Targeted Flora Survey

Moama Solar Farm Preferred Access Site

Cobb Highway Moama

NSW 2731

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Targeted Flora Survey

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1. Introduction

This report provides information relating to a Targeted Flora Survey for *Prasophyllum sp.* Moama (Leek Orchid genus) and *Pterostylis despectans* (Lowly Greenhood Orchid) at the Moama Solar Farm Access Site, located on the east side of the Cobb Highway approximately 7 km north of Moama township (Figure 1). These threatened species are targeted because of their presence (at a nearby location close to Barnes Crossing (Figure 5 - Referred to as the 'Benchmark' site).

This targeted survey has been prepared at the request of Mytilineos RSD. The background documents for the survey include the Statement of Environmental Effects – Moama Solar Farm (Geolyse, 2018), the Moama Solar Biodiversity Assessment (EMM Consulting, 2018) containing the *Prasophyllum sp.* 'Moama' Expert Report (Bower 2018).

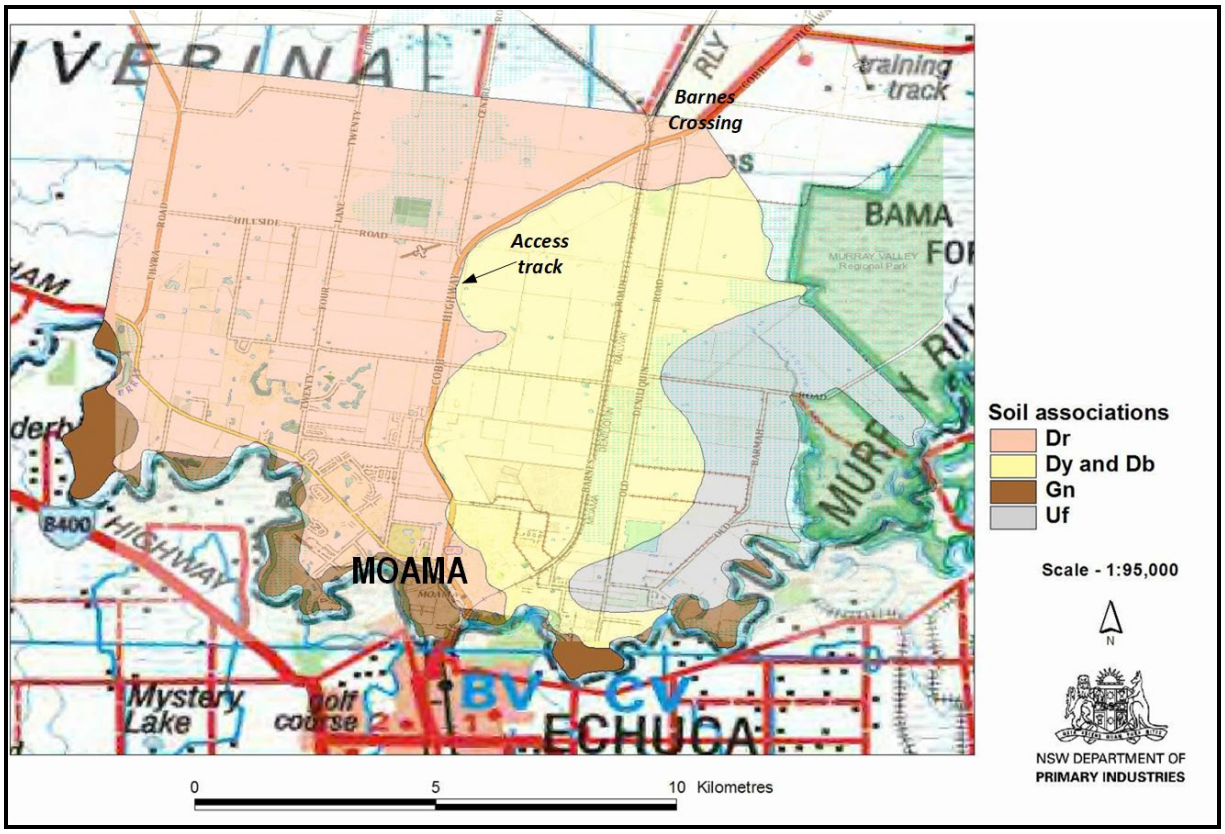

Figure 1. Locality plan and soil type distribution

2. Scope

The Targeted Flora Survey for *Prasophyllum sp.* (Leek Orchid) Moama and *Pterostylis despectans* (Lowly Greenhood Orchid) was required as stated in the Statement of Environmental Effects – Moama Solar Farm (Geolyse, 2018) to determine if either species a was present on the traverse of the proposed preferred access track to the Moama Solar Farm which is planned to be developed on the Cobb Highway Travelling Stock Reserve, 7 km north of Moama. An alternative access to the south was proposed pending the findings of this survey.

This report has been prepared as a part of the Biodiversity Assessment Method (BAM) process as specified under the *Biodiversity Conservation Act 2016* and the *Biodiversity Conservation Regulation (2017)*. In relation to the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999,* if there is the potential for a significant impact on nationally threatened species or communities, or listed migratory species, then under the Act a referral to the Minister should be considered. This report will also inform decision makers, such as Murray River Council planners and the NSW Department of Planning and Environment operatives.

The Geolyse (2018) Statement of Environmental Effects (SEE) indicated as follows:

> *"There is a moderate potential for Prasophyllum sp. Moama and Pterostylis despectans to occur in the preferred access. The removal of individuals from a population of Prasophyllum sp. Moama or Pterostylis despectans (if present) would likely be significant given that only one population of each species is known from north of Moama. Accordingly, the proponent has committed to no significant impact on the species by following the procedure outlined in Section 4.1 (of the SEE). In addition, should the preferred access be constructed, impacts on the two Turnip Copperburr plants would also be avoided."*

The access track (Figure 2) will be approximately 7 m wide and 160 m in length (~1,120 m^2) from the highway7 to the paddock gate. The site survey is 12.5 m either side of the centreline of the track on Murray River Council's stamped plan.

3. Methodology

The targeted survey area included the access track as well as the area 10 m either side of the access track. The alternative access track was inspected, but not surveyed in detail for the reasons outlined in the following discussion.

The report was compiled following a site visit on 28th October 2022 and was conducted by Mr Peter Clinnick with over 30 years experience in assessing Riverina soils, vegetation and habitat (Expertise listed in Appendix 3).

The objective of the targeted threatened plant survey was to firstly establish with a high level of confidence the presence of the target species and if present to collect data to determine the number of individuals or area of habitat present at a time of the year when the target species is most likely to be evident and identifiable (September -October).

The survey was conducted using the methodology outlined in the document entitled "*Surveying threatened plants and their habitats*" (Department of Planning, Industry and Environment, 2020). A database search for the "candidate" threatened species was also performed with results (Appendix 1) in agreement with the Geolyse survey (2018 - Figure 5). In accordance with the BAM other important site considerations were:

- Habitat constraints listed for the species in the Threatened Biodiversity Data Collection (TBDC) are absent, or
- Habitat constraints or microhabitats on which the species depends are sufficiently degraded such that the species is unlikely to use the subject land; or
- The species is a vagrant in the biogeographic subregion.

The survey plan is based on Tables 2 and 3 of the Recommended Traverse Separation and Effort (time) outlined in the aforementioned Department of Planning, Industry and Environment 2020 methodology guide. In this field traverses were separated by ~3 m (5 m recommended) across the 25 m wide, 160 m long survey area (4,000 m^2). The recommended time for a survey of this size would be about 0.5 hour, but in this instance since the traverses were only 3 m apart and difficult ground conditions (Figure 1) more than 1 hour was spent in surveying the vegetation.

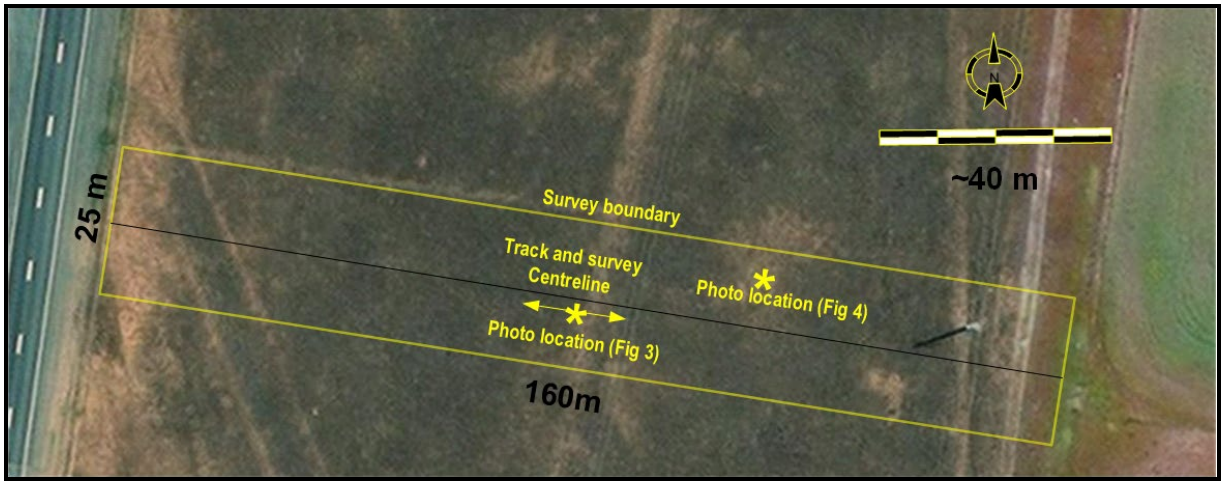

Figure 2. Plan of survey area

Table 1. Survey GPS reference points

Survey Extent (GDA 94 55H)	Easting	Northing
South east	297817	6007605
North east	297831	6007630
Soth west	297664	6007620
North west	297668	6007645

Figure 3. View of access track survey area east (left) and west (right)

Figure 4. Vegetation cover and ground condition

4. Candidate Threatened Species and Habitat

Candidate Threatened Species

The following threatened species, as indicated in Table 2, have the potential to occur on the site.

Table 2. Threatened species list

Scientific Name (Flora species)	Common Name	NSW status	Comm. status
Pterostylis despectans	Lowly greenhood	Critically Endangered	Endangered
Prasophyllum sp. Moama.	Leek orchid genus	Critically Endangered	Not listed
Sclerolaena napiformis	Turnip Copperburr	Endangered	Endangered

Habitat

The survey site is part of the Murray River floodplain (Murray Fans). The site is situated in a low lying area of the riverine landscape and the soil type is a Duplex Yellow soil (Yellow Sodosol). The surface A horizon consists of 5 cm of grey clay loam, which is hardsetting and has weak angular stucture with some buckshot, indicating periodic waterlogging. There is a sharp boundary with the underlying B/C soil horizons consisting of mottled yellowish brown heavy clay down to a depth of many meters. Hydraulic conductivity is poor throughout the soil profile and it was also noted in the Department of Agiculture Report (1987) that in the case of the Yellow Duplex soils seed establishment and germination is poor.

The vegetation is typical of the Plant Community Type Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion. Open to closed grasslands usually about 0.3 m high composed of speargrass (*Austrostipa nodosa*), Windmill Grass (*Chloris truncata*) and Whitetop Wallaby Grass (*Austrodanthonia caespitosa* Figure 3) with forbs including a range of daisies such as *Leucochrysum molle* and *Calotis scabiosifolia* and legumes, such as *Swainsona spp.*

Site disturbance

The surveyed preferred access site has been subjected to various linear and widespread forms of disturbance, but nonetheless maintains a representative suite of PCT 44 Grassland species (Appendix 2). Linear impacts crossing the survey area have resulted from drain installation, telephone cable trenching, electricity line establishment (two lines) building material dumping (bricks), vehicle tracks and seasonal fire break establishment (10 m width). More widespread impacts can occur from grazing by cattle, particularly during drought periods.

There is no evidence or history of fire for the site over the past 25 years. Extensive roadside flooding occurs during wetter years and this was evident at the time of the survey with 10-20 cm of water covering the site (Figure 4).

5. Results and Discussion

The field survey of the area (~4,000 m^2) proposed for the Moama Solar Farm access track did not find any plants or remnants of the threatened species *Pterostylis despectans* (Lowly Greenhood) or *Prasophyllum sp*. Moama (Leek Orchid genus). In the case of Turnip Copperburr some specimens have been previously recorded in the vicinity of the access track (Geolyse, 2018 – Figure 5; BioNet Altas Map, 2022- Appendix 1).

Individuals of *Sclerolaena napiformis* (Turnip Copperburr) were not evident within the survey area where previously it had been found. The reason may be the domination by grasses and forbs that have responded more favourably to the current saturated conditions and that the previously observed *Sclerolaena napiformis* (Turnip Copperburr) individuals of have decayed due to the wet seasons during the intervening years since the survey was conducted in 2018. However, several dead remnants and a few live individuals were present outside the formally surveyed area on slightly higher land in the north west corner of the adjacent property, to the south of the solar farm development.

The previous records of *Pterostylis despectans* (Lowly Greenhood) or *Prasophyllum sp*. Moama (Leek Orchid genus) and the species profiles (DPIE, 2022) indicate that the species are found on Red Duplex soil types. These redder soils are located higher in the landscape than the surveyed site (Figure 1). The red soils have good drainage and aeration attributes and are not as hardsetting as the Yellow Duplex topsoils. Stuckey (1967) and Tsiftsis *et al*. (2012) indicated that the performance of orchid populations is significantly affected by physical and chemical properties of soil (e.g. pH, soil moisture, nutrients). Thus, it maybe postulated that the mycorrhizal fungi are suppressed due to periodic waterlogging and poor soil oxygenation in the Yellow Duplex soils at the site.

Bower (2018) in his targeted search of the site noted the following for *Prasophyllum sp*. Moama:

> *"The preferred access route traverses an area of Riverina Grassland that has undergone moderate disturbance historically. ……*
>
> *The access route also differs from the Prasophyllum sp. 'Moama' benchmark site* (Red Duplex soils) *in being traversed by a shallow drainage line and associated low spots that pool water in wet seasons."*

Figure 5. Threatened species locations close to Barnes Crossing (Source: Geolyse, 2018)

6. Conclusion

The field survey of the area (~4,000 m^2) proposed for the Moama Solar Farm access track did not find any plants or remnants of the threatened species *Pterostylis despectans* (Lowly Greenhood) or *Prasophyllum sp*. Moama (Leek Orchid genus). In the case of Turnip Copperburr some specimens have been previously recorded on higher ground in the vicinity of the preferred access track (Geolyse, 2018) but are no longer evident. Some *Sclerolaena napiformis* (Turnip Copperburr) plants were evident in the neighbouring property to the south of the Moama Solar Farm.

The absence of the aforementioned two orchid species does not preclude individuals or a population of the target orchid species developing at the site. However, despite there being a similar vegetation type at the 'Benchmark' site near Barnes Crossing, the soil type and periodic flooding would appear to be two major habitat factors that would limit the development of the two orchid species. The suitability of the habitat for threatened species *Pterostylis despectans* (Lowly Greenhood) or *Prasophyllum sp*. Moama (Leek Orchid genus) at the preferred access Track site is rated as very low.

Importantly, given the outcomes of the targeted species survey, the access track will not have any impact on the previously identified threatened species. Moreover, the previously identified locations for *Sclerolaena napiformis* (Turnip Copperburr) will be avoided during construction.

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Appendix 1. Threatened Species Profiles

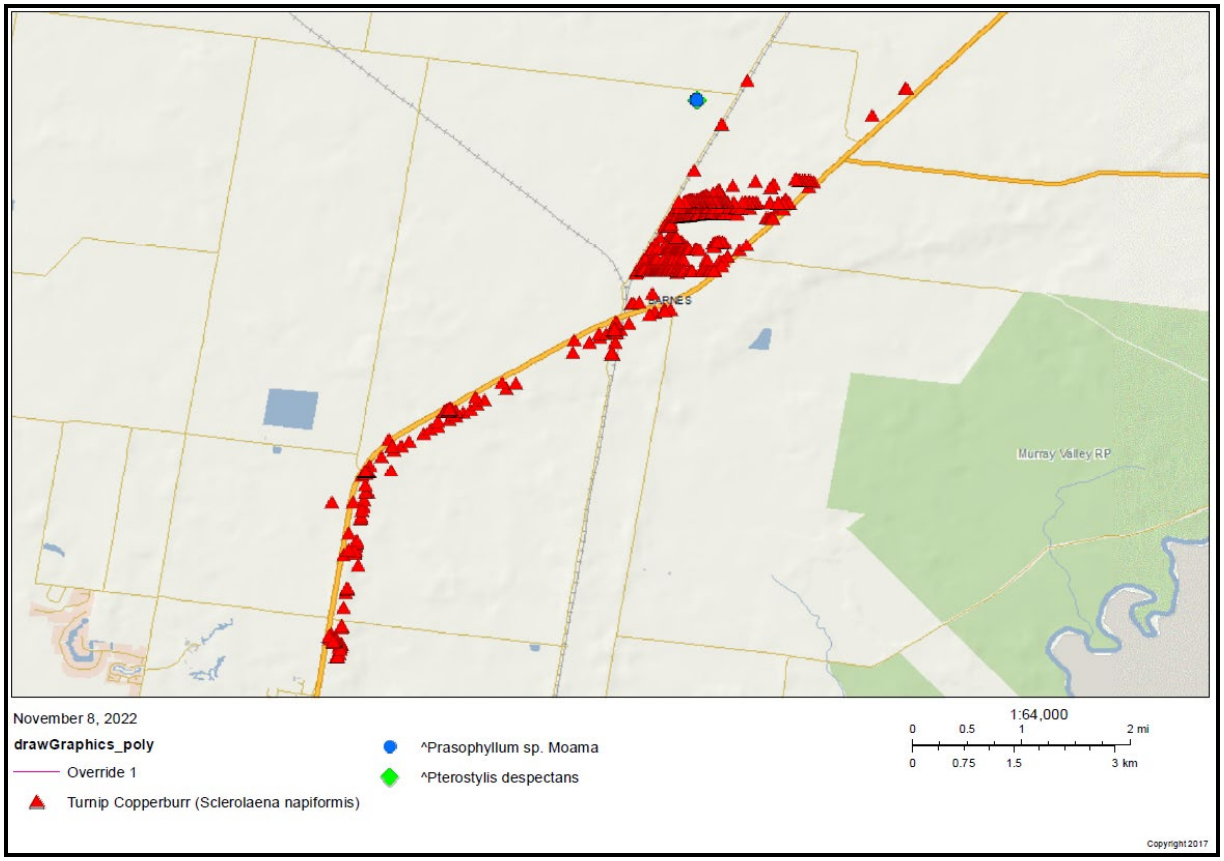

Figure A-1 BioNet Atlas map of threatened species locations (8-11-2022)

Pterostylis despectans (Lowly greenhood)

Scientific name: *Pterostylis despectans.*

Conservation status in NSW: Critically Endangered.

Commonwealth status: Endangered.

Description

Pterostylis despectans is a terrestrial herb with flowering stems 30-80 mm tall, 6-10 basal leaves in a rosette, and 3 or 4 stem-sheathing bract-like leaves above, the rosette leaves are 10-20 mm long and 6-9 mm wide. There are 1-6 flowers, usually with up to 4 open at a time, on slender pedicels up to 15 mm long spreading widely from the stalk. Flowering occurs in October and November. Pterostylis despectans is not easily confused with other orchid species, being characterised by the flower colours, a short flower stem, long spreading pedicels, sepal points often resting on the soil, and a labellum with two prominent basal bristles.

Distribution

In New South Wales the species is known only from a single population discovered in 2005 near Moama in the Riverina district. The site is within the Murray Local Government Area. Several surveys of Riverina grassland and

regional Travelling Stock Reserves did not record *P. despectans* and it seems likely that the species is extremely rare in New South Wales. The species also occurs as very small fragmented populations in central Victoria and in South Australia. The total estimated number of individuals in the Victorian and South Australian populations is less than 1500. The Moama population has been assessed as comprising between 20 and 60 individual plants. All plants known to date occur within an area of about one hectare, within an apparently suitable habitat patch-size of about 20 ha. Pterostylis despectans is not known to occur in any NSW conservation reserves.

Habitat and ecology

The plant remains dormant underground as a tuber in late summer into early winter. In winter it develops a rosette of six to ten leaves. The flower stem is produced between late October and December and the leaves shrivel up by the time the flowers mature. Like most Australian terrestrial orchids the species is believed to be partly or fully dependent on a mycorrhizal symbiont.

The New South Wales population occurs in natural forb-rich grassland on flat alluvial plains and not derived from Acacia pendula woodland. The only tree species recorded as present at the site is Allocasuarina luehmannii.

The soil is a reddish, probably calcareous, clay loam.

The community is described as occurring on plains of Quaternary alluvial sediments with an annual rainfall of 405-465 mm.

Prasophyllum sp. Moama - profile

Scientific name: *Prasophyllum sp. Moama.*
Conservation status in NSW: Critically Endangered.
Commonwealth status: Not listed.

Description

Prasophyllum sp. Moama is a terrestrial herb of the Leek Orchid genus. It has a single erect tubular tapering leek-like leaf, up to 30 cm tall and about 2-3 mm in diameter, through which the inflorescence spike breaks, leaving a free segment of leaf above.

Distribution

Prasophyllum sp. Moama is known in NSW from only one locality, discovered in 2005, near Moama. The site is in the Murray Local Government Area. Several previous surveys of Riverina grassland and regional Travelling Stock Reserves in New South Wales did not detect the species. The species is not endemic to New South Wales, occurring also in Victoria in small to moderate-sized populations within 50 km of Echuca. The Moama site is currently managed, under short-term funding, as a high conservation value area on a Travelling Stock Reserve (TSR), but remains subject to discretionary grazing.

Habitat and ecology

d) Occurs in forb-rich natural grasslands on flat alluvial plains.

e) Occurs on reddish calcareous clay-loam soils.

f) Average annual rainfall between 405-465 mm

Description

Prasophyllum sp. Moama is a terrestrial herb of the Leek Orchid genus. It has a single erect tubular tapering leek-like leaf, up to 30 cm tall and about 2-3 mm in diameter, through which the inflorescence spike breaks, leaving a free segment of leaf above.

Distribution

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Habitat and ecology

- Occurs in forb-rich natural grasslands on flat alluvial plains.
- Occurs on reddish calcareous clay-loam soils.
- Average annual rainfall between 405-465 mm.

Sclerolaena napiformis (Turnip Copperburr) - profile

Scientific name: *Sclerolaena napiformis*

Conservation status in NSW: Endangered

Commonwealth status: Endangeredexternal link

Description

Low subshrub to about 30 cm high, branches slender and sparsely covered with short curled hairs. Leaves linear to narrow, 5-15 mm long. Fruit hard and 2-3 mm long, with 5 or 6 widely-spreading stout spines, each 1-4 mm long, radiating outwards with 2 considerably shorter than the others.

Distribution

Known from only a few small populations in remnant grassland in the southern Riverina of NSW and north-central Victoria. NSW populations are confined to the area between Jerilderie and Moama on travelling stock routes and road reserves.

Habitat and ecology

Confined to remnant grassland habitats on clay-loam soils. Grows on level plains in tussock grassland of Austrostipa nodosa and Chloris truncata, in grey cracking clay to red-brown loamy clay.

Sites are roadside travelling stock routes and reserves subject to sheep grazing.

Associated species include Austrodanthonia duttoniana, Enteropogon acicularis, Austrostipa nodosa, Chloris truncata, Lolium rigidum, Swainsona murrayana, S. plagiotropis, S. procumbens, Rhodanthe corymbiflora, Calotis scabiosifolia, Microseris lanceolata, Acacia pendula and various chenopods.

Fruiting period is from November to May.

Grows in areas with intermittent light grazing. Based on past land use, this regime may promote the growth of the species, or at least not be detrimental to it.

Plants grow as low shrubs within an open to mid-dense tussock grassland with herbaceous ground layer.

Appendix 2. Surveyor's Expertise

Peter Clinnick has a Degree in Agricultural Science with Honours from La Trobe University and is a recognized ecologist/soil scientist and member of the Soil Science Society of Australia since 1980. He has been engaged by CSIRO Forestry, industry, community groups and local government to work in extension, research and statutory planning throughout Australia. Peter has been Accredited under the NSW Biodiversity Assessment Method process. He has more than 35 year's experience in biodiversity assessment, soils and geomorphology investigations for rural landholders, developers and utilities. Peter is currently Managing Director of the regionally based environmental consulting company Advanced Environmental Systems Pty Ltd.

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