Addendum to NSW Biodiversity Offsets Policy for Major Projects

Upland swamps impacted by longwall mining subsidence

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ISBN 978 1 76039 625 1
OEH 2016/0766
December 2016

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Introduction

This policy will operate as an addendum to the Biodiversity Offsets Policy for Major Projects (BOP). It must be read in conjunction with the BOP and the Framework for Biodiversity Assessment (FBA), which underpins the BOP by setting out the process for assessing biodiversity impacts and determining offset requirements for those impacts.

The BOP, which commenced on 1 October 2014, applies to most impacts on biodiversity that may be caused by major projects, with a focus on the clearing of native vegetation. However, there are some impacts that the BOP explicitly does not address, including subsidence associated with mining developments.

This addendum extends the BOP to the calculation and provision of biodiversity offsets for the subsidence impacts of longwall coal mining on upland swamps and associated threatened species.

Longwall mining is an underground coal mining technique that is common in NSW. Subsidence refers to the sudden or gradual caving in or sinking of an area of land.

Longwall mining may cause subsidence, which can in turn impact on upland swamps. This policy outlines a clear and consistent approach to:

- identifying subsidence-related impacts on upland swamps
- calculating and securing offsets for swamps impacted by longwall mining subsidence.

It aims to provide certainty for government, industry and the community about the way that the impacts of longwall mining on upland swamps will be addressed.

Objectives

This policy shares the three key objectives of the BOP:

1. to provide clear, efficient and certain guidance for stakeholders
2. to improve outcomes for the environment and communities
3. to provide a practical and achievable offset scheme for proponents.

Further guidance on these objectives is provided in the BOP (pages 7–8).

Scope and application

This addendum to the BOP applies to state significant development proposals for longwall mining underneath upland swamps, and should be read in conjunction with the BOP and the FBA.

As the BOP applies solely to the clearing of native vegetation, it assumes total loss of biodiversity from clearing activities once development consent is granted (see Figure 1 in the BOP for a visual illustration).

Subsidence impacts on upland swamps are inherently more uncertain than the clearing of native vegetation and it takes time and monitoring to ascertain whether impacts have occurred. This means that this addendum applies beyond the development application stage of a major project and requires an adaptive management approach to environmental consequences throughout the life cycle of a major project that involves longwall mining underneath upland swamps.

Definitions

The definitions outlined in the BOP and the FBA apply to this policy.

Upland swamps are perched freshwater wetlands that occur in shallow basins of low hills or mountains. Examples include Coastal Upland Swamps, Newnes Plateau Shrub Swamps, Montane Peatland and Swamp, Blue Mountains Swamps and Temperate Highland Peat Swamps on Sandstone.

Relevant legislation or other mandating instruments

The BOP is not currently implemented in legislation. The BOP commenced a transitional implementation period of 18 months on 1 October 2014, with the intention that legislation will be introduced to formalise its approach to biodiversity assessment and offsetting in the planning approval process.

It is now intended that the BOP will be implemented in legislation as part of the biodiversity reforms.

How the policy will work

The policy principles of the BOP continue to apply

The overarching principles, definitions and policy settings of the BOP and the FBA are all directly applicable to this addendum. This includes the principle that biodiversity offsets sit within the assessment hierarchy of 'avoid, minimise, offset'. Offsets should only be used to compensate for impacts when all feasible measures have first been taken to avoid and minimise those impacts.

The FBA provides clear guidelines for the avoidance and minimisation of impacts to biodiversity values during each stage of a project life cycle.

Proponents must prioritise avoiding and minimising the impacts of mining on all biodiversity values, including upland swamp ecological communities. This should not only occur in the planning phase of a project, but throughout its entire life, including the operational phase.

Figure 1 below illustrates this iterative process with regard to longwall mining and upland swamps.

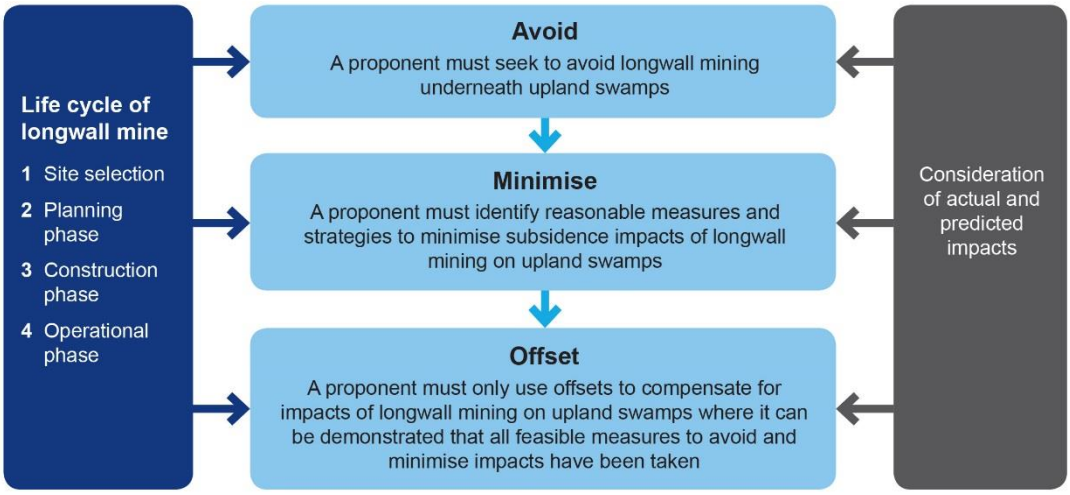

Figure 1: Assessment hierarchy for longwall mining and upland swamps. Throughout the life cycle of a longwall mine, proponents must consider the actual and predicted impacts of longwall mining and prioritise avoiding and minimising the impacts of mining on all biodiversity values.

The FBA also identifies impacts that may be considered severe enough to prevent a project going ahead, known as 'impacts that require further consideration'. The BOP states that these impacts include those likely to cause extinction of a species from a local area or reductions in vegetation bordering streams and rivers.

If a project proposes to have an impact requiring further consideration, the prima facie position is that a project should not proceed given the severity of the impact. The consent authority may, however, consider if there are other factors that might allow the project to proceed with these impacts, including social and/or economic benefits of a project and if the impact can be appropriately ameliorated through additional conservation measures.

The other principles of the BOP are:

- offset requirements must be based on a reliable and transparent assessment of losses and gains
- offsets must be targeted to the biodiversity values being lost or to higher conservation priorities
- offsets must be additional to other legal requirements
- offsets must be enduring, enforceable and auditable
- supplementary measures can be used in lieu of offsets when offsets are not available.

This addendum outlines an approach to ensuring that offset requirements for upland swamps impacted by mining subsidence are based on a reliable and transparent assessment of losses and gains.

Calculating and securing offsets based on predicted impacts

Negligible environmental consequences

Where *negligible environmental consequences* for upland swamps are predicted, a proponent is not required to quantify or demonstrate that they can legally secure an offset prior to approval of an extraction plan.

Negligible environmental consequences is considered to mean one or more of the following:

- negligible change to the shallow groundwater regime of a swamp compared with control swamps
- negligible change to the composition or distribution of swamp dependent vegetation communities and threatened species.

Greater than *negligible environmental consequences* includes one or more of the following:

- a shallow groundwater level within swamp sediments lower than the baseline level at any monitoring site within a swamp (in comparison to control swamps)
- a rate of shallow groundwater level reduction post-mining that exceeds the rate of shallow groundwater level reduction during the baseline period at any monitoring site (measured as average millimetres per day during the recession curve).

Negligible environmental consequences is focused on groundwater as the best and most certain indicator of whether there will be an impact on the ecological community, as swamps are water-dependent ecosystems. If the shallow groundwater regime within swamp sediments is impacted during, or within 12 months after, mining operations, it is likely that the groundwater-dependent vegetation community and threatened species that comprise the swamp community will also be lost over time.

If consent is granted, then conditions of consent must include performance measures preventing greater than *negligible environmental consequences*. Monitoring is required to detect impacts, to measure performance and to ensure compliance. It is essential to manage the risk that actual impacts exceed predicted impacts. Monitoring is discussed in further detail below.

Where predictions exceed negligible environmental consequences

If it is predicted that upland swamps are likely to experience greater than *negligible environmental consequences* as a result of mining subsidence, conditions of consent will require that, on the approval of an extraction plan, a proponent must demonstrate a legal ability to secure offsets for the swamps to be undermined in that extraction plan, as calculated using the FBA.

Monitoring the environmental consequences of mining on upland swamps

The impacts of subsidence on upland swamps are difficult to predict, primarily because of time lags before environmental consequences are fully expressed.

Primary monitoring

Hydrological monitoring provides the most useful means for determining impacts within a timeframe suitable for regulatory and operation decision making (IESC 2015-068) because changes in hydrology can be detected relatively quickly. Monitoring of shallow groundwater levels in swamps is therefore likely to be the most important measure for early detection of impacts.

The primary focus of monitoring in this policy is therefore the piezometric measurement of the effect of mine subsidence on the shallow groundwater regime that supports the upland swamp vegetation communities and associated threatened species. Upland swamps will be subject to natural fluctuation of groundwater levels, just as ecological communities will be subject to climatic variation. Monitoring of the swamps is not intended to trigger offset requirements for natural climatic variation. By monitoring undermined swamps and control sites, the variation between sites can be measured. An offset requirement will only be triggered when there is a significant difference in the variation between sites that coincide with mining activity.

A minimum of two years pre-mining piezometric data should be obtained at both control and potentially impacted upland swamps and used to establish the baseline shallow groundwater regime in every swamp within 400 metres of longwall mining. Where less than two years of pre-mining data is available, then a more conservative assessment of the sensitivity of the feature to potential impacts must be applied.

A monitoring program that incorporates these elements is referred to as a Before – After – Control – Impact (BACI) design. A BACI design must be used for the monitoring program to distinguish impacts from mining from natural seasonal or climatic variation. The monitoring program should also seek to identify any positive or negative trends in groundwater, particularly in the two years before and 12 months after mining. The use of control sites to understand natural variability should be complemented by mine-site specific rainfall and evaporation data to provide a meteorological context for interpreting swamp groundwater levels.

If a significant variation in groundwater levels is detected (i.e. a shallow groundwater level lower than the baseline at any monitoring site, or a rate of reduction that exceeds the rate of reduction during the baseline monitoring period), the results must be immediately reported to the consent authority and referred to the independent expert panel to determine if a requirement for securing offsets has been triggered, and advise on the extent of offsets required.

Secondary monitoring

Direct monitoring of the ecology of swamps (such as loss or change in vegetation type, impacts on identified upland swamp dependent threatened species or invertebrates, impacts on soil stability or erosion) is valuable. It may inform the understanding of the timing and extent of these impacts following changes to the shallow groundwater regime, and inform any adaptive management processes. The monitoring of upland swamp vegetation types and dependent threatened species should focus on those reliant on the shallow groundwater aquifers within swamps, such as those described in the relevant Scientific Committee determinations. For threatened species, the Giant Dragonfly, Blue Mountains Water Skink and *Boronia deanei* are examples of species that are reliant on upland swamp vegetation types in Newnes Plateau Shrub Swamp communities.

It can take time for ecological responses to a mining-induced change in environment to occur and be detected and this may be too long to inform an effective regulatory response. For this reason, direct monitoring of ecology may not be required for all mining developments.

However, proponents may choose to undertake this secondary monitoring to support the interpretation of their primary monitoring data, when it is submitted to the independent panel.

Independent expert panel

A standing independent expert panel will be appointed by the Office of Environment and Heritage (OEH) and funded by proponents to provide expert advice to the consent authority on the environmental consequences of mining underneath upland swamps.

The aim of the panel is to ensure that monitoring of impacts on upland swamps is rigorous and scientifically robust.

The panel will review and evaluate a proponent's proposed approach to monitoring that is outlined in an extraction plan. It will also review and evaluate data collected through primary and secondary monitoring by the proponent and presented to the consent authority as evidence of the impact of mining activities on undermined swamps, as well as auditing that monitoring.

Panel members must be independent of government and the resources or mining sector, and be experts in relevant fields, such as hydrogeology, zoology, or upland swamp ecology.

OEH and the Department of Planning and Environment (DPE) will develop terms of reference for the independent panel.

Calculating the maximum predicted offset liability

Where it is predicted that mining will cause greater than *negligible environmental consequences*, each extraction plan for longwall mining must calculate the *maximum predicted offset liability* for the swamps to be undermined in that extraction plan.

It is recognised that the impact of altering the hydrological regime within upland swamps is not equivalent to removing all vegetation. However, this impact is likely to result in total loss of the upland swamp ecological community in the long-term as a result of loss of the critical ecosystem functions. When predicting the offset liability it is the loss of the upland swamp ecological community, including the threatened species that rely on that community, which must be calculated to determine the offset liability.

The offset liability should be assessed as a potential maximum (i.e. worst case scenario), given the uncertainty in the prediction of subsidence and consequent high likelihood of significant environmental impacts for upland swamps. This is consistent with the precautionary principle. Upland swamps are features of high environmental value that are at high risk of impact from mining related subsidence which, once expressed, are permanent and irreversible.

For each extraction plan, a *maximum predicted offset liability* must be calculated for the total area of upland swamps predicted to be subject to greater than *negligible environmental consequences*. This will be the ecosystem credits calculated using the FBA equivalent to the predicted loss of the upland swamp vegetation types present in those swamps. Where relevant, species credits for threatened species known or predicted to occur within the swamps must also be calculated.

Securing an appropriate offset for predicted impacts

Alongside the application for each extraction plan, the proponent must prepare a Biodiversity Offset Strategy that demonstrates how it can fully meet the requirements of its *maximum predicted offset liability* for the required ecosystem and species credits, applying the rules of

the BOP. If a proponent demonstrates that a like-for-like offset cannot be secured, other options under the variation rules of the BOP or supplementary measures may be considered.

Prior to approval of an extraction plan, the proponent must demonstrate to the consent authority how it will legally secure its *maximum predicted offset liability* for all mining subject to that plan – e.g. how it will purchase the relevant offset site, purchase biodiversity credits from a landholder or arrange for relevant supplementary measures to be carried out. Suitable means of demonstrating this include ownership of the land or a long-term option to purchase, or provision of an adequate security bond or deposit. Conditions of development consent may also require that a suitable bank of offsets is established early in the life of the development, and then maintained as a rolling bank of offsets as appropriate.

Offsets identified in the Biodiversity Offsets Strategy are only required to be secured or credits retired once the impacts of mining are confirmed through monitoring and reviewed by the independent expert panel. Where it is predicted that a partial impact to an upland swamp is likely, then only the portion of the swamp likely to experience greater than *negligible environmental consequences* should be included in the offset calculation.

The BOP is accredited under the Assessment Bilateral Agreement between the NSW and Commonwealth governments. Further consideration and consultation may be required for swamp communities that are listed under the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* if sufficient like-for-like offsets cannot be identified in advance of mining activities commencing under an extraction plan.

Consideration of actual and predicted impacts

The independent expert panel will consider monitoring data 12 months after mining passes within 400 metres (or within the 20 millimetre subsidence contour, whichever is greater) of an upland swamp, to advise the consent authority whether a greater than *negligible environmental consequences* has occurred, and whether offsets should be realised. The 20 millimetre subsidence contour reflects the minimum level of subsidence that can be detected.

If monitoring demonstrates that greater than negligible change to the shallow groundwater regime occurs, and the shallow groundwater does not return to its natural regime within 12 months, then the proponent must meet the full calculated value of the offset for that swamp equivalent to that impact within six months of the completion of the monitoring review by the independent expert panel.

If the independent expert panel assesses that the monitoring data demonstrates that a predicted groundwater impact has not occurred within 12 months of completion of all mining within 400 metres of a swamp, or has occurred in only part of that swamp, then the full offset associated with the swamp, or part of that offset, may be deducted from the project's overall *maximum predicted offset liability*.

When actual impacts are greater than predicted impacts

It is possible that the actual impacts of mining on the shallow groundwater regime may be greater than predicted impacts.

As described above, all proponents will be required to monitor impacts on the shallow groundwater regime. Where the independent expert panel concludes that monitoring demonstrates that the actual impact is greater than predicted, more than negligible and that the shallow groundwater does not return to its natural regime within 12 months, the proponent must identify and retire an offset equivalent to the actual impact within six months.

This requirement will be specified in conditions of consent.

Application for reduction in the *maximum predicted offset liability*

The independent expert panel will consider any applications for a reduction in the *maximum predicted offset liability* and provide advice to the consent authority. Any application for a

reduction in the *maximum predicted offset liability* must be supported by monitoring data collected in a manner accepted by the panel. Any such application must be made between one and five years of the completion of mining within 400 metres of the upland swamp.

Acquittal of offsets

The proponent may, at any time, acquit the full value of the offset, by purchasing and retiring credits, or through supplementary measures in accordance with the BOP. If this occurs prior to the undermining of any swamps, the proponent may negotiate with the consent authority about the approved monitoring program.

Re-crediting of retired offsets

The independent expert panel will consider any applications for the re-crediting of retired offsets based on primary and secondary monitoring and provide advice to the consent authority.

If ongoing monitoring of the shallow groundwater regime within an upland swamp beyond the time when an offset is secured demonstrates that the groundwater has returned to a natural regime (as described by the two year, pre-mining baseline), then the proponent may apply for a reduction in a future offset liability under this framework. The application will be considered by the independent expert panel and determined by the consent authority. Any such application must be made within five years of the completion of mining within 400 metres of the upland swamp.

If less than two years of baseline data on the shallow groundwater regime was collected for any upland swamp, the proponent cannot apply at a later date for a reduction in the future offset liability through re-crediting.

Applications based on secondary monitoring data must be made not less than five years after the completion of mining within 400 metres of the upland swamp.

Any application for a reduction in a future offset liability must be supported by monitoring data collected by proponents and must be reviewed by the independent expert panel prior to determination by the consent authority.

Application

This addendum will be applied to all new applications for development consent or proposed modifications of development consent for longwall mining that may cause subsidence impacts on upland swamps.

This framework will be applied, where reasonable and feasible, to mines that have already submitted a development application or proposed modification of development consent for longwall mining that may cause subsidence impacts on upland swamps.

Where projects have existing development consent for longwall mining that may cause subsidence impacts on upland swamps, the framework will be applied to all new extraction plans where reasonable and feasible.

Appendix A: Decision Flow Diagram