FLORA AND VEGETATION SURVEY OF THE PROPOSED KWINANA TO AUSTRALIND GAS PIPELINE INFRASTRUCTURE CORRIDOR

Prepared for:

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November 2003

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1. SUMMARY

Mattiske Consulting Pty Ltd was commissioned by Bowman Bishaw Gorham on behalf of the Department of Industry and Resources Gas Pipeline Working Group to review the vegetation of the proposed gas pipeline infrastructure corridor from Kwinana to Australind. The proposed project was undertaken to review the option of expanding the existing corridor as compared with alternative options. The proposed parallel corridors traverse some 125 kilometres. The area surveyed is located within the Darling Botanical District of the Southwest Botanical Province (Beard 1990).

The survey of the flora and vegetation values was based on aerial photograph interpretation and on further field studies carried out on the ground, as required. A total of 69 families, 195 genera and 326 plant taxa (including varieties and subspecies) were recorded within the survey area. Species representation was greatest amongst families Myrtaceae, Papilionaceae, Proteaceae and Poaceae, a flora composition typical of the Darling Botanical District.

No plant species listed as Declared Rare Flora under the Wildlife Conservation Act (1950) were located during the survey. No plant species listed as Vulnerable, Threatened, Endangered or Critically Endangered under the EPBC Act (1999) were located during the survey.

One Priority Four species (*Acacia flagelliformis*), one Priority Three species (*Acacia semitrullata*) and one Priority One species (*Boronia juncea* subsp. *juncea*) were located within the proposed corridor alignment. It is recommended that further fieldwork be undertaken in the specific areas and vegetation communities that support these endangered species during the construction phase to determine any methods that can minimize disturbance to the native vegetation.

Seventy-nine introduced species were observed in the survey area. Some of these species are particularly aggressive and therefore require management so that infestations do not spread or intensify during operational activities. These include the declared plants (under Section 37 of the Agriculture and Related Resources Protection Act, 1976). Paterson's Curse (*Echium plantagineum*), Cotton Bush (*Gomphocarpus fruiticosus)*, Prickly Pear (*Opuntia* spp.), Blackberry (*Rubus fruiticosus*) and Arum Lily (*Zantedeschia aethiopica*). Consequently, there is a need to maintain vehicle hygiene and cleaning operations to limit the spread of weeds in the project areas. Several of the introduced species (not native to Western Australia) were planted in paddocks and rehabilitation areas along the route.

A total of forty-two vegetation communities were recorded on the infrastructure corridor.

Seven vegetation communities are defined as locally significant. The locally significant communities are associated with the presence of Priority Flora, restricted or isolated remnants and the presence of flora exhibiting range extension.

The Threatened Ecological Community (C2 which is equivalent to 3a community as defined by Gibson *et al.* 1994 and recommended for listing by English and Blyth 1997 and 1999; occurred on five localized areas on the alignment. However the community was very degraded and in most cases only the occasional *Corymbia calophylla* or *Kingia australis* plants were present.

Consequently the pockets of C2 community were so disturbed, fragmented and small that they were considered to be not sustainable, nor regarded of any value. This community is listed pursuant to Schedule 2 of the Environmental Protection Biodiversity Conservation Act (1999); however in view of the degree of degradation there should be no need for referral to Environment Australia.

Many of the vegetation communities occurring within the corridor are classified as Degraded (5) according to the standardized scale commonly used in the Perth Metropolitan area and in Bush Forever publications (Keighery, 1994). These are communities occurring as fragments within grazing paddocks in the southern dairy farming areas.

Based on relative conservation values of the various alternative routes recommendations have been made as to the preferred alternative routes. The key issues appear to relate to the Leda section of the route where the route options are constrained and choices have to be made between loss of vegetation in reserves, conservation category wetlands and an EPP lake. The majority of the remaining route has relatively low native biological values, as large sections on the central and eastern option for the southern section near Bunbury and Australind. have been largely cleared and/or disturbed and through the Kemerton area the route largely follows already cleared alignments, tracks or paddocks.

2. INTRODUCTION

2.1 Location

Mattiske Consulting Pty Ltd was commissioned by Bowman Bishaw Gorham on behalf of the Department of Industry and Resources Gas Pipeline Working Group to review the vegetation of the proposed gas pipeline infrastructure corridor from Kwinana to Australind. The proposed project was undertaken to review the options of expanding the existing corridor as compared with alternative route options. The area surveyed is located within the Darling Botanical District of the Southwest Botanical Province (Beard 1990).

The survey was conducted by several botanists from Mattiske Consulting Pty Ltd in a series of field trips from October 2002 to October 2003. The multiple surveys occurred as result of alternative routes formulated by environmental officers from Bowman Bishaw Gorham.

2.2 Climate

The Darling Botanical District experiences a Dry Mediterranean climate with 5-6 dry months each year. The Dry Mediterranean climate falls in the relatively humid zone of the southwest (Beard 1990).

2.3 Vegetation

The survey area lies within the Darling Botanical District of the Southwest Botanical Province (Beard 1990) and thus exhibits characteristics of this province.

Dominant plant families within the Drummond Botanical Sub-district of the Darling Botanical District include Proteaceae (*Grevillea*, *Banksia*), Myrtaceae (*Eucalyptus*, *Melaleuca*) and Mimosaceae (*Acacia*). The Drummond Botanical Sub-district is characterised by *Banksia* woodland on leached sands with *Melaleuca* swamps where ill-drained; woodland of tuart (*Eucalyptus gomphocephala*), jarrah (*Eucalyptus. marginata*) and marri (*Corymbia calophylla*) on less leached soils (Beard, 1990).

2.4 Declared Rare and Priority Flora

In general, legislation regulates the destruction of indigenous flora. The prohibition of picking wildflowers exists in most circumstances unless special authorization is obtained. Uncontrolled disturbance of indigenous flora would lead to the destruction of some species, particularly of those that are more susceptible to the effects of picking than others.

The Department of Conservation and Land Management assign conservation status to flora that are restricted geographically or threatened by local processes. Regulations aim to protect populations and conserve species.

Declared Rare Flora species are gazetted under section 2 of section 23F of the Wildlife Conservation Act (1950) and therefore it is an offence to "take" or damage rare flora without Ministerial approval. Section 23F of the Wildlife Conservation Act (1950) defines "to take" as "… to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora to cause or permit the same to be done by any means". Those species listed as Declared Rare Flora may not be taken without the specific written approval of the Minister for the Environment. This prohibition applies equally to both Crown and private land; to licensed and unlicensed persons; and to the owners and occupiers of land on which rare flora is found (Department of Conservation and Land Management 2003).

As there is a large Western Australian flora, there are many species that are known from only a few collections, or a few sites, but which have not been adequately surveyed. Such flora may be rare or threatened, but cannot be considered for declaration as rare flora until such survey has been undertaken. These flora species are included on a supplementary conservation list called the Priority Flora List. Priority Flora species are under consideration for declaration as 'rare flora' but are in urgent need of further survey (Priority One to Three) or require monitoring every 5-10 years (Priority Four). Table 1 presents a definition of Declared Rare and the four Priority Flora ratings.

Table 1: Definition of Rare and Priority Flora Species (Department of Conservation and Land Management 2003)

Conservation Code	Category
R	**Declared Rare Flora – Extant Taxa** "Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such."
P1	**Priority One – Poorly Known Taxa** "Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey."
P2	**Priority Two – Poorly Known Taxa** "Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey."
P3	**Priority Three – Poorly Known Taxa** "Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but need further survey."
P4	**Priority Four – Rare Taxa** "Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years."

Threatened species are a matter of national environmental significance under the Environmental Protection and Biodiversity Conservation Act (1999). A person must not take an action that has, will have, or is likely to have a significant impact on a listed threatened species or ecological community, without approval from the Commonwealth Minister for the Environment and Heritage. Table 2 presents the definitions of the categories of threatened species under the EPBC Act (1999).

Table 2: Categories of Threatened Flora Species (Environmental Protection and Biodiversity Conservation Act 1999)

Category Code	Category
Ex	**Extinct** Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

2.5 Local and Regional Significance

Vegetation communities are referred to as Locally Significant where the presence of Priority Flora species has been recorded, where they provide a range extension of particular taxa from previously recorded locations, or where they are very restricted to one or two locations or occur as small isolated communities. In addition, communities that exhibit unusually high structural and species diversity are also of Local Significance (Mattiske, pers. comm.).

Vegetation communities are referred to as Regionally Significant where they are limited to specific landform types, are uncommon or restricted vegetation community types within the regional context, or support populations of Declared Rare Flora significance (Mattiske, pers. comm.).

2.6 Threatened Ecological Communities

Communities are described as 'Threatened Ecological Communities' (TEC's) if they have been defined by the Western Australian Threatened Ecological Communities' Scientific Advisory Committee and found to be Presumed Totally Destroyed (PD), Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). For definitions of TEC categories and criteria refer to English and Blyth (1997, 1999).

Selected vegetation communities have also been listed as "Threatened Ecological Communities" under the EPBC Act (1999). The TEC's at the national level are defined on the Environment Australia website (www.ea.gov.au).

3. OBJECTIVES

The general objective of this project was to describe and define the botanical values associated with the proposed gas pipeline infrastructure corridors from Kwinana to Australind for Bowman Bishaw Gorham on behalf of the Department of Industry and Resources Development Gas Pipeline Working Group. The specific objectives of the flora and vegetation survey were to:

- collect and identify the vascular plant species present in the field survey area,
- search for any rare, endangered or significant flora species,
- review the conservation status of the vascular plant species by reference to current literature and current listings by the Department of Conservation and Land Management (2003) and plant collections held at the State Herbarium and current listings associated with the Environmental Protection Biodiversity Conservation Act (1999),
- identify any weed species present,
- define and map the plant communities present,
- review the local and regional significance of the plant communities recorded,
- assess relative conservation values of the various alternative routes, and
- prepare a report that summarizes the findings.

4. METHODS

The vegetation of the Kwinana to Australind infrastructure corridors was surveyed following the pipeline alignments by all accessible tracks and where time permitted, traversing areas on foot. Field surveys were conducted between October 2002 and October 2003 by botanists from Mattiske Consulting Pty Ltd. The multiple surveys occurred as result of the alternative routes formulated by environmental officers from Bowman Bishaw Gorham.

The recording sites were selected in areas, which supported native species. Detailed recordings were undertaken to identify baseline structure of communities and further sites were recorded where local variation occurred. Aerial photography was then used to extrapolate the distribution of the vegetation and the community boundaries.

4.1 Flora

A database search was undertaken of records held by the Department of Conservation and Land Management for Declared Rare and Priority Flora species likely to occur in the vicinity of the project area. Relevant species were examined at the Western Australian State Herbarium prior to the field survey being undertaken.

The flora of the survey area was described and collected systematically at each survey site by botanists from Mattiske Consulting Pty Ltd during field trips from October 2002 to May 2003. All plant specimens collected during the field survey were dried and fumigated in accordance with the requirements of the Western Australian Herbarium. The plant species were identified and then compared with pressed specimens housed at the Western Australian Herbarium. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded follows the Western Australian Herbarium (2003) database.

4.2 Vegetation

The vegetation communities occurring along the survey corridor were described in detail. The use of a standard data collection form ensured the data was collected in a systematic and consistent manner. At each site the following records were made: topography, percentage litter cover, soil type, percentage of bare ground, outcropping rocks and their type, pebble type and size, and time since fire. For each species recorded, the average height and percent foliage cover of species both alive and dead was noted.

Aerial photography was used to extrapolate and map plant communities in combination with running notes made during the course of the survey. The vegetation maps and descriptions provided in this report includes all vegetation communities occurring within the infrastructure corridors.

5. RESULTS

5.1 Flora

A total of 69 families, 195 genera and 326 plant taxa (including varieties and subspecies) have been recorded along the various Kwinana to Australind proposed gas pipeline infrastructure corridors (Appendix A). Within these families, the genera *Eucalyptus*, *Melaleuca* and *Banksia* are predominant in the Woodland communities and *Agonis* and *Astartea* were predominant in the shrubland communities. Among the perennial plant population, the Myrtaceae and Proteaceae contained the greatest number of taxa and typify the remnant *Eucalyptus* Woodlands of the southwest region

A total of seventy-nine introduced species were observed in the route option areas (Appendix A). Five of these were Declared Plants under Section 37 of the Agriculture and Related Resources Protection Act (1976), those being Arum Lily (*Zantedeschia aethiopica*), Blackberry (*Rubus fruticosus*), Cotton Bush (*Gomphocarpus fruticosus)*, Paterson's Curse (*Echium plantagineum*) and Prickly Pear (*Opuntia* sp.). Several of the introduced species (not native to Western Australia) were planted in paddocks and rehabilitation areas along the route.

5.2 Conservation Status of the Flora

No plant species listed as Declared Rare Flora under the Wildlife Conservation Act (1950) were located during the survey. No plant species listed as Vulnerable, Threatened, Endangered or Critically Endangered, under the EPBC Act (1999) were located during the survey.

The Priority Four species, *Acacia flagelliformis* was found in only one location within the proposed corridor alignments whilst the Priority Three species, *Acacia semitrullata* was found to occur in a number of locations within a number of vegetation communities along the proposed corridors. One Priority One species, *Boronia juncea* subsp. *juncea* was located in a number of locations within the proposed corridor alignments. It is recommended that further fieldwork be undertaken in the specific areas and vegetation communities that support these endangered species during the construction phase to determine any methods that can minimise disturbance to the native vegetation.

The recorded locations of the Priority species are summarised below in Table 3.

Table 3: Summary of Location of Priority Species along the alignment of the Kwinana to Australind Infrastructure Corridor
* Note that all locations are in WGS84.

Priority Species	Conservation Status	MGA mE	MGA mN
Boronia juncea subsp. *juncea*	P1	384831	6331840
		386651	6328707
		386707	6330653
		387300	6334560
Acacia semitrullata	P3	384438	6320945
		384523	6320925
		384550	6331840
		384620	6331800
		384640	6330340
		385270	6338653
		385340	6323032
		386200	6336000
		386958	6340798
		386637 to 386645	6336388 to 6336262
		386721	6330941
		388636	6351340
Acacia flagelliformis	P4	384610	6330650

Marsdenia velutina was located within communities G4 and G5 which occur on all the proposed Leda section routes of the proposed gas pipeline corridor. This species was found approximately 2200km outside its previously recorded range, with the closest recorded occurrences being located in the Eastern Kimberley and far North Kimberley coast. This species is acting as an introduced species in this environment.

5.3 Vegetation

A total of 42 vegetation communities were recorded along the proposed routes for the alignment of the Kwinana to Australind gas pipeline infrastructure corridor. The vegetation communities recorded on the alignment have been grouped into twelve structural groups for the project area (Table 4).

Table 4: The Total Number of Vegetation Communities along the Kwinana to Australind Infrastructure Corridor

Group	Total Communities
Agonis flexuosa Woodlands and Forests	2
Banksia Woodlands	6
Corymbia calophylla Woodlands	7
Eucalyptus rudis Woodlands	6
Eucalyptus marginata subsp. *marginata* Woodlands	6
Eucalyptus gomphocephala Woodlands	5
Eucalyptus decipiens Woodlands	1
Kunzea ericifolia subsp. *ericifolia* Shrublands	2
Melaleuca Woodlands	4
Closed Heath	3
Sedgelands	1
TOTAL	**42**

The vegetation communities recorded in the project area are defined below with the community descriptions based on Beard (1990). The species recorded in each community are summarised in Appendix B.

***Eucalyptus rudis* Woodlands**

R1: Disturbed Low Open Woodland of *Eucalyptus rudis* - *Melaleuca rhaphiophylla* over *Pteridium esculentum* and pastoral grasses.

R2: Disturbed Low Open Woodland of *Eucalyptus rudis* - *Corymbia calophylla* over *Melaleuca preissiana*, *Melaleuca rhaphiophylla* and *Taxandria linearifolia* over pastoral grasses in association with watercourses.

R3: Disturbed Low Open Woodland of *Eucalyptus rudis* - *Corymbia calophylla* over *Kunzea ericifolia* subsp. *ericifolia* over pastoral grasses.

R4: Disturbed Low Open Woodland of *Eucalyptus rudis* - *Melaleuca rhaphiophylla* with pockets of *Corymbia calophylla* over pastoral grasses.

R5: Disturbed Low Open Woodland of *Eucalyptus rudis* over *Melaleuca preissiana* with *Juncus pallidus* in depressions, over pasture grasses.

R6: Woodland of *Eucalyptus rudis – Melaleuca rhaphiophylla* over *Melaleuca teretifolia* and *Astartea fascicularis* over *Lepidosperma longitudinale.*

***Corymbia calophylla* Woodlands**

C1: Disturbed Open Woodland of *Corymbia calophylla - Melaleuca preissiana – Melaleuca rhaphiophylla* over *Xanthorrhoea preissii, Viminaria juncea, *Gladiolus caryophyllaceus* and pastoral grasses.

C2: Disturbed Open Woodland of *Corymbia calophylla - Melaleuca preissiana* over *Kingia australis* and *Hypocalymma angustifolium* over pastoral grasses.

C3: Low Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii, Dasypogon bromeliifolius* and *Adenanthos meisneri.*

C4: Disturbed Open Woodland of *Corymbia calophylla - Eucalyptus rudis* over *Agonis flexuosa* over pastoral grasses.

C5: Disturbed Low Open Woodland of *Corymbia calophylla - Melaleuca preissiana* over *Taxandria linearifolia, Astartea fascicularis, Baumea articulata* and *Juncus pallidus* over pastoral grasses.

C6: Disturbed Low Open Woodland of *Corymbia calophylla - Eucalyptus marginata* subsp. *marginata - Banksia menziesii - Allocasuarina fraseriana* over *Kunzea ericifolia* subsp. *ericifolia* over pasture grasses.

C7: Disturbed Low Open Woodland of *Corymbia calophylla - Eucalyptus wandoo* over *Melaleuca preissiana* over pasture grasses.

***Eucalyptus marginata* subsp. *marginata* Woodlands**

M1: Disturbed Open Woodland of *Eucalyptus marginata* subsp. *marginata* over *Cartonema philydroides.*

M2: Open Woodland of *Eucalyptus marginata* subsp. *marginata – Corymbia calophylla* over *Kunzea ericifolia* subsp. *ericifolia, Pericalymma ellipticum* and *Acacia pulchella* var. *glaberrima* over Poaceae species.

M3: Open Woodland of *Eucalyptus marginata* subsp. *marginata - Banksia ilicifolia - Banksia grandis - Banksia littoralis* and *Nuytsia floribunda* over *Kunzea ericifolia* subsp. *ericifolia, Acacia pulchella, Stirlingia latifolia, Xanthorrhoea preissii* and *Dasypogon bromeliifolius.*

M4: Woodland of *Eucalyptus marginata* subsp. *marginata - Corymbia calophylla - Banksia attenuata* and *Banksia grandis* over *Xanthorrhoea preissii, Hibbertia hypericoides, Aotus procumbens, Macrozamia riedlei, Dasypogon bromeliifolius* and *Bossiaea eriocarpa.*

M5: Woodland of *Eucalyptus marginata* subsp. *marginata - Corymbia calophylla - Banksia attenuata - Banksia grandis* and *Xylomelum occidentale* over *Kunzea ericifolia* subsp. *ericifolia, Hibbertia hypericoides, Daviesia incrassata* subsp. *incrassata, Brachyloma preissii, Persoonia saccata* and *Acacia willdenowiana*.

***Eucalyptus gomphocephala* Woodlands**

G1: Open Woodland of *Eucalyptus gomphocephala* - *Corymbia calophylla* over pasture species.

G2: Open Woodland of *Eucalyptus gomphocephala* - *Allocasuarina fraseriana* over low mixed shrubs and herbs.

G3: Open Woodland of *Eucalyptus gomphocephala* – *Eucalyptus marginata* subsp. *marginata*– *Banksia* species over low mixed shrubs and herbs.

G4: Open Woodland of *Eucalyptus gomphocephala* over *Acacia saligna, Acacia rostellifera, Dryandra sessilis* var. *cygnorum* and low mixed shrubs.

G5: Open Woodland of *Eucalyptus gomphocephala* over *Acacia* species and *Melaleuca rhaphiophylla* and low sedges and shrubs.

***Eucalyptus decipiens* Woodlands**

E1: Low Open Woodland of *Eucalyptus decipiens* - *Banksia littoralis* - *Acacia rostellifera* over *Dryandra sessilis* var. *cygnorum* and low mixed shrubs.

***Banksia* Woodlands**

B1: Disturbed Low Open Woodland of *Banksia ilicifolia* - *Eucalyptus marginata* subsp. *marginata* - *Allocasuarina fraseriana* over low shrubs and pastoral grasses.

B2: Disturbed Open Woodland of *Banksia ilicifolia* - *Eucalyptus marginata* subsp. *marginata* - *Allocasuarina fraseriana* - *Xylomelum occidentale* over *Hibbertia hypericoides, Hibbertia huegelii* and *Hyalosperma cotula.*

B3: Open Woodland of *Banksia attenuata* – *Banksia ilicifolia* - *Eucalyptus marginata* subsp. *marginata* over *Kunzea ericifolia* subsp. *ericifolia, Stirlingia latifolia, Calytrix fraseri, Adenanthos meisneri* and *Dasypogon bromeliifolius.*

B4: Open Woodland of *Banksia attenuata* – *Eucalyptus marginata* subsp. *marginata* over *Kunzea ericifolia* subsp. *ericifolia, Allocasuarina humilis, Stirlingia latifolia* and mixed shrubs.

B5: Open Woodland of *Banksia attenuata* – *Banksia ilicifolia* - *Eucalyptus marginata* subsp. *marginata* over *Kunzea ericifolia* subsp. *ericifolia* with occasional *Nuytsia floribunda* and *Corymbia calophylla* over *Melaleuca thymoides, Calytrix fraseri, Acacia pulchella* var. *glaberrima* and mixed shrubs.

B6: Open Woodland of *Banksia ilicifolia* - *Banksia attenuata* - *Agonis flexuosa* and *Eucalyptus marginata* subsp. *marginata* over dense *Kunzea ericifolia* subsp. *ericifolia* with *Bossiaea eriocarpa, Hibbertia hypericoides, Dasypogon bromeliifolius, Acacia pulchella* and *Patersonia occidentalis*.

***Melaleuca* Woodlands**

P1: Disturbed Open Woodland of scattered *Melaleuca preissiana* over *Juncus pallidus* and pastoral grasses.

P2: Disturbed Low Open Woodland of *Melaleuca rhaphiophylla* - *Melaleuca preissiana* over *Astartea fascicularis* over pasture grasses and sedges.

P3: Low Open Woodland of *Melaleuca preissiana* and occasional *Eucalyptus marginata* subsp. *marginata* and *Kunzea ericifolia* subsp. *ericifolia* over *Hypocalymma angustifolium* and *Calytrix* species over *Dasypogon bromeliifolius.*

P4: Low Open Woodland of *Melaleuca preissiana* with either *Agonis flexuosa* or *Kunzea ericifolia* subsp. *ericifolia* over *Hypocalymma angustifolium* and *Calytrix* species over *Dasypogon bromeliifolius.*

***Agonis flexuosa* Woodlands and Forests**

F1: Open Forest of *Agonis flexuosa – Eucalyptus marginata* subsp. *marginata* over grasses.

F2: Open Woodland of *Agonis flexuosa* with occasional *Banksia attenuata, Banksia ilicifolia* and *Nuytsia floribunda* over mixed shrubs.

***Kunzea ericifolia* subsp. e*ricifolia* Shrublands**

K1: Disturbed Low Shrubland of *Kunzea ericifolia* subsp. *ericifolia* over *Regelia ciliata* over pastoral grasses.

K2: Tall Shrubland of *Kunzea ericifolia* subsp. *ericifolia* over *Hypocalymma angustifolium* and mixed shrubs over *Meeboldina scariosa,* with occasional emergent *Eucalyptus marginata* subsp. *marginata, Banksia attenuata* and *Banksia ilicifolia.*

Closed Heath

H1: Closed Heath of Myrtaceae species, including *Kunzea ericifolia* subsp. *ericifolia, Pericalymma ellipticum, Astartea fascicularis* and *Melaleuca* species over *Baumea* and *Meeboldina* species, with occasional emergent trees of *Corymbia calophylla* and *Eucalyptus marginata* subsp. *marginata.*

H2: Closed Heath of *Pericalymma ellipticum – Hypocalymma angustifolium* shrubs over mixed sedges, with occasional emergent *Melaleuca preissiana, Nuytsia floribunda* and very occasional *Banksia littoralis* trees.

H3: Closed Heath of *Astartea fascicularis – Calothamnus lateralis* and *Cassytha racemosa* over mixed sedges.

Sedgelands

S1: Sedgelands of *Baumea, Meeboldina* and *Juncus* species over pastures in disturbed areas.

5.4 Significant Vegetation Communities

Vegetation communities B2, B4, B5, C5, H3 and M4 are regarded as Locally Significant due to the presence of *Acacia semitrullata* (P3), Community H2 is regarded as Locally Significant to the presence of *Acacia flagelliformis* (P4) and community H3 is regarded as Locally Significant due to the presence of *Boronia juncea* subsp. *juncea* (P1).

Vegetation Community C2 is regarded as 'Threatened Ecological Communities' (TEC's) as described by English and Blyth (1997, 1999) or under the EPBC Act (1999). Five areas of this community were located during the survey. These were centered at:

6411600 mN 397850 mE
6406050 mN 397850 mE
6404800 mN 397850 mE
6400600 mN 397700 mE
6400400 mN 397700 mN

The Threatened Ecological Community (C2 which is equivalent to 3a community as defined by Gibson *et al.* 1994 and recommended for listing by English and Blyth 1997 and 1999; this community is also listed at the Federal level under the EPBC Act 1999) occurred on five localized areas on the alignment. However the community was very degraded and in most cases only the occasional *Corymbia calophylla* or *Kingia australis* plants were present. Consequently these pockets were so disturbed and fragmented (small) that they were considered to be not sustainable, nor regarded as of any value. This community is listed pursuant to Schedule 2 of the Environmental Protection Biodiversity Conservation Act (1999). However in view of the degree of degradation, there should be no need for referral to Environment Australia.

Wetlands in the Wellesley area (near Kemerton) are considered to be significant because of the lack of remnant vegetation left on the Swan Coastal Plain and as it provides one of the few opportunities left to link native vegetation corridors (and associated wildlife corridors) from the coast to eastern areas of the Swan Coastal Plain. This area is under increasing pressure from industrial estates, the expansion of the Australind and Bunbury urban areas and from sand and mineral sand operations.

6. DISCUSSION

6.1 Flora

The flora and vegetation assessment undertaken on the Kwinana to Australind infrastructure corridor recorded 69 families, 195 genera and 326 plant taxa, including subspecies and varieties (Appendix A). The low number of taxa recorded during a survey of such relatively large size reflects the high degree of disturbance and the large area of cleared pasture, particularly in the southern portion. The major families recorded reflect the predominant types of vegetation communities recorded. In view of the seasonal conditions and particular period of drought, it is predicted that additional species would be recorded if further survey work were undertaken during other seasons or in more favourable rainfall periods.

No plant species listed as Declared Rare Flora under the Wildlife Conservation Act (1950) were located during the survey. No plant species listed as Vulnerable, Threatened, Endangered or Critically Endangered, under the EPBC Act (1999) were located during the survey. One Priority Four species (Acacia flagelliformis), One Priority Three species (*Acacia semitrullata*) and one Priority One species (*Boronia juncea* subsp. *juncea*) were located within the proposed corridor alignment. It is recommended that further fieldwork be undertaken in the specific areas and vegetation communities that support these species during the construction phase to determine any methods that can minimize disturbance to the native vegetation.

The construction staff operating in the area will need to be informed of the recorded locations of the populations of Priority Flora taxa found along the proposed pipeline infrastructure corridor. All operators will also need to be informed of the potential for individual plants likely to be found at additional locations, particularly where the route may alter from that assessed in the present survey.

A high number of weeds are found to occur within the proposed pipeline infrastructure corridors. The abundance of weeds far exceeds the diversity of weed species recorded. This is because a small number of introduced species are common pasture weeds and occur in dense numbers in grazing paddocks. A total of 77 introduced species were identified within the infrastructure corridor. Five of the recorded weed species, Arum Lily (*Zantedeschia aethiopica*), Blackberry (*Rubus fruticosus*), Cotton Bush (*Gomphocarpus fruticosus)*, Paterson's Curse (*Echium plantagineum*) and Prickly Pear (*Opuntia* sp.) are listed as declared plants under Section 37 of the Agriculture and Related Resources Protection Act (1976). Declared Plants are weeds, which already are or have the potential to become pest weeds. Declared Plants are classed with a priority rating depending on the level or treatment they require for their control, which differs for each weed in different areas of the state. This priority ranking system should not be confused with the Priority status applied to native plant species under threat of extinction. The specific requirements for Declared Plant control and landholder obligations (WA Department of Agriculture, 2003) are summarized in Table 5.

Arum Lily (*Zantedeschia aethiopica*), Blackberry (*Rubus fruticosus*) and Cotton Bush (*Gomphocarpus fruticosus*) are listed by the WA Department of Agriculture as having P1 and P4 requirements for control. Paterson's Curse (*Echium plantagineum*) is listed as having P1 and P3 requirements.

Prickly Pear (*Opuntia* sp.) is listed as a Declared Plant and has requirements for control and landholder obligations in other areas of the state. However there are no requirements for control of the Prickly Pear in the area of this study.

One of the species located was found to be outside of its normal range of occurrence. *Marsdenia velutina* was recorded within communities G4 and G6. The WA Herbarium currently holds four specimens of *Marsdenia velutina* which each represent a separate population. The closest population of this species is located on Mabel Downs in the East Kimberley (approximately 2200km away), with the remaining three populations being located on the far north Kimberley coast, in the Kalumburu region. A population is considered to exhibit a range extension when it is located more than 100km away from previously recorded populations. This species is acting as an introduced species in this environment.

Within the project area, threats to flora conservation currently include the introduction of exotic plant species (weeds), grazing by domestic stock, feral animals and kangaroos, mining, associated infrastructure and vehicular activity, (not necessarily in the order of degree of threat). In terms of land management and potential impacts on natural resources, addressing these issues may have implications for future land use and nature conservation.

Table 5: Specific Requirements for Declared Plant control and landholder obligations (WA Department of Agriculture, 2003)
(Modified from the WA Department of Agriculture website http://www.agric.wa.gov.au)

Specific Requirements	Management Actions
P1 Prohibits movement	The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P3 Aims to control infestation by reducing area and/or density of infestation	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- • Within 100 metres inside of the boundaries of the infestation. • within 50 metres of roads and highwater mark on waterways. • within 50 metres of sheds, stock yards and houses. Treatment must be done prior to seed set each year. Of the remaining infested area:- • Where plant density is 1-10 per hectare treat 100% of infestation. • Where plant density is 11-100 per hectare treat 50% of infestation. • Where plant density is 101-1000 per hectare treat 10% of infestation. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
P4 Aims to prevent infestation spreading beyond existing boundaries of infestation.	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- • within 100 metres inside of the boundaries of the infested property • within 50 metres of roads and highwater mark on waterways • within 50 metres of sheds, stock yards and houses Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.

6.2 Vegetation

6.2.1 Communities and Disturbance

A total of forty two vegetation communities were located and mapped within the corridor alignments. The vegetation communities recorded along the Kwinana to Australind infrastructure corridor were not particularly diverse, despite the high number of communities recorded. The high number of communities recorded during this survey reflects the large area surveyed and to some degree the diversity of landforms within the survey area. Many of the vegetation communities differ only slightly from one another and the contrasts are more than likely due to a loss of structure and diversity due to degradation from intensive farming practises throughout much of the survey area, particularly in the southern portion.

The predominant plant communities were *Eucalyptus* Woodlands over various other tree and shrub species. There were also many *Melaleuca* Woodlands and *Banksia* Woodlands, while less common were *Agonis* Woodlands, *Kunzea* Shrublands, Heaths and Sedgelands. Pastures were also very common.

The condition of the vegetation throughout the survey area ranged from Very Good (3) to Degraded (5), in accordance with the condition scale, adapted from *Keighery* (1994) and used for the Perth Metropolitan area in Bush Forever publications (Department of Environmental Protection, 2000). Evidence of disturbance was largely associated with roads, railway lines, powerlines, existing pipeline corridors and variable grazing pressure associated beef and dairy farms, particularly in the southern portion. In most cases, communities described as "Disturbed" exist as fragments within or adjacent to Completely Degraded (6) pasture, containing only introduced pastoral grasses and being completely void of native species. Most of the communities not specifically defined as "Disturbed" should be regarded as being in Good (4) condition, with the exception of communities E1 and G1.

6.2.2 Significance of Vegetation

Seven of the communities recorded in the Kwinana to Australind infrastructure corridor survey area are regarded as significant. Vegetation communities are referred to as locally significant where the presence of priority flora species has been recorded, where they maintain a range extension of particular taxa from previously recorded locations, or where they are very restricted to one or two locations and/or occur as small isolated communities. In addition, communities that exhibit unusually high structural and species diversity are also of local significance.

Vegetation communities are referred to as Regionally Significant where they are limited to specific landform types, are uncommon or restricted community types within the regional context, or are recognized as a threatened ecological community or supports Declared Rare Flora.

Local Significance

Seven vegetation communities supported Priority Flora taxa (communities B2, B4, B5, C5, H2, H3 and M3). Three Priority Flora species have been located within the survey area (Department of Conservation and Land Management, 2001). In general, vegetation communities in which Priority Flora taxa have been recorded are Locally Significant. These should be avoided whenever possible during construction and operational activities.

Regional Significance

The Threatened Ecological Community (C2 which is equivalent to 3a community as defined by Gibson *et al.* 1994 and recommended for listing by English and Blyth 1997 and 1999; this community is also listed at the Federal level under the EPBC Act 1999) occurred on five localized areas on the alignment, however the community was very degraded and in most cases only the occasional *Corymbia calophylla* or *Kingia australis* plants were present.

Consequently the pockets of C2 community were so disturbed and fragmented (small) that these pockets were considered to be not sustainable and not regarded as of any value. This community is listed pursuant to Schedule 2 of the Environmental Protection Biodiversity Conservation Act (1999); however in view of the degree of degradation should not require referral to Environment Australia.

Therefore, none of the communities recorded along the Kwinana to Australind infrastructure corridor were defined as Regionally Significant due to the degree of disturbance in this community.

Degree of Land Clearing

Vegetation communities located in the agricultural areas should be considered both restricted and isolated as they occur in an environment predominantly cleared for primary production. For the most part, vegetation communities described occur as small isolated communities and are very restricted to one or two locations in the survey area.

Therefore, the majority of the vegetation along the routes (with the exception of a few key areas near Leda and Kemerton) has been largely disturbed by agricultural activities, weed invasions, urban expansion and existing infrastructure corridor developments that few sections of the proposed routes are significant in either a local or regional context.

6.3 Plant Diseases

The fungal disease – *Phytophthora cinnamomi* has been confirmed on the low lying wetlands within the Kemerton area of the route alignment and consequently there is a need to take a precautionary approach to all of the vehicle movements along the route to ensure maximum vehicle hygiene is maintained at all times. This dieback has been present for some time and has led to the decline in several susceptible species including *Banksia littoralis* and *Banksia ilicifolia* in these low lying areas.

Therefore every effort should be made to maintain vehicle hygiene measures at all times.

7. RECOMMENDATIONS

The route has been revised on numerous occasions in localised areas so as to minimise the degree of clearing along the alignment. Therefore there is only minimal disturbance to remnant areas of native vegetation, particularly in the agricultural areas. The latter revisions and attempts to minimise the disturbance of native vegetation is in line with the Environmental Protection Authority (EPA) Position Statement No. 2 (Environmental Protection Authority 1999a) and Environmental Protection Authority (EPA) Bulletin 966 (Environmental Protection Authority 1999b).

The width of the clearing along the proposed infrastructure corridor should be kept to a minimum and prior to any earthworks a detailed inspection should be undertaken on the ground by a botanist and engineer to determine any methods that can minimize disturbance to the native vegetation.

Rehabilitation after construction should aim to return disturbed areas to their pre-production state, or better. The following points should be considered in the preparation of a rehabilitation program:

- the spread of invasive weeds and dieback (in less disturbed areas) be minimized by maintaining vehicle hygiene or other suitable means of control;
- any viable seed be collected for future rehabilitation work;
- unnecessary clearing of vegetation beyond that strictly required is avoided, particularly larger trees present through most of the survey area, which provide habitats of many forms and are an integral part of the ecosystem; and
- establishment program for the species through translocation trials or seed collection trials. The latter should be undertaken in consultation with experts in this field (eg. Kings Park Botanic Gardens or the Department of Conservation and Land Management).
- stockpiling of topsoil, log debris and leaf litter removed during clearing for future use in rehabilitation programs in the immediate area. If possible, stockpiled topsoil should be directly replaced on disturbed areas.

The impact of *Phytophthora cinnamomi* presents a major threat to the ecology and conservation of susceptible vegetation communities throughout Western Australia. The occurrence of *P. cinnamomi* is not specific to land tenure. Effective control of *P. cinnamomi* (i.e. detection, research and management, requires the combined efforts of the general public, industries and the federal, state and local government departments (Shearer 1990). With respect to the Kwinana to Australind infrastructure corridor, the key area of concern is in the low-lying swamp and wetland areas along the alignment and more specifically in the Kemerton area.

Tracks need to be rationalised and managed to allow access, yet minimize disturbance to developing and established vegetation. In particular, general access should be restricted, albeit denied in sensitive or problematic areas (e.g. restoration areas, weed eradication trials, location of endangered flora, weed infested areas, areas of high erosion). Tracks that are no longer required should be physically blocked off and rehabilitated.

Disturbance to the vegetation in the way of loss or fragmentation may adversely affect the long term viability, condition and diversity of vegetation occurring along certain areas of the infrastructure corridor. Increasing edge effects will invariably reduce the resilience of the vegetation communities to cope with disturbances (e.g. fire, weed invasion) in both the short and long term. Increased fragmentation and associated perimeter area ratios of bushland areas also incur greater management expense (pers. comm. E.M. Mattiske, J. Quilty) to the landholders. It is therefore reiterated that disturbance is minimized wherever possible and consideration is given to edge effects and increasing fragmentation.

A management plan to reduce the impact of the future pipeline construction will need to address issues including erosion, rehabilitation, track use and access, soil hygiene, weed control strategies, remnant vegetation and fragmentation.

8. LIST OF PARTICIPANTS

The following personnel of Mattiske Consulting Pty Ltd were involved in this project:

Principle Ecologist:
- Dr. E. Mattiske

Senior Botanist:
- Dr. P. Armstrong

Botanists:
- Mr. P. Montague
- Ms. K. Honczar
- Ms. N. Whittington
- Ms. K. Freeman
- Mr. S. Chalwell

9. ACKNOWLEDGEMENTS

The author would like to thank Mr Phil Bayley for assistance with the field survey and the staff members of the Department of Mineral and Petroleum Resources Gas Pipeline project team.

In addition, the authors would like to particularly thank Mr Allan White and staff of CAD Resources for assistance with the map production phase.

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APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family		Species
DENNSTAEDTIACEAE		*Pteridium esculentum*
ZAMIACEAE		*Macrozamia riedlei*
PINACEAE	*	*Pinus pinaster*
	*	*Pinus sp.*
ARAUCARIACEAE	*	*Araucaria heterophylla*
CUPRESSACEAE		*Actinostrobus pyramidalis*
		Callitris sp.
POACEAE		*Amphipogon laguroides*
		Austrodanthonia occidentalis
		Austrostipa compressa
		Austrostipa sp.
	*	*Avena fatua*
	*	*Avena* sp.
	*	*Briza maxima*
	*	*Briza minor*
	*	?*Bromus* sp.
	*	*Cynodon dactylon*
	*	*Cynodon* sp.
	*	*Ehrharta calycina*
	*	*Ehrharta longiflora*
	*	*Eragrostis curvula*
	*	*Hordeum leporinum*
	*	*Lagurus ovatus*
	*	*Pennisetum clandestinum*
	*	*Pennisetum macrourum*
	*	*Pennisetum setaceum*
	*	*Pentaschistis airoides*
	*	*Phalaris aquatica*
		Poaceae sp.
CYPERACEAE		*Baumea juncea*
	*	*Cyperus eragrostis*
		Ficinia nodosa
		Gahnia trifida
		?*Lepidosperma brunonianum*
		Lepidosperma effusum
		Lepidosperma longitudinale

APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family		Species
CYPERACEAE (Continued)		*Lepidosperma squamatum*
		Lepidosperma sp.
		Mesomelaena stygia
		Mesomelaena tetragona
		Schoenus curvifolius
		Schoenus sp.
		?*Schoenus* sp.
		Tricostularia neesii var. *neesii*
ARECACEAE	*	*Washingtonia filifera*
ARACEAE	*	*Zantedeschia aethiopica*
RESTIONACEAE		*Desmocladus asper*
		Desmocladus fasciculatus
		Desmocladus flexuosus
		Hypolaena exsulca
		Lyginia barbata
		Lyginia imberbis
		Meeboldina coangustata
		Meeboldina roycei (ms)
CENTROLEPIDACEAE		*Centrolepis drummondiana*
COMMELINACEAE		*Cartonema philydroides*
JUNCACEAE	*	*Juncus acutus*
		Juncus pallidus
		Juncus subsecundus
		Juncus sp.
DASYPOGONACEAE		*Dasypogon bromeliifolius*
		Kingia australis
		Lomandra caespitosa
		Lomandra hermaphrodita
		Lomandra nigricans
		Lomandra sericea
		Lomandra sonderi
		Lomandra ?*suaveolens*
		Lomandra sp.

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Note: * Denotes introduced taxa

Family		Species
XANTHORRHOEACEAE		*Xanthorrhoea gracilis*
		Xanthorrhoea preissii
PHORMIACEAE		*Dianella revoluta* var. *divaricata*
ANTHERICACEAE		*Corynotheca micrantha*
		Dichopogon capillipes
		Johnsonia acaulis
		Johnsonia sp.
		Laxmannia squarrosa
		Thysanotus multiflorus
		Thysanotus patersonii
		Thysanotus thyrsoideus
		Tricoryne elatior
ASPHODELACEAE	*	*Trachyandra divaricata*
COLCHIACEAE		*Burchardia umbellata*
HAEMODORACEAE		*Conostylis aculeata* subsp. *aculeata*
		Conostylis aculeata subsp. *preissii*
		Conostylis juncea
		?*Conostylis* sp.
		Haemodorum simplex
		Haemodorum spicatum
		Phlebocarya ciliata
AGAVACEAE	*	*Agave americana*
IRIDACEAE	*	*Gladiolus caryophyllaceus*
	*	*Gladiolus undulatus*
		Patersonia occidentalis
	*	*Romulea rosea*
	*	*Watsonia meriana var. bulbillifera*
	*	*Watsonia* sp.
ORCHIDACEAE		*Cyrtostylis sp.*
	*	*Disa bracteata*
		Epiblema grandiflorum var. *grandiflorum*
		Eriochilus dilatatus subsp. dilatatus (ms)
		Leporella fimbriata
		Lyperanthus nigricans

APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family		Species
ORCHIDACEAE (Continued)		*Microtis media* subsp. *media*
		Oligochaetochilus vittatus
		Prasophyllum parvifolium
		Orchidaceae sp.
		Orchidaceae sp. 2
CASUARINACEAE		*Allocasuarina fraseriana*
		Allocasuarina humilis
		Casuarina obesa
MORACEAE	*	*Ficus marophylla*
PROTEACEAE		*Adenanthos meisneri*
		Adenanthos obovatus
		Banksia attenuata
		Banksia grandis
		Banksia ilicifolia
		Banksia littoralis
		Banksia menziesii
		Conospermum triplinervium
		Dryandra lindleyana
		Dryandra sessilis var. *cygnorum*
		Grevillea crithmifolia
		Grevillea preissii subsp. *preissii*
		Grevillea vestita subsp. *vestita*
		Hakea varia
		Persoonia longifolia
		Persoonia saccata
		Petrophile linearis
		? *Petrophile serruriae*
		Stirlingia latifolia
		Synaphea spinulosa subsp. *spinulosa*
		Xylomelum occidentale
LORANTHACEAE		*Nuytsia floribunda*
POLYGONACEAE	*	*Acetosella vulgaris*
		Muehlenbeckia adpressa
	*	*Rumex crispus*
	*	*Rumex pulcher*
	*	*Rumex* sp.

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Note: * Denotes introduced taxa

Family		Species
AMARANTHACEAE		*Ptilotus drummondii* var. *drummondii*
		Ptilotus polystachyus
AIZOACEAE	*	*Carpobrotus edulis*
CARYOPHYLLACEAE	*	*Petrorhagia dubia*
RANUNCULACEAE		*Clematis linearifolia*
	*	*Ranunculus muricatus*
LAURACEAE		*Cassytha racemosa*
DROSERACEAE		*Drosera erythrorhiza*
		Drosera menziesii
		Drosera pallida
		Drosera pulchella
		Drosera sp. (climbing)
CRASSULACEAE	*	*Crassula alata* var. *alata*
PITTOSPORACEAE		*Billardiera variifolia*
		Pittosporaceae sp.
ROSACE	*	*Rubus fruiticosus*
MIMOSACEAE		*Acacia alata*
	*	*Acacia decurrens*
		Acacia extensa
		Acacia flagelliformis (P4)
		Acacia huegelii
	*	*Acacia longifolia*
	*	*Acacia podalyriifolia*
		Acacia pulchella
		Acacia pulchella var. *glaberrima*
		Acacia rostellifera
		Acacia saligna
		Acacia semitrullata (P3)
		Acacia trigonophylla
		Acacia willdenowiana

APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family		Species
PAPILIONACEAE		*Aotus gracillima*
		Aotus procumbens
		?*Aotus* sp.
		Bossiaea eriocarpa
		Daviesia incrassata subsp. incrassata
		Daviesia physodes
		Dillwynia sp. A Perth Flora (pn)
		Euchilopsis linearis
		Gompholobium capitatum
		Gompholobium confertum
		Gompholobium scabrum
		Gompholobium tomentosum
		Gompholobium venustum
		Hardenbergia comptoniana
		Hovea trisperma
		Jacksonia furcellata
		Jacksonia horrida
		Jacksonia sternbergiana
		Kennedia prostrata
	*	*Lotus suaveolens*
	*	*Lupinus cosentinii*
	*	*Lupinus* sp.
	*	*Medicago* ?*polymorpha*
		Nemcia ?*capitata*
		Oxylobium lineare
		Templetonia retusa
	*	*Trifolium arvense*
	*	*Trifolium* sp.
		Viminaria juncea
GERANIACEAE	*	*Erodium botrys*
		Geranium retrorsum
		Geranium sp.
	*	*Pelargonium capitatum*
OXALIDACEAE	*	*Oxalis caprina*
RUTACEAE		*Boronia dichotoma*
		Boronia juncea subsp. *juncea* (P1)
		Philotheca spicata

APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family		Species
TREMANDRACEAE		*Platytheca galioides*
		Tetratheca hirsuta
POLYGALACEAE		*Comesperma calymega*
		Comesperma confertum
EUPHORBIACEAE	*	*Euphorbia peplus*
	*	*Euphorbia terracina*
		Phyllanthus calycinus
		Poranthera drummondii
	*	*Ricinus communis*
ANACARDIACEAE	*	*Schinus molle*
	*	*Schinus terebinthifolia*
STERCULIACEAE	*	*Brachychiton acerifolius*
		Thomasia cognata
DILLENIACEAE		*Hibbertia huegelii*
		Hibbertia hypericoides
		Hibbertia racemosa
		Hibbertia stellaris
		Hibbertia subvaginata
		Hibbertia vaginata
VIOLACEAE		*Hybanthus calycinus*
CACTACEAE	*	*Opuntia stricta*
LYTHRACEAE	*	*Lythrum hyssopifolia*
MYRTACEAE		*Agonis flexuosa*
		Astartea fascicularis
		Astartea sp. Brixton Road (pn)
		Astartea sp. Juniperina (pn)
		Baeckea camphorosmae
		Calothamnus lateralis
		Calytrix flavescens
		Calytrix fraseri
		Corymbia calophylla
		Eucalyptus decipiens
	*	*Eucalyptus globulus*

APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family	Species
MYRTACEAE (Continued)	*Eucalyptus gomphocephala*
	Eucalyptus marginata subsp. *marginata*
	Eucalyptus rudis
	Eucalyptus wandoo
	Eucalyptus sp.
	Hypocalymma angustifolium
	Hypocalymma robustum
	Kunzea ericifolia subsp. *ericifolia*
	Kunzea glabrescens
	Melaleuca hamulosa
	Melaleuca huegelii
	Melaleuca incana subsp. *incana*
	Melaleuca lateritia
	Melaleuca nematophylla
	Melaleuca pauciflora
	Melaleuca preissiana
	Melaleuca rhaphiophylla
	Melaleuca systena
	Melaleuca teretifolia
	Melaleuca thymoides
	Melaleuca viminea subsp. *viminea*
	Pericalymma ellipticum
	Regelia ciliata
	Scholtzia involucrata
	Taxandria linearifolia (ms)
HALORAGACEAE	*Gonocarpus paniculatus*
APIACEAE	*Daucus* sp.
	Platysace filiformis
	Trachymene pilosa
	Trachymene sp.
	Xanthosia huegelii
EPACRIDACEAE	*Astroloma pallidum*
	?*Astroloma* sp.
	Brachyloma preissii
	Conostephium pendulum
	Leucopogon australis subsp. *acutifolius* (ms)
	Leucopogon conostephioides

APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family		Species
EPACRIDACEAE (Continued)		*Leucopogon oxycedrus*
		Leucopogon ?*parviflorus*
		Leucopogon polymorphus
		Leucopogon propinquus
		Leucopogon sp.
		Lysinema ciliatum
PRIMULACEAE	*	*Anagallis arvensis*
LOGANIACEAE		*Logania serpyllifolia* subsp. *angustifolia*
		Phyllangium paradoxum
GENTIANACEAE	*	*Centaurium erythraea*
MENYANTHACEAE		*Villarsia albiflora*
ASCLEPIADACEAE	*	*Asclepias* sp.
	*	*Gomphocarpus fruiticosus*
	*	*Marsdenia* ?*velutina*
BORAGINACEAE	*	*Echium plantagineum*
LAMIACEAE		*Hemiandra pungens*
	*	*Mentha pulegium*
	*	*Mentha* sp.
SCROPHULARIACEAE	*	*Parentucellia viscosa*
OROBANCHACEAE	*	*Orobanche minor*
RUBIACEAE		*Opercularia hispidula*
		Opercularia vaginata
LOBELIACEAE		*Lobelia tenuior*
GOODENIACEAE		*Dampiera linearis*
		Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634) (pn)
		? *Lechenaultia floribunda*
		Scaevola glandulifera

APPENDIX A : VASCULAR PLANT SPECIES RECORDED ON PROPOSED KWINANA TO AUSTRALIND PIPELINE, OCTOBER 2002 - OCTOBER 2003

Note: * Denotes introduced taxa

Family		Species
STYLIDIACEAE		*Levenhookia stipitata*
		Stylidium brunonianum
		Stylidium brunonianum subsp. *brunonianum*
		Stylidium calcaratum
		Stylidium ?*carnosum*
		Stylidium divaricatum
		Stylidium junceum
		Stylidium piliferum subsp. *piliferum*
		Stylidium schoenoides
ASTERACEAE	*	*Arctotheca calendula*
		Asteridea pulverulenta
	*	*Cirsium vulgare*
	*	*Conyza* sp.
		Cotula coronopifolia
		Hyalosperma cotula
	*	*Hypochaeris glabra*
		Lagenophora huegelii
		Podolepis lessonii
		Senecio sp.
		Siloxerus humifusus
	*	*Sonchus oleraceus*
	*	*Ursinia anthemoides*

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
Acacia alata			+																																							
* *Acacia decurrens*																									+																	
Acacia extensa															+												+													+	+	
Acacia flagelliformis (P4)																																							+			
Acacia huegelii																									+		+	+														
* *Acacia longifolia*				+																																						
* *Acacia podalyriifolia*																																										+
Acacia pulchella															+														+													
Acacia pulchella var. *glaberrima*			+											+				+	+	+	+		+	+	+	+		+				+	+				+			+		+
Acacia rostellifera																			+	+	+	+																				
Acacia saligna			+	+									+								+	+																				
Acacia semitrullata (P3)										+					+										+		+	+												+		
Acacia trigonophylla														+											+			+												+		
Acacia willdenowiana																	+																									
* *Acetosella vulgaris*																																										+
Actinostrobus pyramidalis		+																																								
Adenanthos meisneri			+					+		+																	+	+								+			+	+		
Adenanthos obovatus										+															+															+		
* *Agave americana*																																										+
Agonis flexuosa									+		+														+		+	+	+				+	+	+					+		+
Allocasuarina fraseriana		+	+								+								+					+	+	+										+						
Allocasuarina humilis															+													+														
Amphipogon laguroides																																							+	+		
* *Anagallis arvensis*						+												+	+		+																				+	
Aotus gracillima										+																														+		
Aotus procumbens															+	+												+														
?*Aotus* sp.																																+										
* *Araucaria heterophylla*																																										+
* *Arctotheca calendula*				+															+	+	+		+	+		+															+	
* *Asclepias* sp.																																										+
Astartea fascicularis					+	+				+																	+				+								+	+		+
Astartea spp. (previously fascicularis)																																							+			
Astartea sp. Brixton Road (pn)																																								+		
Astartea sp. juniperina (pn)				+																																						+
Asteridea pulverulenta														+											+		+															
?*Astroloma* sp.														+																												
Austrodanthonia occidentalis																									+																	
Austrostipa compressa														+													+									+						
Austrostipa sp.																				+																						
* *Avena fatua*				+		+												+	+	+	+	+	+	+		+								+	+						+	+
* *Avena* sp.																								+	+	+								+	+						+	+
Baeckea camphorosmae			+					+																	+																	
Banksia attenuata														+	+	+	+		+	+	+				+		+	+	+						+	+	+					
Banksia grandis															+	+	+			+							+	+														
Banksia ilicifolia														+	+									+	+	+	+	+	+						+	+	+				

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
Banksia littoralis															+										+			+				+										
Banksia menziesii											+									+	+															+						
Baumea juncea																						+																				
Billardiera variifolia			+																																							
Boronia dichotoma																											+												+	+		
Boronia juncea subsp. *juncea* (P1)																																								+		
Bossiaea eriocarpa														+	+	+									+		+	+	+													
* *Brachychiton acerifolius*																																										+
Brachyloma preissii														+		+	+								+		+	+									+					
* *Briza maxima*			+	+						+				+	+			+	+	+	+	+		+	+	+	+	+						+	+	+	+		+	+	+	+
* *Briza minor*				+										+										+	+	+													+	+	+	
?*Bromus* sp.																												+												+		
Burchardia umbellata			+											+		+									+		+	+														
Callitris sp.																																										+
Calothamnus lateralis										+																						+							+	+		
Calytrix flavescens																									+		+	+					+									
Calytrix fraseri														+	+												+	+														
* *Carpobrotus edulis*																			+	+	+																					
Cartonema philydroides														+											+			+												+		
Cassytha racemosa																												+				+							+	+		
Casuarina obesa			+																																							
* *Centaurium erythraea*																																								+	+	
Centrolepis drummondiana																																				+						
* *Cirsium vulgare*																															+										+	+
Clematis linearifolia																					+																					
Comesperma calymega																									+		+	+												+		
Comesperma confertum																																+								+		
Conospermum triplinervium																				+																						
Conostephium pendulum														+	+										+		+	+	+													
Conostylis aculeata subsp. *aculeata*														+	+	+	+								+														+			
Conostylis aculeata subsp. *preissii*																			+	+	+															+						
Conostylis juncea																											+	+														
?*Conostylis* sp.																									+		+															
* *Conyza* sp.																																										+
Corymbia calophylla	+	+	+	+			+	+	+	+	+	+	+	+		+	+	+							+		+	+											+		+
Corynotheca micrantha																									+																	
Cotula coronopifolia																															+								+			
* *Crassula alata* var. *alata*																								+	+	+		+														
* *Cynodon dactylon*				+		+							+						+															+	+							+
* *Cynodon* sp.																																		+	+							+

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
* *Cyperus eragrostis*																																										+
Cyrtostylis sp.															+		+												+													
Dampiera linearis														+														+				+							+	+		
Dampiera trigona															+																									+		
Dasypogon bromeliifolius			+							+				+	+	+	+							+	+	+	+	+	+			+				+	+			+		
Daucus sp.														+																												
Daviesia incrassata subsp. incrassata																	+																									
Daviesia physodes																								+		+	+	+														
Desmocladus asper																					+																					
Desmocladus fasciculatus															+	+									+																	
Desmocladus flexuosus			+											+	+		+								+											+						
Dianella revoluta var. *divaricata*																			+	+	+				+																	
Dichopogon capillipes																	+								+																	
Dillwynia sp. A Perth Flora (pn)																																								+		
* *Disa bracteata*														+										+	+	+		+											+	+		
Drosera erythrorhiza															+																											
Drosera menziesii																											+															
Drosera paleacea																													+													
Drosera pulchella																																								+		
Drosera sp. (climbing)															+	+	+												+													
Dryandra lindleyana			+																	+	+																					
Dryandra sessilis var. *cygnorum*																		+	+	+	+		+																			
* *Echium plantagineum*																															+											
* *Ehrharta calycina*		+	+	+	+	+			+	+	+	+	+	+				+	+	+	+	+	+	+	+	+				+				+	+		+				+
* *Ehrharta longiflora*																															+					+						
Epiblema grandiflorum var. *grandiflorum*																																								+		
* *Eragrostis curvula*		+	+	+	+	+	+	+	+	+	+	+	+	+					+		+									+						+		+				+
Eriochilus dilatatus subsp. dilatatus																	+																									
* *Erodium botrys*																			+																							+
Eucalyptus decipiens																							+																			
Eucalyptus globulus																																										+
Eucalyptus gomphocephala																		+	+	+	+	+																				+
Eucalyptus marginata			+					+			+			+	+	+	+		+	+	+				+		+	+	+							+				+		+
Eucalyptus marginata subsp. *marginata*							+				+			+	+									+		+		+						+								
Eucalyptus rudis	+	+	+	+	+	+			+	+			+																													+
* *Eucalyptus* sp. eastern variety				+				+																																		+
Eucalyptus sp. rehab species																					+																					
Eucalyptus wandoo												+																														
Euchilopsis linearis																																								+		
* *Euphorbia peplus*																				+	+	+																				
* *Euphorbia terracina*																		+	+	+	+		+																			+
Ficinia nodosa																				+																						
* *Ficus marophylla*																																										+

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
Gahnia trifida																						+																					
Geranium retrorsum				+																																						
* *Geranium* sp.																			+																							
* *Gladiolus caryophyllaceus*							+																											+	+							
* *Gladiolus undulatus*																																								+		
* *Gomphocarpus fruiticosus*																					+																					
Gompholobium capitatum																								+		+	+													+		
Gompholobium confertum																											+	+														
Gompholobium scabrum																													+													
Gompholobium tomentosum			+											+	+		+		+					+	+	+	+	+							+	+		+	+		
Gompholobium venustum																									+																	
Gonocarpus paniculatus																																							+			
Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634) (pn)																																							+	+		
Grevillea crithmifolia																			+		+																					
Grevillea preissii subsp. *preissii*																					+																					
Grevillea vestita subsp. *vestita*																				+																						
Haemodorum simplex																																+										
Haemodorum spicatum																									+																	
Hakea varia																																+							+			
Hardenbergia comptoniana															+		+		+	+	+		+	+	+	+																
Hemiandra pungens														+									+	+	+	+	+	+												+		
Hibbertia huegelii														+										+	+	+	+	+														
Hibbertia hypericoides			+											+	+	+	+			+	+			+	+	+	+	+	+								+					
Hibbertia racemosa																					+				+		+										+					
Hibbertia stellaris																																							+	+		
Hibbertia subvaginata															+	+	+																			+						
Hibbertia vaginata															+																											
* *Hordeum leporinum*				+		+												+		+											+			+	+							
Hovea trisperma																								+		+	+	+	+													
Hyalosperma cotula																								+	+	+																
Hybanthus calycinus																			+																							
Hypocalymma angustifolium								+		+																							+						+	+		
Hypocalymma robustum														+																										+		
* *Hypochaeris glabra*														+	+			+	+	+	+		+	+	+	+	+							+	+	+	+		+	+		+
Hypolaena exsulca										+					+										+		+	+											+	+		
Jacksonia furcellata														+		+		+	+								+	+								+	+			+		
Jacksonia horrida										+						+																										
Jacksonia sternbergiana			+															+	+																					+		
Johnsonia acaulis															+																						+					
Johnsonia sp.																												+														
* *Juncus acutus*																															+										+	+
Juncus pallidus					+	+				+																				+											+	

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
Juncus subsecundus																																									+	+
Juncus sp.								+																																		
Kennedia prostrata														+		+	+		+	+				+	+	+	+															
Kingia australis								+																																		
Kunzea ericifolia subsp. *ericifolia*			+		+	+		+		+	+			+	+		+							+	+	+	+	+	+			+	+			+				+		
Kunzea glabrescens														+											+		+	+									+			+		
Lagenophora huegelii														+		+																										
* *Lagurus ovatus*																		+	+	+	+	+	+											+	+							+
Laxmannia squarrosa														+										+	+	+	+															
?*Lepidosperma brunonianum*																						+																				
Lepidosperma effusum																						+																				
Lepidosperma longitudinale						+		+		+																																
Lepidosperma squamatum			+												+									+	+	+	+															
Lepidosperma sp.															+	+																+							+	+		
Leporella fimbriata															+																											
Leucopogon australis subsp. *acutifolius* (ms)																								+	+	+	+													+		
Leucopogon conostephioides																												+														
Leucopogon oxycedrus															+																											
Leucopogon ?*parviflorus*																				+	+																					
Leucopogon polymorphus														+	+												+															
Leucopogon propinquus														+											+																	
Leucopogon sp.																																					+					
Levenhookia stipitata																									+																	
Lobelia tenuior														+													+													+		
Logania serpyllifolia subsp. *angustifolia*																											+															
Lomandra caespitosa																									+			+														
Lomandra hermaphrodita															+																											
Lomandra nigricans																													+													
Lomandra sericea														+														+														
Lomandra sonderi			+												+	+	+																									
Lomandra ?*suaveolens*																												+														
Lomandra sp.																									+		+															
* *Lotus suaveolens*																															+			+	+				+	+	+	
* *Lupinus cosentinii*																		+	+															+	+						+	+
* *Lupinus* sp.																						+												+	+						+	
Lyginia barbata			+							+																																
Lyginia imberbis														+	+	+									+		+	+											+	+		
Lysinema ciliatum																												+														
* *Lythrum hyssopifolia*																																							+			
Macrozamia riedlei			+											+	+	+	+	+	+	+	+			+	+	+	+	+	+							+						+
* *Marsdenia* ?*velutina*																					+	+																				
* *Medicago* ?*polymorpha*																															+			+	+						+	
Meeboldina coangustata			+					+																																	+	

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
Meeboldina roycei (ms)																																+							+	+	+	
Melaleuca hamulosa																																								+		
Melaleuca huegelii																					+																					
Melaleuca incana subsp. *incana*																																							+			
Melaleuca lateritia				+																																			+	+		
Melaleuca nematophylla					+																																					
Melaleuca pauciflora																																							+			+
Melaleuca preissiana		+		+	+		+	+	+	+		+																		+	+	+	+						+	+		
Melaleuca rhaphiophylla	+	+	+	+		+	+			+			+								+	+									+							+				+
Melaleuca systena																					+																					
Melaleuca teretifolia						+																									+											
Melaleuca thymoides														+	+									+	+	+	+	+									+		+		
Melaleuca viminea subsp. *viminea*								+																														+				+
* *Mentha pulegium*																															+										+	+
* *Mentha* sp.																																									+	+
Mesomelaena stygia																									+																	
Mesomelaena tetragona			+					+																																		
Microtis media subsp. *media*																																								+		
Muehlenbeckia adpressa																						+																				
Nemcia ?capitata																												+														
Nuytsia floribunda		+						+						+	+									+	+	+	+	+	+						+				+	+		
Oligochaetochilus vittatus																+	+																									
Opercularia echinocephala																+																										
Opercularia hispidula														+																												
Opercularia vaginata																				+																						
* *Opuntia stricta*																																									+	+
Orchidaceae sp.																	+																									
Orchidaceae sp. 2															+	+																										
* *Orobanche minor*																			+	+				+	+	+	+															
* *Oxalis caprina*																				+			+																		+	+
Oxylobium lineare																																							+	+		
* *Parentucellia viscosa*																																							+	+		
Patersonia occidentalis								+		+				+	+									+	+	+	+	+	+											+		
* *Pelargonium capitatum*																						+																				
* *Pennisetum clandestinum*	+		+	+											+																+			+	+						+	
* *Pennisetum macrourum*			+																															+	+						+	
* *Pennisetum setaceum*																					+	+												+	+						+	
* *Pentaschistis airoides*																											+							+	+						+	
Pericalymma ellipticum								+		+					+													+				+							+	+		
Persoonia longifolia																											+	+														
Persoonia saccata														+			+											+	+													
Petrophile linearis			+											+	+												+	+								+						
? Petrophile serruriae																																										

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
* *Petrorhagia dubia*																			+	+	+				+																+	+
* *Phalaris aquatica*				+																																					+	
Philotheca spicata			+																																					+		
Phlebocarya ciliata			+											+														+								+	+			+		
Phyllangium paradoxum																																				+						
Phyllanthus calycinus																			+	+		+																				
Pinus sp.																																										+
* *Pinus pinaster*																												+														+
Pittosporaceae sp.																											+															
Platysace filiformis																	+										+															
Platytheca galioides																																								+		
Poaceae sp.															+						+	+																				
Podolepis lessonii																																				+						
Poranthera drummondii																												+														
Prasophyllum parvifloium															+																											
Pteridium esculentum	+										+																													+		
Ptilotus drummondii var. *drummondii*																				+																						
Ptilotus polystachyus																			+				+																			
Pyrorchis nigricans																																				+						
* *Ranunculus muricatus*																															+											
Regelia ciliata																			+																	+						
* *Ricinus communis*																																									+	+
* *Romulea rosea*																					+												+	+	+						+	+
* *Rubus fruiticosus*																																										+
* *Rumex crispus*		+		+																																						+
* *Rumex pulcher*																																										+
* *Rumex* sp.																									+																	
Scaevola glandulifera																				+																						
* *Schinus molle*																																										+
* *Schinus terebinthifolia*																					+																					
Schoenus curvifolius																												+														
Schoenus sp.																																							+	+		
?*Schoenus* sp.																			+		+																					
Scholtzia involucrata																																				+						
Senecio sp.																									+																	
Siloxerus humifusus																																							+	+		
* *Sonchus oleraceus*				+														+			+		+		+									+	+						+	+
Stirlingia latifolia			+											+	+									+	+	+		+														
Stylidium brunonianum																									+															+		
Stylidium brunonianum subsp. *brunonianum*														+	+									+	+	+	+	+				+				+			+	+		
Stylidium calcaratum																																							+			
Stylidium ?carnosum															+												+		+													
Stylidium divaricatum																																							+	+		

APPENDIX B: VASCULAR PLANT SPECIES IN VEGETATION COMMUNITIES ON PROPOSED KWINANA TO AUSTRALIND PIPELINE ROUTE, 2002 - 2003

	Vegetation Communities																																								
Species	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**C1**	**C2**	**C4**	**C5**	**C6**	**C7**	**M1**	**M2**	**M3**	**M4**	**M5**	**G1**	**G2**	**G3**	**G4**	**G5**	**E1**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**P1**	**P2**	**P3**	**P4**	**F1**	**F2**	**K1**	**K2**	**H1**	**H2**	**H3**	**S1**	**D**
Stylidium junceum																																							+	+		
Stylidium piliferum subsp. *piliferum*															+	+											+															
Stylidium schoenoides																									+		+	+														
Synaphea spinulosa subsp. *spinulosa*																									+																	
Taxandria linearifolia (ms)		+								+																																
Templetonia retusa																				+		+																				
Tetraria octandra																+																										
Tetratheca hirsuta															+													+														
Thomasia cognata																						+																				
Thysanotus multiflorus																											+					+							+	+		
Thysanotus patersonii																								+	+	+	+	+														
Thysanotus thyrsoideus																									+			+														
* *Trachyandra divaricata*																			+	+	+		+																			+
Trachymene pilosa																																	+			+						
Trachymene sp.																									+		+															
Tricoryne elatior			+											+							+				+		+															
Tricostularia neesii var. *neesii*								+																																		
* *Trifolium arvense*																																		+	+						+	+
Trifolium sp.										+																																
* *Ursinia anthemoides*														+					+					+	+	+	+	+						+	+	+	+			+		+
Villarsia albiflora																																							+	+		
Viminaria juncea							+																																	+		+
* *Washingtonia filifera*																																										+
* *Watsonia meriana* var. *bulbillifera*		+																																								+
* *Watsonia* sp.			+							+																												+				
Xanthorrhoea gracilis															+										+																	
Xanthorrhoea preissii			+				+	+		+				+	+	+	+		+	+	+		+	+	+	+	+	+									+		+	+		+
Xanthosia huegelii														+													+	+														
Xylomelum occidentale			+												+		+								+	+																
* *Zantedeschia aethiopica*	+																	+																								+