

PAC request for additional information from DECCW (12/01/2010)

Questions:

- 1) Some of the swamps on the Woronora Plateau and Maddens Plains have been monitored for the last 25 years. This monitoring program is of international importance in assessing impacts of climate change. The PAC requests information on this program from DECCW.**

The southern portion of Northcliff mine domain overlaps the scientifically important Dharawal upland swamp study area. This area is part of an important reference area for research on edaphic control of wetlands, fire-driven vegetation dynamics, and climate change impacts on wetlands. A network of vegetation monitoring sites was established in 1983 and has been monitored in subsequent decades (most recently in 2009). The sites are serviced with detailed temporal data on plant species composition, vegetation structure, soil chemistry and fire history, providing a temporal sequence of data with few parallels worldwide. The data were used initially to produce insights into the role of edaphic gradients on floristic diversity (Keith & Myerscough 1993) and characterisation of vegetation patterns (Keith 1994). The monitoring data were subsequently applied to test the power of plant functional traits to predict vegetation change in response to fire regimes (Keith et al. 2007). This was the first comprehensive empirical test of an approach that is used internationally in the development of fire management strategies for natural areas. In more recent work within the study area, the dynamics of swamp-woodland boundaries was examined in relation to trends in climatic moisture over the last four decades of the 20th century (Keith et al. 2009). The results demonstrated high sensitivity of swamp boundaries to decadal changes in climatic moisture (swamp area varied within subcatchments by 0-30% over the 40-yr assessment period) and have important global implications for wetland persistence under climate change. The influence of regional trends in evapotranspiration on local hydrology appears to be a critical factor mediating swamp boundary dynamics (Keith et al. 2009).

Approximately half of the 60 monitoring sites, one of two intensive swamp gradsects and three of ten subcatchments in the climate study occur within the southern portion of the Northcliff mine domain. The remainder of the network of sites and subcatchments occur to the east. In addition to the significant contribution of these studies to knowledge underpinning natural resource management, the established research infrastructure (including historical data sets, permanently marked field sites and infrastructure) makes a valuable contribution to future studies including:

- continued development of models of fire - vegetation dynamics, with re-monitoring planned to follow the next significant wildfire event;
- understanding and predicting climate change impacts on wetlands, with ongoing research and assessments planned as climate change plays out;
- use as a reference area for evaluation of subsidence effects on under-mined swamps in the region.

Alternative research sites are not available due to the irreplaceable body of historical data obtained from research investments since 1983.

The viability of this internationally significant research is contingent on maintaining the hydrological integrity of swamps throughout the climatic gradient that extends east to west across the study area from Maddens Plains to the headwaters of Stokes and Four Mile Creeks and their tributaries. If hydrological integrity is disrupted by underground mining in some part of this gradient, the experimental design will be confounded, precluding valid attribution of observed changes in swamps to climate change, as opposed to changes in hydrology initiated by underground mining. **If mining were to impact the swamps in this study area, it would compromise the scientific values of over 25 years of research.**

The Dharawal upland swamps that are part of the study area are identified in the Swamp matrix in the column 'Scientific Research Importance', provided as answer to question 2, and on Map 1 'Dharawal Upland Swamp Scientific Research Area'.

DECCW considers that the following criteria can be used to identify swamps of special significance, having regard to scientific research. The identified swamps:

- a) Are an important reference area for ecosystem and landscape processes that operate over a larger region. Examples include:
 - climate change
 - landscape fire mosaics
 - landscape hydrological processes
 - landscape faunal movements
 - spatial vegetation dynamics

- b) Contain features or resources for which few alternative opportunities exist for scientifically valid study, for example:
 - Deep deposits or long chronological sequences of peat
 - Occurrences of species, assemblages of species or combinations of environmental conditions that are scarce in the landscape
 - Hydrological fluxes of detectable magnitude

- c) Are part of a network of research sites, in which the damage, degradation or uncontrolled change to component sites would compromise the scientific validity of inferences drawn from the study, for example through:
 - reduced replication
 - confounding of treatments or controls
 - causing unbalanced design
 - disruption or damage to research infrastructure
 - precluding future collection of data consistent with specifications of previously collected data

- d) Are part of a research project providing important insights required for:
 - assessment of management of natural resources.
 - understanding long-term change in the landscape and/or biota

Can DECCW provide a comparison table showing the upland swamps it considers are of special significance (grouped into categories by reason(s) for this status) against the information provided for these same