

27 April 2018

Michael Pring
Development Director
Landcom
Level 14, 60 Station Street
PARRAMATTA, NSW 2150

Dear Michael,

**Re: Efficacy of the 'Orchid Reserve' and 'Orchid Pollinator Corridors'
in the proposed North Tuncurry Development**

The purpose of this letter is to provide an appraisal of the likely future outcomes for the Critically Endangered Tuncurry Midge Orchid within the proposed 4 hectare Orchid Reserve and the suitability of the Orchid Pollinator Corridors for maintaining pollinator populations within the reserve.

The author undertook investigations on the pollination of the Tuncurry Midge Orchid between 2012 and 2014, with most of the work occurring in 2013 (Bower, 2014). The author is an experienced orchid pollination biologist with 19 scientific papers and many reports on orchid pollination. He is also an accredited Biodiversity Assessment Method assessor (accreditation number BAAS18048).

Tuncurry Midge Orchid Ecology, Habitat and Pollinators

Known populations of the Tuncurry Midge Orchid occur almost entirely in disturbed heath-dominated habitats and are rare to absent in climax vegetation, suggesting it is principally a colonising species that is dependent on periodic habitat disturbance for survival. It favours partially shaded or semi-open habitats, such as the edges of clearings along power lines and patches of scattered shrubs within post sand mining rehabilitation sites. These habitats suggest the Tuncurry Midge Orchid is likely to be a fire ephemeral that flourishes when the habitat opens up after fire and gradually declines as the shrub canopy closes over again.

Natural populations of the Tuncurry Midge Orchid are pollinated by at least five species of Chloropid flies (Bower, 2014). Several studies have shown that other Midge Orchid species have multiple pollinators in the families Chloropidae and Milichiidae (see discussion in Bower, 2014). The limited available data suggests Midge Orchids are specialised for pollination by Chloropids and Milichiids but attract multiple species from these families for pollination. The attraction of multiple

pollinators is an important consideration in relation to the proposed orchid reserve and pollinator corridors at North Tuncurry.

An orchid with multiple pollinators is less susceptible to reproductive failure than more highly specialised orchids that depend on a single pollinator species.

There do not appear to have been any studies on movement and dispersal in Chloropids and Milichiids. However, Chloropid and Milichiid flies are very small, only 2 – 3 mm long, and are relatively weak fliers. Consequently, they are likely to have very small home ranges (less than 20 square metres) and are unlikely to be adapted to fly hundreds of metres between habitat patches. Dispersal of these flies is likely to be slow with population expansion limited to tens of metres per year within suitable habitat. Longer distance dispersal may occur if flies are caught in strong wind gusts and by chance land in suitable habitat. However, only a very small proportion of individuals is likely to move in this way and most that do are unlikely to find a mate in their new habitat unless a population already exists there. Some insects are known to have dispersive phases in their life-cycles, usually as juveniles, and this may also apply to Chloropids and Milichiids, in which case longer distance dispersal would be possible.

The degree to which the Tuncurry Midge Orchid is dependent on the five pollinators so far identified is unknown. It is likely that further species of Chloropids and Milichiids are capable of acting as pollinators. Also unknown is the degree of habitat specificity of the known pollinators which is likely to vary between species, such that some are likely restricted to coastal heathy woodland, while others may be habitat generalists. The latter may more readily colonise disturbed and isolated habitats, such as those in the proposed subdivision.

Tuncurry Midge Orchid Reserve

The orchid reserve is to be maintained as conservation lands; that is, no development-related vegetation disturbance would occur within the reserve area (EMM, 2018). Four hectares is considered adequate to maintain a viable Tuncurry Midge Orchid population within the reserve in perpetuity, provided the reserve is managed effectively. The major threats to the Midge Orchid population within the reserve are considered to be:

- ***Lack of disturbance.***

Without periodic disturbance, the shrub layer vegetation is likely to thicken to the point that complete shading of the ground occurs, thereby inhibiting growth and flowering of the orchids. To avoid this very real possibility, the orchid reserve will need to be disturbed periodically, for example by mosaic controlled burning or by vegetation thinning.

- ***Loss of one or more pollinators.***

Pollinator loss may occur if there is a catastrophic event, such as a wildfire that removes all the vegetation in the reserve. In this case, recolonisation of the reserve by pollinators from outside will be essential for the long-term survival of the orchids.

- **Weed invasion**

Invasion of the reserve by exotic weeds, such as Lantana or Bitou Bush, also represent potential major threats to the Tuncurry Midge Orchid population. Both these plants and others can shade out small herbs leading to their local extinction. Weed management will be critically important.

- **Human disturbance**

Degradation of the native vegetation in the reserve by humans may also lead to a decline in habitat quality, which may indirectly affect orchid survival. There may also be direct affects, such as trampling. Access to the reserve by humans will need to be carefully controlled.

Pollinator Corridors

The works proposed within the 'orchid reserve corridors' (EMM, 2018) indicate that the existing vegetation is to be completely removed, the site excavated, shaped and replanted with 'ephemeral' vegetation below 3 m AHD, and with local heathland species between 3 and 4.4 m AHD between the excavated drain and roadways. Approximately half the area of the 'pollinator corridors' will be rehabilitated with vegetation similar to the existing plant community. The other half will be managed for surface water disposal. The rehabilitated parts of the pollinator corridors are considered likely to be suitable habitat for most of the Midge Orchid pollinators that occur naturally in the former native vegetation. Provided the rehabilitated parts of the corridors provide near continuous heathland vegetation, they are considered likely to be effective for pollinator movement into the Orchid Reserve.

However, it is also considered likely that other species of generalist chloropids would colonise the backyards of the subdivision and the water management parts of the corridors which may then serve as sources of supplementary pollinators in the orchid reserve. Attraction of chloropids to potted Midge Orchids placed in a backyard has been documented (Jones, 1970) and chloropids have visited Midge Orchids in a backyard glasshouse (Bates, 1981). Because Midge Orchids are well known for having multiple pollinators, it is considered likely that suitable generalist pollinators would re-colonise the orchid reserve in the event of a catastrophe from the 'finger drain corridors' and surrounding backyards. These generalist species may then be replaced by movement of the original heathland species through the rehabilitated parts of the corridors as the vegetation in the Orchid Reserve recovers.

Conclusions

It is concluded that:

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- The population of the Tuncurry Midge Orchid in the 4 hectare Orchid Reserve within the proposed North Tuncurry development is considered likely to persist in the long term provided the reserve is appropriately managed.
 - It is considered likely that rehabilitation of 50 percent of the 'finger drain corridors' would provide suitable habitat for movement of midge orchid pollinators between the conservation lands and the Orchid Reserve.
 - However, it is also considered that generalist chloropids are likely to colonise backyards of the subdivision and may provide supplementary pollination of the Tuncurry Midge Orchid in the Orchid Reserve following a catastrophe such as a reserve-wide fire.

References

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Signed:



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