risk assessment of all foreseen impacts should be undertaken and this should be accompanied by an action plan of what happens if these impacts reach an unsatisfactory level.

The trigger points should identify the stage where remedial action can be taken to minimise adverse effects. This point should be able to be clearly identified and analysis of results should be timely enough to ensure that remedial action can occur if necessary.

5.4 The proposed remedial actions to be taken in response to a trigger event

With the risk assessments and triggers identified, proposed remedial actions need to demonstrate that the impact of adverse effects to agriculture will be minimised. Remedial actions should be able to stop adverse conditions occurring and where practical, reverse or remediate the adverse conditions which have occurred.

Proponents should demonstrate a capacity to undertake these remedial actions should they be required.

5.5 The basis for assumptions made about the extent to which remedial actions will address and respond to impacts

The reasons for choosing the course of remedial actions needs to be clearly outlined and will need to satisfy the consent authority that these remedial actions are practical and are based on the best current information available. Within this section, the proponent will need to demonstrate that they have the capacity or are able to contract the capacity to implement remedial actions.

The impacts should be identified as reversible or irreversible and the remedial actions should be identified as either reversing or halting the adverse effects. For example, the failure of a water storage facility which goes on to cause extensive erosion and damage to private and public infrastructure used by agriculture may be considered irreversible damage. Addressing traffic impacts on surrounding agricultural enterprises should be considered reversible.

5.6 Demonstrated capacity for the rehabilitation of disturbed lands to achieve the final land use and restore natural resources

The quality of proposed reclaimed and rehabilitated lands should be clearly stated and evidence to convince the consent authority that the reclamation and rehabilitation is both feasible and able to be undertaken by the proponent needs to be provided. While reclamation or rehabilitation for ecological or biodiversity purposes will need to demonstrate its effectiveness through ecological indicators, reclamation or rehabilitation of agricultural land will need to demonstrate sustainable levels of production over a range of seasonal conditions.

Claims of rehabilitation or reclamation back to an unfeasible level of agricultural quality will not be accepted. Evidence that land can be restored to claimed levels should include previous examples of reclamation and/or rehabilitation and scientific evidence in the form of peer reviewed journal articles.

The project should aim to minimise the loss of agricultural land and agricultural productivity. Where agricultural land is taken out of production and not returned, or returned to a lower level of production, justification for this loss of production should be given. If a permanent loss of production, either through loss of agricultural land or through reduced productivity of agricultural land is to occur, a justification as to why the community should accept this reduced level of production should be provided.

5.7 Demonstrated planning for progressive rehabilitation that minimises the extent of disturbance

Rehabilitation and reclamation should be a continuous process throughout the life of the project and beyond. Rehabilitation and reclamation should be planned to occur as soon as practical after an area has finished its extraction. New areas should not be opened up unless areas which have completed their production cycle are undertaking reclamation or rehabilitation.

6.0 Consultation

Significant consultation is expected in developing an agricultural impact statement for a state significant project. An AIS engagement strategy should be developed as early in the project planning stage as possible. The engagement strategy should detail:

- consultation undertaken to date including consultation undertake at exploration licence stage
- consultation with relevant government agencies
- consultation with impacted landholders and community groups
- the issues identified and measures to address these issues
- the outcomes of the consultation, and
- any commitments for further consultation.

Records of consultation should include:

- consultation issue
- date
- location
- who attended the consultation meeting, and
- the outcomes of the consultation and/or other issues arising from the consultation.

Every effort should be made to engage with all affected and interested parties. If this is not the case, reasons for not consulting and details of efforts made to engage that group should be noted.

Further information

Title	Details
Agricultural Impact Statement Guideline	www.planning.nsw.gov.au
'Guideline for Soil Surveying Soil and Land Resources' 2nd Ed	McKenzie NJ, Grundy MJ, Webster R and Ringroase-Voase AJ (2008) Guidelines for Surveying Soil and Land Resources. Second Edition. CSIRO Publishing, Melbourne
Interim protocol for site verification and mapping of biophysical strategic agricultural land	www.planning.nsw.gov.au
The Australian Soil Classification	Isbell RF (2002) The Australian Soil Classification, Revised Edition. CSIRO Publishing Collingwood.
Soil physical measurements	McKenzie N, Coughlan K, and Cresswell H (eds) (2002) Soil physical measurement and interpretation for land evaluation. CSIRO Publishing Collingwood.
Soil chemical measurements	Rayment GE and Lyons DJ (2011) Soil chemical methods – Australasia. CSIRO Publishing Collingwood.
Guidelines to the Mining, Rehabilitation and Environmental Management Process	http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0016/427021/EDG03-Mining,-Rehabilitation-and-Environmental-Management-Process-Guide-UPDATED-April-2012.pdf
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Spatial Information Exchange (SIX) Viewer	https://six.nsw.gov.au/wps/portal).
Office of Environment and Heritage Vegetation Information Systems database	http://www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm)
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