A SURVEY FOR THE GAZETTED RARE ORCHID DIURIS PURDIEI ON PRIVATELY OWNED LAND IN THE CANNING VALE AREA.

PREPARED BY

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ON BEHALF OF

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SUMMARY:

A survey of approximately 22 hectares of privately owned land opposite the north western intersection of Hope Road and the Serpentine Trunk Main revealed that the area contained 16 individuals of the gazetted rare plant species *Diuris purdiei*. It was determined that this species preferred habitat consisted of a swamp type vegetation community dominated by *Pericalymma ellipticum*, *Hypocalymma angustifolium* and *Xanthorrhoea preissii*. As the area of land on which these 16 gazetted rare plants are located is in the process of being developed for urban purposes, options available to the land owner have been discussed. The aim of this discussion was to hopefully protect the land owner from committing an offence under Section 23F of the Western Australian Wildlife Conservation Act 1959-1980 and also hopefully satisfy the requirement of the Department of Conservation and Land Management.

INTRODUCTION:

The flora of south western Australia is renowned for its floristic richness, diversity and high numbers of unique and endemic species. The orchid family is one family in which such a diverse assemblage of unique and endemic species can be found. While many of the orchid species in the south west are widespread and common, such as *Caladenia flava*, *Diuris longifolia* and *Leporella fimbriata*, a substantial number have rarely been observed and are therefore considered to be rare and/or to have a very restricted or disjunct geographical range. Eleven of the most rare and restricted orchid species to be found in the south west are currently gazetted as rare flora under the provisions of Section 23F of the Western Australian Wildlife Conservation Act 1959-1980. Such plant species are legally protected from being taken, damaged or destroyed in their natural habitat. One of these gazetted rare orchid species is *Diuris purdiei*.

This present study aims to verify the presence of this orchid, *D. purdiei*, on land owned by Mr Crouch, land bounded by Hope Road and the Serpentine Trunk Main and covering approximately 22 hectares. The study attempts to document the species presence on this land, identify the size of the population, recognize the major vegetation

community type within which the rare species occurs and to determine the extent of its range. Results obtained from the field surveys conducted during this study will hopefully assist the Client, Mr Crouch, and the Department of Conservation and Land Management when deciding on the future of this rare species, on this land, as the land in currently undergoing urban development.

DIURIS PURDIEI: HISTORY, BIOLOGY, AND CONSERVATION STATUS.

History;

Diuris purdiei was named by Dr L. Diels in April of 1903 in the Journal of Proceedings of the Mueller Botanic Society of Western Australia (No. 11:79). The original specimen, the Type specimen, was first collected by Mr Alexander Purdie from the Cannington area on the 7th of October, 1901 (Diels 1903). The species was named in honour of Mr Purdie as he was the first to collect it (Pelloe 1930).

Descriptions and illustrations of this species have since appeared in a number of publications over the years including those by Pelloe (1930), Erickson (1951, 1965, 1978), Nicholls (1969), Pocock (1972), Patrick and Hopper (1982), Hoffman and Brown (1984), Leigh, Boden and Briggs (1984) and Bates (1986).

The species has, since the Type collection, been collected on only a few occasions, the majority of which were collected in the early 1900s. Only one specimen housed at the Western Australian Herbarium has been collected in more recent times, as is shown in Table 1.

Taxonomic Characteristics;

The genus *Diuris* is represented by 8 described taxa in Western Australia of which *D. purdiei* is one. This genus in Western Australia is characterized by being terrestrial herbs with narrow grass-like leaves and flowers which are generally yellow in colour with either browm or red markings. The flowers possess two erect coloured petals which flank the dorsal sepal and two lateral sepals which

TABLE 1. History of *Diuris purdiei* collections, 1901-1969.

Date	Month	Location of Collection	Collector
1901*	Oct	Cannington	Mr A. Purdie
1902	Sept	Cannington	Mr A. Purdie
1902	Oct	Cannington	Mr C. Andrews
1920	Sept	Pinjarra	Mr O. Sargent
1923	Sept	Cannington	Mr Glanert
1926	Oct	Pinjarra	Mr T. Goadby
1926	Oct	Pinjarra	Mr T. Goadby
1926	Oct	Pinjarra	Mr T. Goadby
1927	Sept	Armadale area	Mr C. Andrews
1937	Sept	Pinjarra	Mr T. Goadby
1937	Sept	Pinjarra	Mr T. Goadby
1969	Sept	Cannington, Nicholson Rd.	Mr A. George

* refers to Type collection.

are tail-like and pointed, greenish in colour and hang from under the labellum (Patrick & Hopper 1982, Leigh, Boden & Briggs 1984). The labellum is three-lobed and generally large. Species in this genus are commonly called Donkey Orchids after the large ear-like petals, but Catsface and Bee Orchids are other names commonly used.

D. purdiei, commonly called Purdie's Donkey Orchid, is a small plant ranging in height from 12-45 cm and having from 5-10 leaves which arise from the base of the plant where they are enclosed in two prominent sheaths. The leaves are very narrow, spirally twisted and 4-10 cm long. Only one flowering stem is produced per plant with 1-9 flowers per stem. The flowers are yellow with magenta veins. The dorsal sepal is smaller and shorter than the laterals which are green and pointed. The petals are elliptical and are on long claws. The labellum is large, three lobed and possesses teeth on the lateral lobes. The midlobe of the labellum is twice as long as the lateral lobes and has raised edges which run its length (Patrick & Hopper 1982, Diels 1903, Maddocks 1984). (Figure 1) (See also Plates 1-3)

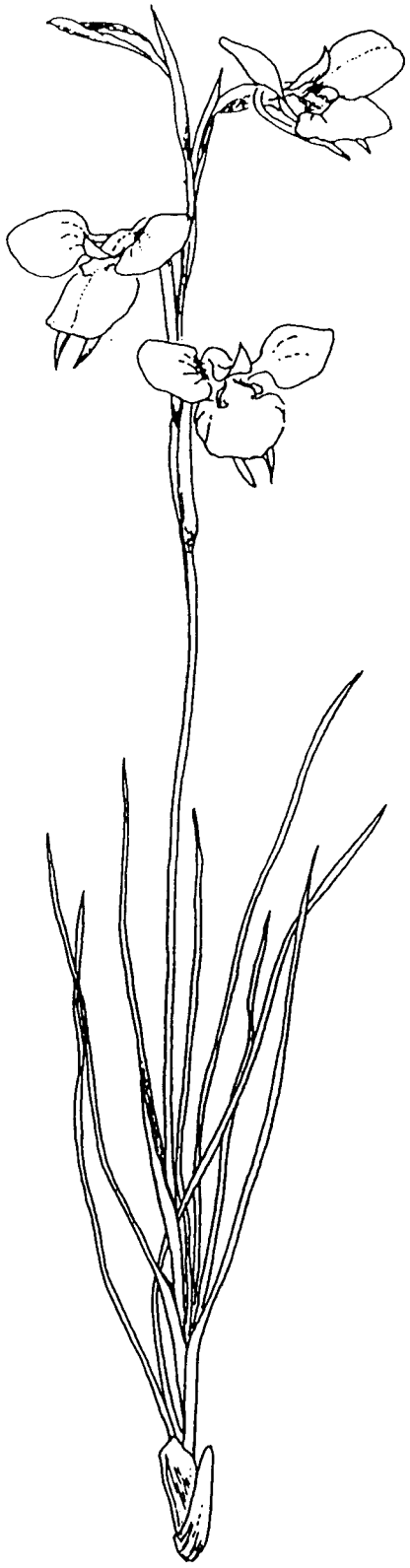

FIGURE 1. Whole plant of *Diuris purdiei* with flowers and leaves. (Taken from Patrick & Hopper 1982)

Distribution;

D. purdiei has a very restricted distribution being recorded only from the coastal plain in the immediate vicinity of Cannington-Canning Vale and extending southwards to Pinjarra (Table 1, Figure 2). The species known geographical range is less than 100 km (Barrett 1982). Mr A.P. Brown (pers. comm.) has also reportedly located the species in the vicinity of Yarloop, but no specimen from this location are currently housed in the Western Australian Herbarium. Unconfirmed reports of the species occurring in the vicinity of Donneybrook and Bridgetown have also been made (Pelloe 1930, Hussey 1977). The species has never been recorded north of the Swan River.

Habitat;

This species is almost exclusively confined to the margins of intermittent seasonal swamps and winter wet depressions on the coastal plain. However, occasionally it can be found growing in the middle of seasonal swamps, particularly those dominated by a dense *Pericalymma ellipticum* thickets. In its preferred habitats it may be found growing in low scrub dominated by *Hypocalymma angustifolium*, *Xanthorrhoea preissii* and *P. ellipticum* with the occasional, scattered, emergent *Melaleuca preissiana* (Maddocks 1984). The soils of these habitats are sands to sandy clays and posses a high moisture and organic matter content.

Flowering Period;

This species flowering period extends from September to early November, peaking in mid to late October.

Biology and Ecology;

Like other Western Australian terrestrial orchid species, flowering in *D. purdiei* only occurs after its habitat has been burnt by fire in the preceding summer to early autumn (Hoffman and Brown 1984). Without fire this species will not flower but will still produce leaves.

Although the pollinator of *D. purdiei* is unknown it has been suggested that native bees are probably responsible

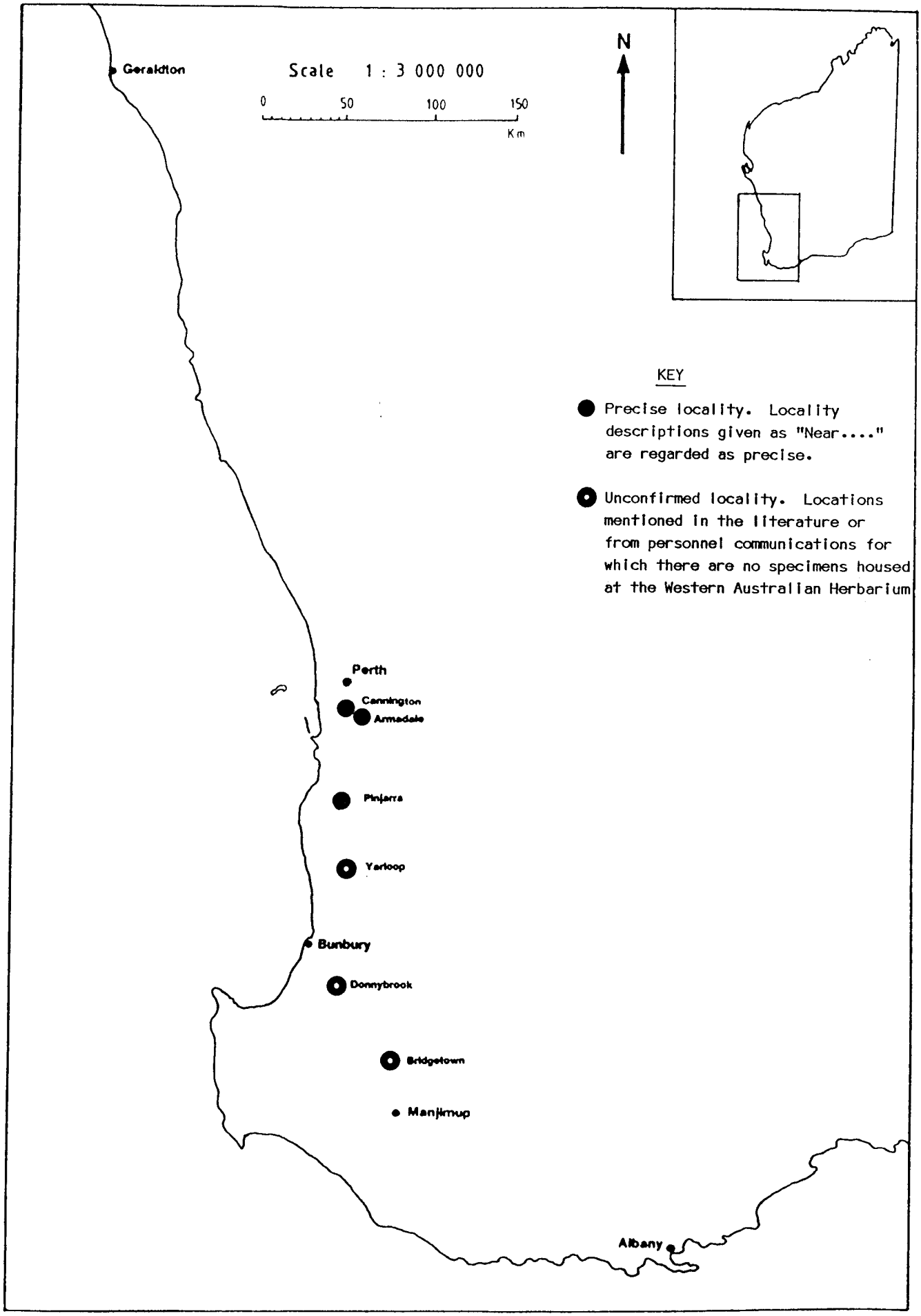

FIGURE 2. The known and unconfirmed distribution of *Diuris purdiei* within Western Australia.

(Maddocks 1984, Bates 1986). Native bees have been observed pollinating flowers of other *Diuris* species (Nash 1979). Small native beetles have recently been observed alighting and congregating on the labellum of this species and to enter the pollinia/stigmatic areas on repeated occasions. On two occasion these beetle were observed removing pollinia from *D. purdiei* flowers (Personal Observations).

Conservation Status;

The conservation status of *D. purdiei* has been assessed by several authors over the last decade. Hartley and Leigh (1979), Leigh, Briggs and Hartley (1981) and Leigh, Boden and Briggs (1984) concluded that *D. purdiei* was a rare species which occurred in small isolated population over a wide area. They considered that such species were often restricted to specific habitats, as is the case with *D. purdiei*. These authors also considered that this species was endangered and therefore in series risk of disappearing from the wild within 1 or 2 decades if present land use and other casual factors continue to operate. Barrett (1982) concluded that *D. purdiei* was a geographically restricted species with a geographical range of less than 100 km.

D. purdiei was gazetted as a rare species under Section 23F of the Western Australian Wildlife Conservation Act 1959-1980 on the 12th of March 1982. The abovementioned Act protects all species of native flora as well as offers special protection to those species of plants which have been gazetted as rare under Section 23F. Under this Section of the Act, the Minister may, by notice published in the Government Gazette, declare a plant species as likely to become extinct, rare or otherwise in need of special protection throughout the whole of the state (Hopper 1982). Before a plant species can be gazetted as rare it must first fulfil certain requirements, as defined by Rye and Hopper (1981). These requirements are that:

1. The taxon is formerly named under conventions proposed in the International Code of Botanical Nomenclature.
2. A reasonably thorough search has been made to locate wild populations and the number of plant present.
3. Less than a few thousand reproductively mature plants are known to exist in the wild.

D. purdiei fulfills the above requirements and therefore the species is considered to be and is gazetted as, a rare species of flora.

All present known population of *D. purdiei*, with the exception of the Pinjarra population, are an privately owned land and therefore may be subject to clearing and urban development in the future. The Pinjarra population is located within an 'A' Class reserve for the conservation of flora and therefore, its future is reasonably secure.

The conservation status of *D. purdiei* in terms of its gazettal as a rare species and the legal status that accompanies such gazettal, has not changed since 1982 and is unlikely to change in the near future because, as mentioned by Leigh, Boden and Briggs (1984) this species present known distribution, especially in the Cannington-Canning Vale areas is threatened by continuing urban development.

METHODS:

The field survey for *D. purdiei* on Mr Crouch's land and especially the land delimited by the Department of Conservation and Land Management was conducted over an eight week period from mid September to early November of 1986. The area in question had been burnt the previous summer and this would assist greatly with locating and identifying *D. purdiei* plant, as this species flowers only after its habitat has been burnt (Hoffman & Brown 1984).

The area delimited by the Department of Conservation and Land Management covers an area of approximately 6 hectares and was bounded by the Serpentine Trunk Main to the east and Hope Road to the south. The area intensively surveyed in this study covered approximately 22 hectares and included the abovementioned area. (Figure 3)

To accurately survey this 22 hectares of land for populations of *D. purdiei*, a series of reference points were established at each corner of the study area and at 100 meter intervals throughout it. The baseline for the study area was the Serpentine Trunk Main. The above procedure led to the creation of a reference grid which assisted with the locating of individual plants, drawing up of a map and plotting the location of individuals on this map. The study area was further divided up into a series of east-west running transects which were spaces at intervals of 50 meters. These transects were walked on several occasions to locate individuals of *D. purdiei*. Towards the end of the survey period, when the preferred

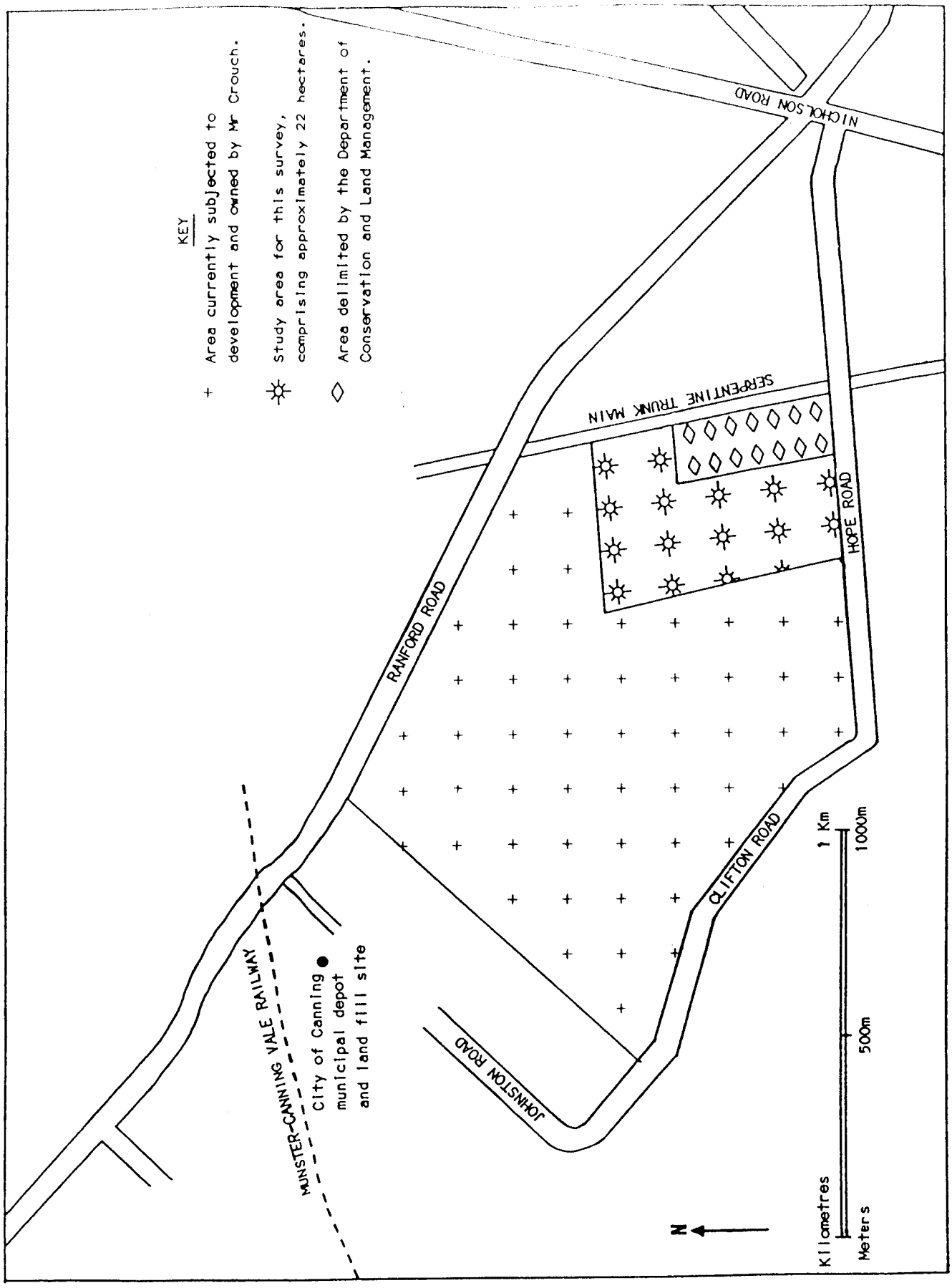

FIGURE 3. The location of the Client's land currently under development and the location of the study area, in relation to the land delimited by the Department of Conservation and Land Management.

habitat of *D. purdiei* had been identified, random searches of these habitats were conducted.

Field surveys were conducted within the study area on the following dates; 16th, 22nd, 23rd, and 30th of September; 6th, 13th, 16th, 21st, and 28th of October; and on the 3rd of November. A representative from the Department of Conservation and Land Management, Mr A.P. Brown, Technical Officer, Flora Conservation, was present during part of the field survey conducted on the 16th of October.

During the survey period, when individuals of *D. purdiei* were located and correctly identified, a record was made of their location with reference to one of the permanent grid points. At each location where *D. purdiei* was found records were also kept on the associated vegetation type and species composition of the site. These records were kept as to facilitate as assessment of the preferred habitat of this species. Information was also gathered on the soil types present at each location. Photographs were also taken at each locality so that a record of the species habitat could be made pictorially.

During the survey period, on the 6th and 21st of October, the entire area bounded by Hope Road, the Serpentine Trunk Main, Ranford Road and extending westwards to the City of Canning's municipal depot and land fill site was survey for populations of *D. purdiei*.

RESULTS:

A total of 48 man hours were spent surveying the study area for individuals of *D. purdiei*. Sixteen plants were located during this time, all of which were accurately identified as *D. purdiei*. The 16 plants found were located in three separate sites, sites hereafter referred to as A, B, and C, and as shown in Figure 4. Site A contained 5 plants and site B contained 3. The remaining 8 plants were located at site C. Plates 4-6 show these three sites. Each of these sites had been burnt during the previous summer-early autumn.

All of the 16 plants were located within the 22 hectare study area. Fourteen of the 16 plants were found within the area originally delimited by the Department of Conservation and Land Management (Figure 3). The remaining

FIGURE 4. The location of the 16 *Diuris purdiei* plants and the extent of the two vegetation community types within the study area.

2 plants, both from site A were located outside this area but still within the main study area. The area occupied by these 16 plants covered approximately 1 200 square meters. No *D. purdiei* plants were located outside the main study area, despite this area containing numerous localities with suitable habitats.

The study area consisted of two distinctly different vegetation communities. Firstly, there was the *Banksia* woodland community which was restricted to the areas of higher terrain. This vegetation community was dominated by a low woodland of *Banksia menziesii, B. attenuata* and *B. ilicifolia* with scattered emergent *Eucalyptus marginata* and *E. todtiana*, over dwarf scrub dominated by *Stirlingia latifolia*, over a herbaceous layer dominated by *Anigozanthos humilis, Stylidium* spp., *Drosera* spp., and species of orchids.

The second vegetation community within the study area was the swamp community and its margins. This community was restricted to the lower lying area that were partly or whole inundated. This vegetation community type was dominated by a low heath of *P. ellipticum, Hypocalymma angustifolium, Adenanthos obovatus, Boronia spathulata* and *Xanthorrhoea preissii*, however, there were scattered emergent plants of *Melaleuca preissiana* and *B. littoralis*. This low heath had an understorey that was dominated by herbaceous and restionaceous species. Appendix 1 provides a list of the plant species that were found in the swamp vegetation community and Plates 4-6 pictorially show the vegetation association at each of the *D. purdiei* sites.

Those plant species listed in Appendix 1 are suggested as being indicators of the preferred habitat of *D.purdiei*. Within the study area this type of vegetation community occupied 54% of the total area or approximately 11.96 hectares. Figure 4 shows the location of this type of habitat within the study area. The soils at each of the sites where *D. purdiei* was located were sandy clays that had a high water and organic content.

The preferred habitat of *D. purdiei* within the study area was somewhat degraded as a result of the dumping of refuge and the use of motorcycles both on and of already established tracks. It is also suggested that the frequent burning of this vegetation community, at this study area, may be having a detrimental effect on the species composition of the area. Within the last four years the study area has been burnt three times (Maddocks 1984, Personal Observation).

A total of 32 species of orchid were recorded within the study area (Table 2). Eleven of these orchid species were restricted to the *Banksia* woodland vegetation community and another seventeen were restricted to the swamp vegetation community. Four species were found growing in both type of vegetation communities. Two other species of *Diuris* were recorded within the study area, both of which differed significantly from *D. purdiei* in leaf shape, floral morphology and flower colour. These differences between the two species of *Diuris* and *D. purdiei* were easily recognizable and therefore *D. purdiei* could be readily identified. No other gazetted rare orchid species were located within the study area, however, one species, *Caladenia* aff. *pectinata*, is considered to have a very restricted geographical distribution.

DISCUSSION:

A total of 16 *D. purdiei* plants were located within the study area. These 16 plants also represent the total number of plants found within the area of land owned by the Client and bounded by Hope Road, the Serpentine Trunk Main, Ranford Road and the City of Canning's land (Figure 3).

The 16 plant found during this survey compares favourable with a number ranging between 10-20 as was reported by the Western Australian Native Orchid Society and Conservation Group in 1984 for the same area (Maddocks 1984).

Since *D. purdiei* is a gazetted rare plant species as defined under the provisions of Section 23F of the Western Australia Wildlife Conservation Act 1959-1980, the plants on the Client's land cannot be interfered with in any manner, unless the Client has the written permission of the Minister for Conservation and Land Management. This means that no person/s may take, damage or destroy the abovementioned plants, or cause the same to occur, for example, through burning, drainage of its preferred habitat or by allowing animals to graze it, unless they have written Ministerial approval. Should a breach of the provision outlined in this Act occur, the land owner, on prosecution, will be faced with a fine of up to $10 000 for each plant damaged or destroyed.

I don't think this is an accurate interpretation of the penalty.

SCF 24/11/86.

TABLE 2. Orchid species recorded within the study area and the vegetation community type in which they were recorded.

Species	*Banksia* woodland	Swamp
Caladenia deformis	*	
C. discoidea	*	
C. denticulata		*
C. flava	*	*
C. gemmata forma *gemmata*	*	
C. huegelii		*
C. longicauda	*	
C. aff. *pectinata* (large labellum)	*	
Diuris longifolia	*	*
D. aff. *longifolia* (pansy form)		*
D. purdiei		*
Elythranthera brunonis	*	*
Eriochilus scaber		*
Leporella fimbriata	*	
Lyperanthus nigricans	*	
Microtis unifolia		*
Monodenia bracteata		*
Prasophyllum fimbria		*
P. gibbosum		*
P. hians	*	*
P. macrostachyum var. *ringens*		*
P. parvifolium	*	*
P. ovale var. *triglochin*	*	
Pterostylis nana	*	
P. vittata var. *vittata*	*	
Thelymitra antennifera		*
T. campanulata	*	
T. crinita		*
T. flexuosa		*
T. fuscolutea var. *fuscolutea*		*
T. nuda		*
T. pauciflora		*

Therefore, because the area of land on which *D. purdiei* was found is in the process of being developed I strongly recommend that the Client apply, in writing, to the Minister asking for permission to take, destroy or otherwise remove the 16 *D. purdiei* plants from his land before an infringement of the Act occurs. Such an infringement may prove very costly.

If the Minister should refuse the Clients request to take, destroy or otherwise remove the rare flora in question, then there are provisions under the Act which allow for compensation to be paid to the land owner. However, before compensation can be paid the land owner must first satisfy the Minister that his refusal to grant a permit will lead to the loss of use of that land. In the case in question, should the Client's request be refused by the Minister, I feel that the Client would be able to demonstrate a loss of use of the land, especially if the present development proposals are adhered too.

If the Client successfully satisfies the Minister that his refusal to grant a permit has cause the loss of use of that land then compensation will be provided at a per annum rate. This per annum rate is decided upon by agreement between the land owner and the Treasurer. If no such agreement can be reached then an independent valuer is appointed by agreement between both the land owner and the Treasurer. If this agreement is unsatisfactory to either party and once again no agreement can be reached, then a valuer is appointed by the Minister.

Once the Treasurer has began paying compensation for the land, the land may be purchased or resumed by the Governor, for any purpose, as outlined under the Public Works Act of 1902. Should the land in question be purchased or resumed by the Governor it would be more than likely made into a reserve for the conservation of flora. However, because of the small number of plants located on this land compared to land in the near vicinity and the degraded nature of the species preferred habitat, I would suggest that the above sequence of events would not eventuate.

If compensation is paid and if, after a 5 year period, the land in question has not been purchased or resumed by the Governor, then the Minister must lift his restriction on the land owner and shall not refuse the land owner permission to take, damage or otherwise remove the flora in question.

Alternatively, the Client may wish to change his plans for the parcel of land on which the *D. purdiei* plants are located and wish to leave it in an intact state. Should this be the Client desire the Department of Conservation and Land Management may be in a position to provide funds to assist with the fencing of the area and the creation of a reserve. However, as already mentioned, the area is in the process of being developed and the development may be at such a stage where it is not feasible to alter the plans for the area. Also, because of the small number of plants on this land compared to other parcels of land in the near vicinity and the degraded nature of the area, the Department of Conservation and Land Management may not be interested in creating a reserve on this land.

It is my recommendation that the Client apply for permission to take, damage or otherwise remove the 16 *D. purdiei* plant from his land. Because of the small number of plants on the Client's land and the degraded nature of their preferred habitat on this land I feel that the Client's application would be successful. In order for the Client's application to be viewed more favourable I suggest he mention that the 16 *D. purdiei* plantson his land will be removed and given to Dr Kingsley Dixon of the Kings Park Board for conservation and propagation purposes, if permission to remove them is granted. I strongly do not suggest that the Client proceed with the development of the land in the immediate vicinity of these rare plants, until such time as permission has been granted by the Minister because the Department of Conservation and Land Management is fully aware of the orchids presence and an infringement of the Act could prove very costly.

Yes - a practical recommendation
SCF
24/11/88.

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Plate 3. Close-up of *Diuris purdiei* flower.

Plate 4. SITE A, burnt myrtaceous winter wet depression. (Arrows indicate location of the 5 *Diuris purdiei* plants.)

Plate 5. SITE B, burnt *Melaleuca preissiana, Xanthorrhoea* scrub on margins of winter wet depression. (Arrows indicate the location of the 3 *Diuris purdiei* plants.)

Plate 6. SITE C, burnt *Xanthorrhoea, Adenanthos obovatus* scrub on the margins of winter wet depression. (Arrows indicate location of the 8 *Diuris purdiei* plants.)

APPENDIX 1

Plant species found in the swamp vegetation community. Authorities are after Green (1985).

Acacia pulchella R.Br.
Adenanthos obovatus Labill.
Banksia ilicifolia R.Br.
B. littoralis R.Br.
Beaufortia elegans Schauer
Boronia spathulata Lindley
Burchardia umbellata R.Br.
Caladenia denticulata Lindl.
C. flava R.Br.
C. huegelii Reichb.
Calothamnus lateralis Lindl.
Chamaescilla corymbosa (R.Br.)F. Muell. ex Benth.
Conostylis aculeata R.Br.
C. caricina Lindley
Dampiera linearis R.Br.
Dasypogon bromeliifolius R.Br.
Diuris longifolia R.Br.
D. aff. *longifolia* (pansy form)
D. purdiei Diels
Drosera gigantea Lindley
D. menziesii R.Br.
Elythranthera brunonis (Endl.) A.S. George
Eremaea pauciflora (Endl.)Druce
Eriochilus scaber Lindl.
Gompholobium tomentosum Labill.
Hemiandra pungens R.Br.
Hibbertia stellaris Endl.
Hypocalymma angustifolium Endl.
Jacksonia furcellata (Bonpl.) DC
Juncus pallidus R.Br.
Lepidosperma angustatum R.Br.
Lobelia tenuior R.Br.
Lomandra nigricans T.D. Macfarlane
L. odora (Endl.) Ewart
Lyginia barbata R.Br.
Melaleuca incana R.Br.
M. lateritia A. Dietr.
M. preissiana Schauer
Microtis unifolia (G.Forster) Reichb.
Monodenia bracteata (SW.) Durand & Schinz
Patersonia occidentalis R.Br.
Pericalymma ellipticum (Endl.) Schauer
Prasophyllum fimbria Reichb.
P. gibbosum R.Br.
P. hians Reichb.
P. macrostachyum R.Br
var. *ringens* (Reichb.) A.S. George
P. parvifolium Lindl.

Sowerbaea laxiflora Lindley
Stackhousia huegelii Endl.
Stylidium junceum R.Br.
S. piliferum R.Br.
S. shoenoides DC.
Thelymitra antennifera (Lindley) J.D. Hook.
T. crinita Lindl.
T. flexuosa Endl.
T. fuscolutea R.Br.
var. *fuscolutea*
T. nuda R.Br.
T. pauciflora R.Br.
Thysanotus patersonii R.Br.
Tribonanthes australis Endl.
Wurmbea dioica (R.Br.)F. Muell
Xanthorrhoea preissii Endl.