ASSESSMENT REPORT

Ginkgo Mineral Sands Project (DA 251-09-01 Mod 8) and
Snapper Mineral Sands Project (MP 06_0168 Mod 3)
Section 75W Modifications

1 BACKGROUND

Bemax Resources Limited (Bemax) owns and operates a large integrated mineral sands mining operation in the far west of NSW (see Figure 1).

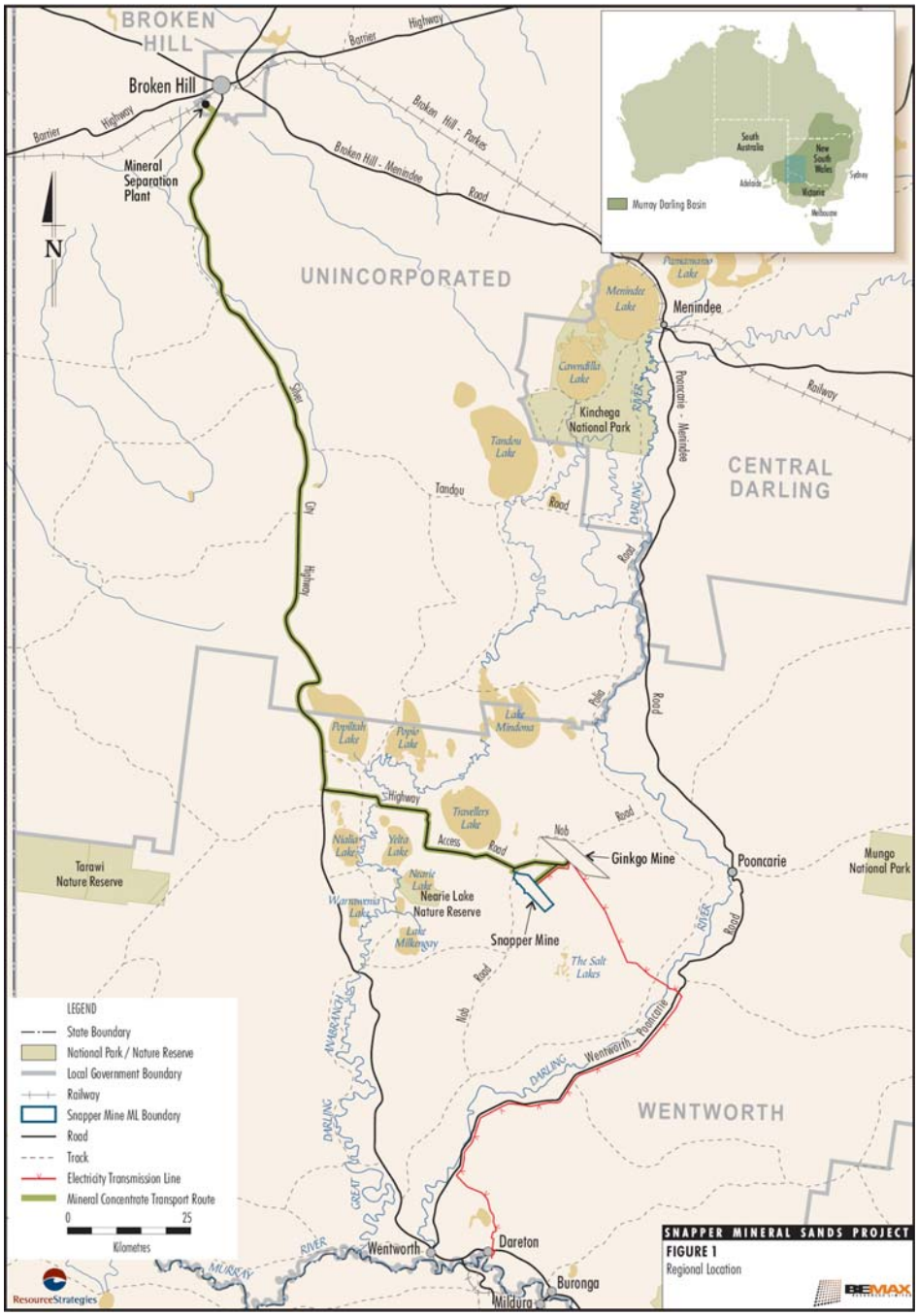

Figure 1: *Bemax mineral sands mining operation.*

The operation comprises the:

- Ginkgo mine near Pooncarie, approved by the Minister in 2002 (DA 251-09-01). Under the consent the mine is allowed to extract up to 13 million tonnes per annum (Mtpa) of mineral sands ore to produce an average of 450,000 tonnes per annum (tpa) of mineral sands concentrate, over a period of 11 years;
- Snapper mine (approximately 10 kilometres south-west of Ginkgo), approved by the Minister in 2007 (MP 06_0168). The Snapper mine has a similar production rate as Ginkgo, with a mine life of 18 years. Construction commenced in August 2008 but delays with dredge construction have pushed back the commencement of ore processing; and
- Broken Hill Mineral Separation Plant (MSP), approved by the Minister in 2002 and since modified to receive and process mineral sands concentrate from both mines, which are located 170 kilometres south of Broken Hill (see Figure 1).

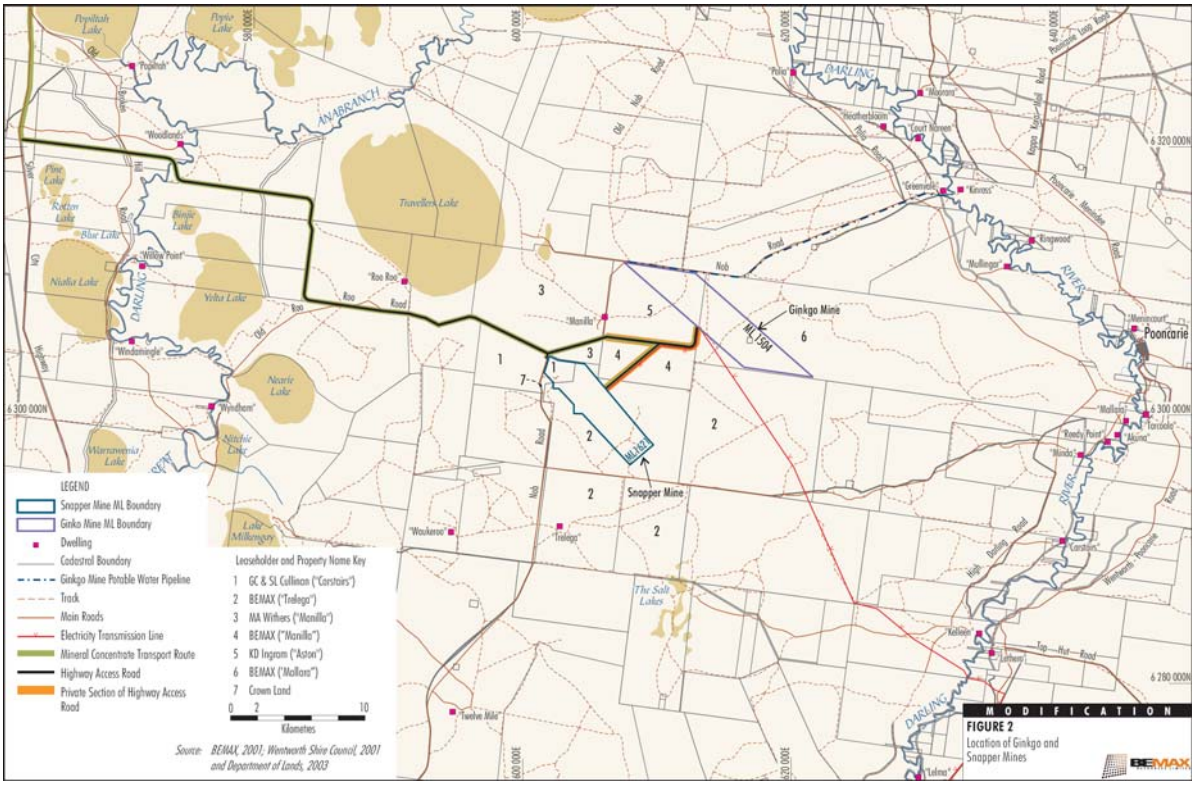

***Figure 2**: Ginkgo and Snapper Mines*

Resource modelling by Bemax has also found that the average ore grades are lower than originally estimated and this, combined with a higher ore reserve, has changed the estimated mining schedule for the two mines. Following detailed mine planning and a review of approved operations, Bemax has identified ways (including alternative mining methods and other modifications) to increase the annual production of heavy mineral concentrate (HMC) at Snapper and improve the efficiency of its operations. The continuing economic challenges for Bemax, including the US/Australian dollar exchange rate, depressed global markets and reduced demand for its products are the key drivers behind Bemax's review of its operations.

2 PROPOSED MODIFICATIONS

On 27 April 2010, Bemax asked the Minister to modify the terms of its project approval for the Snapper mine and development consent for the Ginkgo mine, using section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act):

The proposed modifications are mainly associated with changes to the mining rate and mine plan at Snapper. There are also some changes to the mine plan at Ginkgo and changes to the transport of high-grade ore and HMC between the two mines. A summary of the proposed modifications follows.

Snapper Mine

Bemax is seeking to increase the maximum annual production of HMC at Snapper from 450,000 tpa to 621,000 tpa. This would require the following modifications:

- increasing the total ore mined from 117 Mt to 122 Mt;
- increasing the ore mining rate from 8.2 Mtpa to 9.1 Mtpa;
- constructing a larger HMC treatment facility;

- increasing the water supply capacity of the reverse osmosis plant;
- associated increases in the operational mining areas (including an increase to the HMC treatment facility, soil stockpile areas and addition of a temporary HMC stockpile area adjacent to the mine path); and
- reducing the life of the mine by 1 year, from 16 years to 15 years.

Bemax is also seeking approval for changes to the Snapper mine plan, including:

- changing the mining method in a section of the mine from single-pass to double-pass, with a minor change to the extent of the mine path (see Figures 3 and 4);
- using an electric conveyor system and/or dry mining truck fleet for dry overburden replacement instead of overburden slurrying; and
- increasing the active mining area (from approximately 1,600 to 3,400 metres (m)) to enable longer time for deposited sand residue to dry and therefore improve the stability of on-path overburden emplacement behind the dredge pond (see Figure 5). This would increase the footprint of the off-path overburden emplacement from approximately 145 to 215 hectares (ha) and also increase the height of the final mine landform from between 2 and 4.5 m, to approximately 10 m.

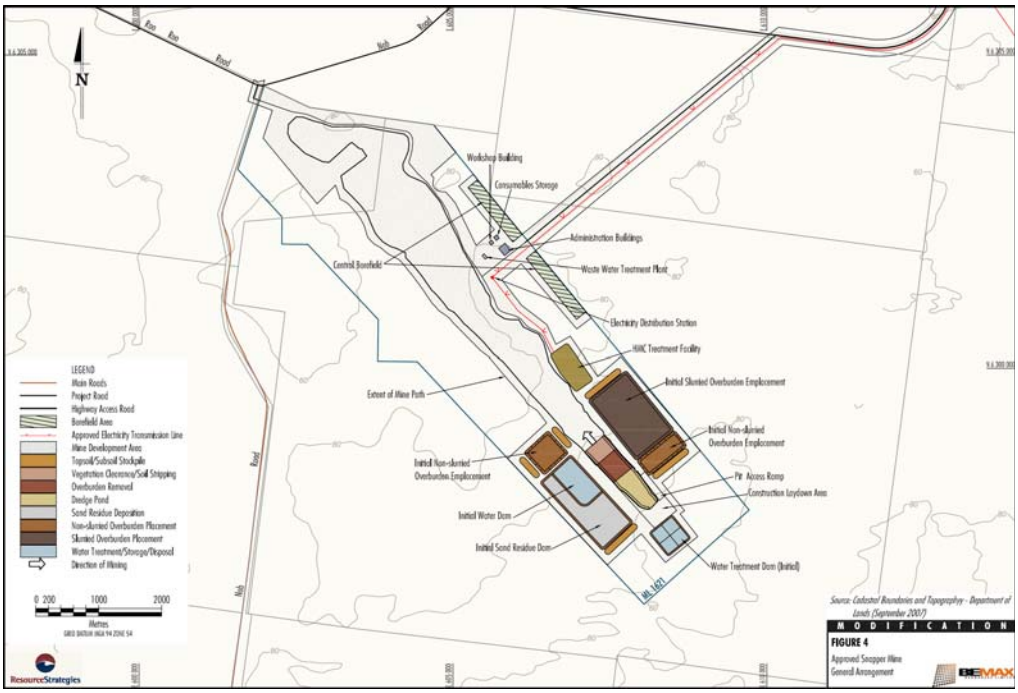

Figure 3 *– Approved Snapper Mine*

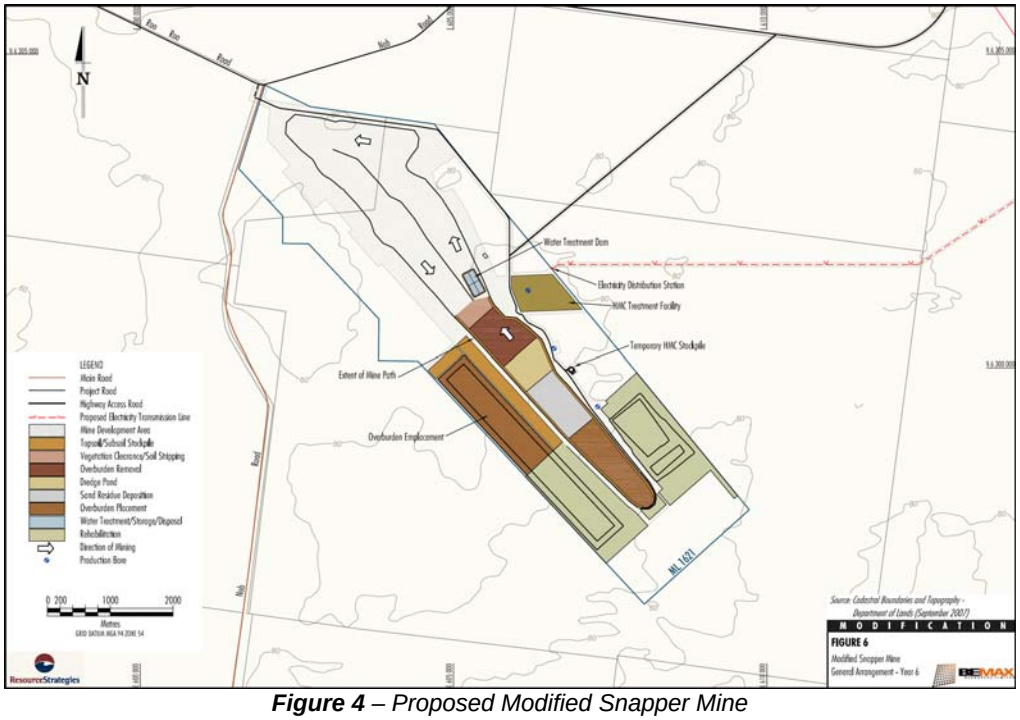

Figure 4 *– Proposed Modified Snapper Mine*

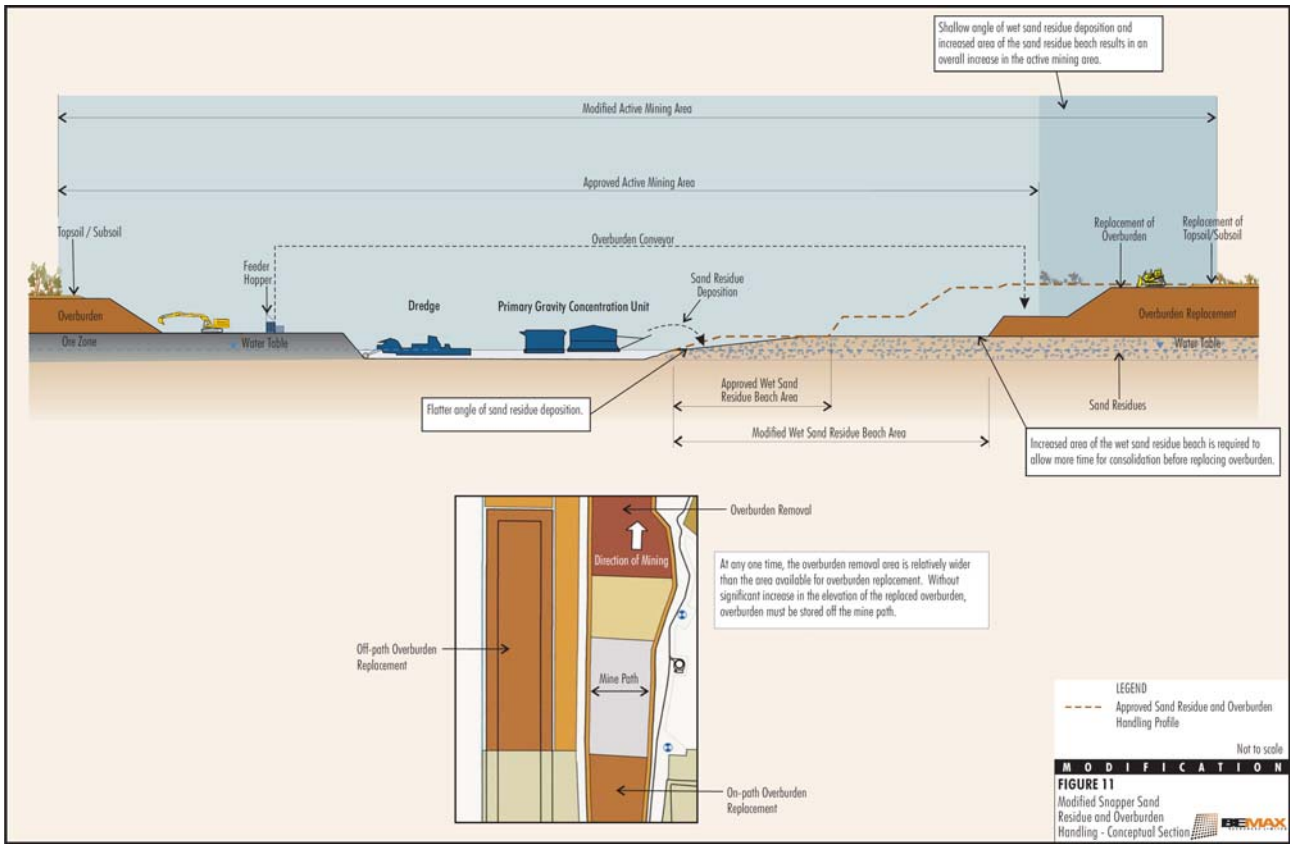

Figure 5 *– Proposed Modifications to Active Snapper Mining Area*

Other modifications at Snapper sought by Bemax include:

- changing the alignment of the electricity transmission line to the Snapper Mine (Figure 4); and
- sourcing saline groundwater from the deeper, higher yielding, Lower Olney Formation aquifer instead of the shallow Loxton-Parilla aquifer, with an associated reduction in the number of bores.

Ginkgo Mine

The proposed modifications at Ginkgo include increasing the total ore mined from 128 Mt to 145 Mt and increasing the life of the mine from 12 years to 14 years.

The proposed modifications would not change Ginkgo's approved:

- mining methods (which includes a double-pass) or rate;
- processing methods or rate; or
- maximum rate of concentrate transport to the MSP.

High-Grade Ore Transport

As a contingency for delays associated with the Snapper mine dredge construction and commissioning, Bemax has sought approval for the continued trucking of an additional 2 Mt of high-grade ore from the Snapper Mine to the Ginkgo Mine until December 2011 (ie over and above the already-approved transport of 2 Mt of ore until December 2010). This would not increase the maximum approved rate of transport of 4 vehicles (2 laden and 2 unladen) per hour.

HMC Transport

To provide flexibility with the construction of the HMC treatment facility at Snapper, Bemax has sought approval for the trucking of HMC between the two mines using vehicles returning from the MSP, at a maximum rate of 4 vehicle movements per hour. Depending on the location of the HMC treatment facility, the modification seeks approval both for the treatment of Ginkgo's HMC and disposal of resulting treatment waste at Snapper Mine, and vice versa.

The proposed modifications would not change the approved mining and processing methods at the two mines, nor the maximum rate of concentrate transport from both mines (combined) to the MSP. The proposal would result in a minor expansion to the mine path at Snapper and a minor increase (approximately 81 hectares or 5%) in the disturbance footprint of the mine.

3 STATUTORY CONTEXT

Approval Authority
The Minister was the consent and approval authority for the original development consent/project approval for the two mines, and is consequently the approval authority for these modification applications. However the Director Mining & Industry Projects may determine the applications under the Minister's delegation of 25 January 2010.

Section 75W
The proposed changes associated with the modification applications would not change the purpose of the development for which consent or approval was originally granted, namely as open cut mineral sands mines. The proposal involves making some minor changes to the existing and approved development, essentially to improve the efficiency of the mines and to ensure stability of the rehabilitated mine path.

Under clause 8J(8)(b) of the *Environmental Planning and Assessment Regulation 2000,* section 75W of the EP&A Act applies to any modification of a development consent granted by the Minister under *State Environmental Planning Policy No 34—Major Employment-Generating Industrial Development* (SEPP 34). The Ginkgo development consent was granted under SEPP 34; and must therefore be modified under section 75W of the EP&A Act.

The Department is satisfied that the proposed changes to both mines can be properly characterised as modifications to the approved development under the existing consent and approval, rather than new projects in their own right, and can be approved under section 75W of the EP&A Act.

Consultation
Under section 75W of the EP&A Act, the Department is not required to exhibit the modification applications or undertake consultation. However, the modification applications were referred to the Department of Environment, Climate Change and Water (DECCW), DECCW's NSW Office of Water (NOW), Industry & Investment NSW (I&I NSW) and the landowner of '*Manilla*', none of which objected to the proposal.

4 ASSESSMENT

4.1 Flora and Fauna
The EA estimates that the proposal would disturb approximately 81 ha in addition to the approved Snapper mine footprint, an increase of approximately 5%. This includes up to 20 ha outside the mining lease associated with the realignment of the electricity transmission line, the majority of which is located within an existing biodiversity offset area. No additional disturbance is proposed at Ginkgo.

Bemax currently implements a range of measures which relate to flora and fauna, including a suite of management plans and a biodiversity offset. These management measures would continue to apply for the modified project. The net change in disturbance of the different vegetation communities occurring at the site compared with the approved mine is shown in Table 1, below.

Table 1: *Vegetation Communities - Changes to Approved Impacts*

Vegetation Community		Approved Snapper Mine Disturbance Area (ha) [1]	Modification Disturbance Area (ha) [2]	Net Modification Disturbance Area (ha)
1	Black Box Woodland	0	1	1
2	Black Oak-Rosewood-Wilga Woodland	1,075	1,045	-30
3	Chenopod Mallee Woodland/Shrubland	30	40	10
4	Irregular Dune Mallee Shrubland	0	5	5
5	Turpentine Shrubland	0	0	0
6	Bluebush Shrubland	200	200	0
7	*Austrostipa* Grassland	325	410	85
8	Samphire Shrubland	0	0	0
9	Linear Dune Mallee Shrubland	0	10	10
TOTAL AREA		**1,630**	**1,711**	**81**

The EA found that three additional vegetation communities would be disturbed by the modified project, namely Black Box Woodland (1 ha), Irregular Dune Mallee Shrubland (5 ha) and Linear Dune Mallee

Shrubland (10 ha). The majority of surface disturbance would occur within grassland, with an overall reduction in the disturbance of woodland compared with the approved project.

Based on a review of previous flora surveys for the two mines, along with a review of current databases, the EA found that no threatened flora species, populations or endangered ecological communities listed under either State or Commonwealth legislation would be affected by the modification.

The EA also includes a review of fauna surveys undertaken at the two mines, both during the original assessments and in pre-clearing surveys. No critical habitat or endangered fauna populations listed under either State or Commonwealth legislation were found to occur within the development area. The fauna surveys have identified a total of 9 threatened fauna species in the Snapper mining lease and an additional 2 threatened fauna species in the offset area, including:

- Western Blue-tongued Lizard;
- Jewelled Gecko;
- Black-breasted Buzzard;
- Major Mitchell's Cockatoo;
- Hooded Robin;
- Little Pied Bat;
- Greater Long-eared Bat;
- Yellow-bellied Sheathtail-bat;
- Inland Forest Bat;
- Crowned Gecko (within offset); and
- Grey Crowned Babbler (within offset).

All species are listed as vulnerable under the *Threatened Species Conservation Act 1995* and the Greater Long-eared Bat is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Although the proposal would disturb an additional 81 ha of land, the EA notes that the majority is grassland and the disturbance of mixed woodland habitat would actually reduce by 29 ha. The EA for the original approved Snapper mine includes assessments of significance, which found that the project would not significantly impact any of these species. The measures Bemax currently implements to mitigate impacts on native fauna include pre-clearing protocols, monitoring, vehicle management (to minimise the risk of accidental strike) and employee education.

The Department and DECCW are satisfied that the proposal is unlikely to have a significant impact on flora and fauna, subject to mitigation measures including biodiversity offsetting (see below).

Biodiversity Offset

As a biodiversity offset, Bemax proposes an additional area comprised of 95 ha of Irregular Dune Mallee Shrubland and 160 ha of Black Oak-Rosewood-Wilga Woodland, to offset the additional 81 ha to be disturbed by the modification. The combined offset for the Snapper mine would therefore consist of the following:

Table 2: *Proposed Biodiversity Offset*

Vegetation Community	Total Area Disturbed (ha)	Proposed Offset Area (ha)
Black Box Woodland	1	24
Black Oak-Rosewood-Wilga Woodland	1,045	2,180
Chenopod Mallee Woodland/Shrubland	40	136
Irregular Dune Mallee Shrubland	5	523
Bluebush Shrubland	200	331
Austrostipa Grassland	410	574
Linear Dune Mallee Shrubland	10	1,703
TOTAL	**1,711**	**5471**

The EA found that the proposed offset, in combination with the existing approved offset, contains native vegetation communities of the same type as those to be disturbed by the modification. DECCW and the Department are satisfied that the proposed offset would effectively compensate for the biodiversity impacts of the proposed modifications, and meet the "improve or maintain" biodiversity guidelines.

Conclusion

The Department and DECCW are satisfied that Bemax has adequately assessed the potential flora and fauna impacts of the proposal, and that Bemax has sought to avoid or minimise the impacts of the modifications on flora and fauna (eg by restricting lateral disturbance by vertically increasing components of the mine such as overburden emplacements). Bemax currently implements a range of measures to manage the impacts of the existing mine on native flora and fauna, and proposes to continue the implementation of its suite of management plans to accommodate the modified developments.

The assessment indicates that the proposal, without any offsetting measures, would result in flora and fauna impacts, most notably the removal of 81 ha of native vegetation.

The Department and DECCW are satisfied that these impacts are able to be mitigated and/or offset to an extent such that the proposal could be considered to 'improve or maintain' biodiversity values of the area over the medium to long term. To achieve this, the Department has recommended conditions requiring Bemax to review and implement its existing management plans and offset bonds for the project.

4.2 Waste Management and Rehabilitation

The proposed modifications would increase the total ore mined at the two mines from 245 Mt to 267 Mt, however the total HMC produced would decrease from 10.7 Mt to 8.9 Mt. This change equates to an increase in total waste product of approximately 23.8 Mt (or 10%) at the two mines. It should be noted that the additional ore to be mined at Ginkgo is due to an overlap between the two limbs of the previously approved double-pass mining method (which Bemax had not previously accounted for) and resultant double-handling, rather than a deeper or broader mining footprint.

To accommodate the additional waste material at Snapper, Bemax proposes an expansion of the off path overburden emplacement (without increasing its approved height), along with an increase in the height of the rehabilitated mine path. Bemax has not sought additional storage capacity at Ginkgo as the approved landform would accommodate the total ore to be mined.

In response to queries from the Department and I&I NSW, Bemax advised that the alternatives considered were to significantly increase the height of the rehabilitated mine path (to avoid increasing the disturbance footprint), or create a much larger overburden emplacement area off the mine path (to avoid increasing the height of existing approved landforms). The proposal would not increase the approved 20 m height of the off-path overburden emplacement, nor would the increased height of the mine path (to 10 m) exceed the maximum approved height of the rehabilitated landforms at the mining complex.

As with the approved modification in December 2009, additional sand residue would be deposited at the Ginkgo mine through the processing of an additional 2 Mt of Snapper ore. The EA predicts that the combined volume of sand residue produced by processing a total of 4 Mt of Snapper ore at Ginkgo would be approximately 2.6% above the residue produced at Ginkgo. The characteristics of the sand residue from Snapper ore would be similar to that from Ginkgo ore. Existing waste management principles would apply, particularly with regard to the rehabilitation of the mine.

The Department is satisfied that the increase in overburden emplacement at Snapper would be suitably managed in accordance with existing measures at the approved mine. The Department is also satisfied that the proportional increase in sand residue at Ginkgo (and the equivalent reduction at Snapper) would result in negligible change to the final landform, and through implementation of the mine's rehabilitation strategies the final landform would be stabilised.

4.3 Other Issues

The Department's assessment of other key issues is summarised in Table 3 below.

Table 3: *Assessment of other key issues*

Issue	***Potential Impacts & Consideration***
Water Resources	The proposed modifications have the potential to affect groundwater resources through the change in extraction and recharge of aquifers. The modification to the Snapper mine includes sourcing saline water for its operations from the deeper Lower Olney Formation aquifer and recharging into the upper Loxton-Parilla Sands aquifer through the water disposal dam within the mine path. No change in the use and supply of water at the Ginkgo mine is proposed. The EA predicts the maximum drawdown in the lower aquifer to occur during year 7 of Snapper operations, with a 0.5 m drawdown extending to a radius of 6 km from the mine. The aquifer is predicted to return to pre-mining levels 20 years after mine closure. The nearest registered bore which accesses a freshwater lens on this aquifer is approximately 45 km to the northwest and no drawdown effects are predicted at this distance.

	The EA also considers the cumulative effects of the Ginkgo mine and modified Snapper mine on the Loxton-Parilla Sands aquifer. Mounding of up to 13 m above the groundwater table is predicted to occur beneath Snapper which would counteract the drawdown associated with Ginkgo. The predicted drawdown effect on the nearby Chalky Well and Greenvale Well bores is approximately 5 cm, which is less than predicted for the approved Snapper project. NOW requested further information about the potential water quality impacts due to transferring water sourced from the deeper aquifer to the shallow aquifer. The additional information indicates that the chemical characteristics and geology of the two aquifers are similar. Therefore the potential impacts of the proposed modifications on groundwater quality are predicted to be minimal. The Department is satisfied that offsite groundwater impacts would be unlikely to increase and has recommended that Bemax be required to review its groundwater monitoring program to reflect the proposed modification.
Air Quality	The proposed modifications at Snapper have the potential to increase dust generated at the mine due to an increase in the ore mining rate, active mining area, overall area of disturbance and overburden emplacements. The mining rate and area of disturbance is not proposed to change at Ginkgo, nor is the rate at which ore from Snapper is temporarily trucked to Ginkgo for treatment. The EA includes an assessment of the potential air quality impacts of the modifications by PAE Holmes, based on previous air quality assessments for both mines. The results of monitoring undertaken to date were also reviewed, which indicate that the mine has been complying with its air quality criteria. Air quality modelling predicted that the emissions from the modified mines would continue to comply with DECCW's air quality criteria for PM_{10}, TSP and dust deposition. Bemax would continue to implement a dust management plan to minimise the dust generated at the mine. The measures in this plan continue to be relevant for the modified developments. The Department is therefore satisfied that the impacts of the proposed modifications on air quality would be minimal over the life of the two mines.
Noise	The increased intensity of operations (and associated mining fleet increase) and road transport of the ore and HMC from Snapper has the potential to change the noise environment. The EA includes an assessment of the potential noise impacts of the modification by PAE Holmes, based on previous assessments for both mines. The results of monitoring undertaken to date were also reviewed, which indicate that noise from the two mines is well within noise criteria at surrounding receivers. The EA predicts total sound power levels at the Snapper mine to marginally increase during construction and marginally decrease during operations, as shown below: **Sound Power Level (dB[A])** **Construction** | **Operations** **Approved Snapper Mine** | **Modified Snapper Mine** | **Approved Snapper Mine** | **Modified Snapper Mine** 124.4 | 125.2 | 126.0 | 125.2 The additional vehicles transporting HMC between the two mines are unlikely to increase noise impacts, given that the closest receivers are approximately 4 km from the mine and haul road and that the maximum predicted frequency is less than 1 vehicle every 15 minutes. Bemax has also undertaken to schedule transport activities to avoid the use of multiple vehicles on the road between the two mines. The Department is satisfied that any noise impacts associated with the proposed modifications would be negligible and would not impact on sensitive receivers. The minor changes in operations would be adequately managed by Bemax's existing approval and consent and its noise management practices.
Transport	The proposed modifications would not result in any additional truck movements or impacts to public roads, or require the construction of any additional road infrastructure. As discussed in the noise assessment, the transport of HMC between the two mines, via road trains or AB-triple vehicles returning from the MSP, to a maximum of 4 vehicle movements per hour, would be scheduled such that it would not occur at the same time as transport of ore between Snapper and Ginkgo. The Department is therefore satisfied that the impacts on road users as a result of the proposed modifications would be negligible.

All other issues have been considered by the Department and are considered to have negligible environmental impacts over and above those assessed and approved, and do not warrant further assessment.

5 CONCLUSION

The Department has assessed the modification applications in accordance with the relevant requirements of the EP&A Act. Based on this assessment the Department is satisfied that:

- the proposal is consistent with the provisions of the relevant planning instruments;
- the potential environmental impacts are not significant and can be adequately minimised, mitigated and/or offset;
- the site is suitable for the development; and
- the proposed modification can be carried out in a manner that is consistent with the objects of the EP&A Act, including the principles of ecologically sustainable development.

The Department therefore believes that the modifications are in the public interest and should be approved. The Department has recommended conditions requiring Bemax to review (and update where necessary) its management plans for the two mines, to reflect the proposed modification.

6 RECOMMENDATION

It is RECOMMENDED that the Director, Mining & Industry Projects:

- **consider** the findings and recommendations of this report;
- **determine** that the proposed modifications are within the scope of section 75W of the EP&A Act;
- **approve** the proposed modifications under section 75W of the EP&A Act; and
- **sign** the attached Notices of Modification (Tag A and B).

Howard Reed 14.10.10

Howard Reed
Manager Mining Projects

DKitto 18/10/10

David Kitto
Director, Mining & Industry Projects