Department of Environment and Conservation

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: 2832/1

Permit type: Area Permit

1.2. Proponent details

Proponent's name: Trigrapes Pty Ltd

1.3. Property details

Property: LOT 11 ON DIAGRAM 67529

Local Government Area: Shire Of Gingin

Colloquial name:

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
60		Mechanical Removal	Horticulture

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
Beard vegetation association: 1027 - Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri. (SAC Bio Datasets 17/02/2009; Shepherd, 2007) Heddle Vegetation Complexes: Karamal complex - south: Open forest of E. marginata - E. calophylla with second storey of B. grandis. Moondah complex: Low closed to low open forest of B. attenuata - B. menziesii - E. todtiana - B. prionotes on slopes, open woodland of E. calophylla - Banksia spp. in valley. (Heddle et al, 1980)	The area under application (60ha) is located within Lot 11 (180ha property, zoned rural). The proposed clearing is for viticulture. The area under application has been identified as two vegetation habitat types: - Banksia spp.-Eucalyptus todtiana low open woodland; and - Eucalyptus marginata-Corymbia calophylla open forest. The area was considered to be in excellent to pristine condition with minimal disturbance observed.	Excellent: Vegetation structure intact; disturbance affecting individual species, weeds non-aggressive (Keighery 1994)	The condition of the native vegetation under application was sourced from the site inspection conducted on the 05 March 2009 (DEC, 2009)

3. Assessment of application against clearing principles

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments

Proposal is at variance to this Principle

A site inspection (DEC, 2009) of the area under application identified two vegetation habitat types:
- Banksia spp.-Eucalyptus todtiana low open woodland; and
- Eucalyptus marginata-Corymbia calophylla open forest

The vegetation under application is in an excellent to pristine condition, supporting structurally intact and floristically diverse vegetation communities with minimal disturbance (DEC, 2009). Given the condition, the vegetation is representative of an area of high floristic diversity.

Suitable habitat was observed for ground dwelling fauna such as the Chuditch and Western Brush Wallaby with the structurally intact and dense understorey. In addition, the western and northern areas under application are well connected to large tracts of surrounding bushland.

There are approximately ten occurrences of Priority Ecological Community (PEC), Banksia on yellow-orange sands with the closest occurrence being within the north-west corner of the area under application (covering an area of ~2ha). This PEC is Banksia woodland of the Gingin area restricted to soils dominated by yellow-

orange sands, which occurs within the area under application. The soils within the area under application are described as yellow earthy sands (Northcote et al. 1960-68), which are consistent with this PEC. In addition, all known occurrences of the Priority Ecological Community (PEC) Banksia on yellow-orange sands contain the rare species Chamelaucium lullfitzii (DEC, 2008). The area under application may also provide suitable habitat for rare flora, Ptychosema pusillum.

DEC (2008) considers that plots should be established in the range of vegetation units at the site and scored (typically spring and late spring), and perform analysis of the data using appropriate statistical techniques to accurately determine the extent of this priority floristic community type present on the site.

Given that the vegetation is in an excellent to pristine condition, there is the potential for this vegetation to provide suitable habitat for fauna and rare flora, and comprises a PEC, it is considered that the vegetation comprises a high level of biodiversity.

An appropriately timed flora survey in accordance with EPA Guidance Statement 51 is required to determine the species composition and significance of the vegetation under application.

Methodology

References:
- DEC (2008)
- DEC (2009)
- Northcote et al (1960-68)
- RPS (2008)

GIS Database:
- SAC Bio Datasets 18/02/2009

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments

Proposal is at variance to this Principle

Two fauna species of conservation significance are known to occur in the local area (10km radius) being, Chuditch (Dasyurus geoffroii) and Black-striped snake (Neelaps calonotos).

Fauna Habitat Notes (DEC, 2007) indicate that Chuditch occupy large home ranges, is highly mobile and appears able to utilise bush remnants and corridors.

Carnaby's Black Cockatoo (Calyptorhynchus latirostris) would also utilise the vegetation under application as they are known to feed on a large variety of plants including Proteaceous species (e.g. banksia, dryandra and grevillea), marri nuts (Corymbia calophylla), jarrah (Eucalyptus marginata), tuart (Eucalyptus gomphocephala) and Casuarina spp (Shah, 2006). This species is listed as a Schedule 1 species under the Wildlife Conservation (Specially Protected Fauna) Notice 2008.

A site inspection (DEC, 2009) of the area under application identified two vegetation habitat types:
- Banksia spp.-Eucalyptus todtiana low open woodland; and
- Eucalyptus marginata-Corymbia calophylla open forest

The vegetation under application is in excellent to pristine condition, supporting structurally intact and floristically diverse vegetation communities (DEC, 2009). Suitable habitat was observed for ground dwelling fauna such as the Chuditch and Western Brush Wallaby with structurally intact and dense understorey, and suitable foraging and nesting habitat for avian species. In addition, the western and northern areas under application are well connected to large tracts of surrounding bushland to form effective corridors allowing fauna to move freely over large surrounding areas of native vegetation.

The vegetation under application is in excellent to pristine condition with Banksia spp, Eucalyptus marginata, and Corymbia calophylla, and comprises habitat suitable for a range of fauna, including those of conservation significance. It is considered that the vegetation under application comprises significant habitat for fauna indigenous to Western Australia and is therefore, considered at variance to this Principle.

An appropriately timed flora survey in accordance with EPA Guidance Statement 56 is required to determine the significance of the vegetation under application as fauna habitat.

Methodology

References:
- DEC (2007)
- DEC (2009)
- Shah (2006)

GIS Database:
- SAC Bio Datasets 17/02/2009

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments

Proposal may be at variance to this Principle

The following five rare flora species are known to occur within the local area (10km radius):
- Chamelaucium lullfitzii;
- Eleocharis keigheryi;
- Grevillea curviloba subsp curviloba;
- Grevillea curviloba subsp incurva; and
- Ptychosema pusillum

The closest records are C. lullfitzii and P. pusillum, which are located ~300m south and south-east of the area under application. Of the five species of rare flora C. lullfitzii and P. pusillum occur on the same soils and within the same vegetation complex as the area under application. C. lullfitzii, a shrub that occurs on white or yellow sand and flowers Sep-Dec; P. pusillum, a perennial herb that occurs on sands and flowers Aug-Oct. (Western Australian Herbarium, 1998-).

During the site inspection (DEC, 2009) areas of yellow sands were observed, which may provide suitable habitat for Chamelaucium lullfitzii; and areas of white sands were observed, which may provide suitable habitat for Ptychosema pusillum.

DEC considers that (2008) Chamelaucium lullfitzii and Ptychosema pusillum may occur within the area under application as both of these species occur nearby and are likely to occur within the area under application; however, an appropriately timed flora survey would be required to confirm their presence. In addition, all known occurrences of the Priority Ecological Community (PEC) Banksia on yellow-orange sands contain the rare species Chamelaucium lullfitzii (DEC, 2008). This PEC ahs been mapped within the north-west corner of the area under application (covering an area of ~2ha) and is likely to occur within other locations within the area under application.

In addition, approximately 20 priority flora species are known to occur within the local area (10km radius):

Given that the vegetation under application includes habitat suitable for rare and priority flora found in the local area, it is considered that the vegetation is likely to include, and be necessary for the continued existence of, rare flora. Therefore, it is considered this current proposal may be at variance to this Principle.

An appropriately timed flora survey in accordance with EPA Guidance Statement 51 is required to determine the occurrence of rare or priority flora.

Methodology

References:
- DEC (2008)
- DEC (2009)
- Western Australian Herbarium (1998-)

GIS Databases:
- Heddle Vegetation Complexes
- Pre-European Vegetation
- SAC Bio Datasets
- Soils, Statewide 17/02/2009

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments

Proposal may be at variance to this Principle

There are four Threatened Ecological Communities (TEC) that are known to occur in the local area (10km radius), being:
- Perth to Gingin Ironstone Formation;
- Herb-rich saline shrublands in claypans;
- Banksia attenuata woodlands over species-rich dense shrublands; and
- Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain.

Of the four TEC, Banksia attenuata woodlands over species-rich dense shrublands (Floristic Community Type 20a), which is located ~4.0km south of the area under application, occurs on the same soils and within a similar vegetation complex as for the area under application. Therefore, it is considered that the vegetation under application may comprise a TEC. DEC (2008) considers that plots need to be established in a range of vegetation units at the site and scored (typically spring and late spring), and perform analysis of the data using appropriate statistical techniques to accurately determine the FCT present at the site.

Given the TEC in the local area, the excellent to pristine condition, and the similar soil and vegetation communities, the current proposal may be at variance to this Principle.

An appropriately timed flora survey in accordance with EPA Guidance Statement 51 and with methodology consistent with Gibson et al. (1994) is required to determine the presence of a TEC within the applied area.

Methodology References:
- DEC (2008)
- Gibson et al. (1994)

GIS Database:
- SAC Bio Datasets17/02/2009

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments

Proposal is not likely to be at variance to this Principle

The vegetation within the areas under application are identified as a component of Beard vegetation type 1027, and Heddle Karamal Complex South and Moondah Complex, of which there is 56.1%, 59.4% and 38.7% of Pre-European extent remaining respectively (Shepherd, 2007; EPA, 2006).

The State Government is committed to the National Objectives and Targets for Biodiversity Conservation which includes a target that prevents the clearance of ecological communities with an extent below 30% of that present Pre-European settlement (Commonwealth of Australia, 2001). The vegetation complexes mapped within the area under application are above the recommended minimum of 30% representation.

Given the extent of vegetation remaining in the Shire (52.8%), the current representation levels of the Heddle complexes and Beard vegetation association and the extensive remnants within the local area, it is not considered likely that the vegetation under application is located in an area that has been extensively cleared.

	Pre-European (ha)	Current extent (ha)	Remaining (%)	In secure tenure (%)
IBRA Bioregion*				
Swan Coastal Plain^	1,501,208	583,140	38.8	
Shire of Gingin*	319,671	168,783	52.8	
Local area (10km radius)	31,400	~12,800	~40	
Beard vegetation type 1027*	39,809	22,315	56.1	30.8
Heddle vegetation complexes**				
Karamal Complex South	24,017	14,278	59.4	27.3
Moondah Complex	17,715	6,864	38.7	9.8

* (Shepherd, 2007)
** (EPA, 2006)
^ Area within Intensive Land Use Zone

Methodology References:
- Commonwealth of Australia (2001)
- EPA (2006)
- Heddle et al (1980)
- Shepherd (2007)

GIS Databases:
- Interim Biogeographic Regionalisation of Australia
- SAC Bio Datasets 17/02/2009

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments

Proposal may be at variance to this Principle

There are no wetlands or watercourses mapped within the area under application with the closest water body being Breera Brook (also mapped as a conservation category wetland), located down slope ~110m south of the area under application. The clearing is proposed within the secondary zone of influence (within 200m of mapped wetlands), which may adversely impact the ecological processes and functions within the wetland (Hill et al, 1996). CCWs are the highest priority wetlands which support a high level of ecological attributes and functions, and their protection also requires the retention of an adequate buffer (WRC, 2001).

A site inspection (DEC, 2009) of the area under application did not identify any wetland dependant vegetation.

Given the area under application is within the buffer to a Conservation Category Wetland, the vegetation under application is considered to may be growing in association with an environment associated with wetlands and watercourses that have significant environmental values. Therefore, the clearing as proposed may be at variance to this Principle.

Methodology References:
- DEC (2009)
- Hill et al (1996)
- WRC (2001)

GIS Databases:
- Geomorphic Wetlands (Mgt Categories), Swan Coastal Plain
- Hydrography, linear

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments **Proposal is at variance to this Principle**

The landscape of the area under application and surrounds can be described as gently undulating plateau underlain by sedimentary rocks (Northcote et al, 1960-68). The chief soils are yellow earthy sands with siliceous sands (Northcote et al, 1960-68). The earthy soils are considered to be at risk of water erosion and the siliceous sands are considered to have high risk to wind erosion. These soils are also known to have a low Phosphorus Retention Index (PRI), and it is considered that the proposed clearing of deep-rooted perennial vegetation is likely to result in increased nutrient loss from the soil profile (McPharlin et al, 1990).

The direct effects of the current proposal to remove 60 hectares of deep rooted perennial native vegetation is considered likely to contribute to the long term cumulative effects of clearing including rising groundwater levels and may result in appreciable land degradation including water logging and eutrophication.

The area under application has a southerly aspect, sloping 175m AHD down to 90m AHD at a gradient of 11%, moderately inclined (Wells, 1988). The clearing as proposed may result in an increase in surface water runoff causing erosion gullies.

Given the areas of earthy soils and the siliceous sands, it is considered that the proposed clearing is likely to cause appreciable land degradation in the form of water erosion, wind erosion, water logging and eutrophication. In addition, given current impacts of extensive native vegetation clearing within a local and regional context, it is considered that the current proposal will contribute to the cumulative impacts of clearing including water logging and eutrophication. Therefore, it is considered that the clearing as proposed is at variance to this Principle.

Methodology References:
- McPharlin et al, 1990)
- Northcote et al (1960-68)
- Wells (1988)

GIS Databases:
- Soils, Statewide
- Topographic Contours, Statewide

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments **Proposal may be at variance to this Principle**

The closest conservation reserves to the area under application are Breera Road Nature Reserve and Timaru Nature Reserve located approximately 800m south and 4.8km south-west, respectively.

Aerial imagery of the local area confirms the vegetation under application has some connectivity to the nearby conservation areas. It is considered likely that the vegetation under application is important for fauna movement and stepping stone for avifauna crossing the landscape. Therefore, the proposed clearing may have an indirect impact on the environmental values of the conservation areas through reducing ecological corridors and inhibiting fauna movement.

Methodology GIS databases:
- DEC Managed Lands and Waters
- Gingin 50cm Orthomosaic - Landgate 2006

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Comments **Proposal is at variance to this Principle**

There are no wetlands or watercourses mapped within the area under application with the closest water body being Breera Brook (also mapped as a conservation category wetland), located down slope ~110m south of

the area under application. The clearing is proposed within the secondary zone of influence (within 200m of mapped wetlands), which may adversely impact the ecological processes and functions within the wetland (Hill et al, 1996). CCWs are the highest priority wetlands which support a high level of ecological attributes and functions, and their protection also requires the retention of an adequate buffer (WRC, 2001).

The area under application has a southerly aspect, sloping 175m AHD down to 90m AHD at a gradient of 11%, moderately inclined (Wells, 1988). The clearing as proposed may result in an increase in surface water runoff causing erosion gullies and sedimentation of Breera Brook.

The chief soils are yellow earthy sands with siliceous sands (Northcote et al, 1960-68). These soils are known to have a low Phosphorus Retention Index (PRI), and it is considered that the proposed clearing of deep-rooted perennial vegetation is likely to result in increased nutrient loss from the soil profile (McPharlin et al, 1990). In addition, any further removal of deep rooted perennials will contribute to the long term cumulative effects of clearing including rising groundwater levels and resulting appreciable land degradation including water logging and eutrophication.

The area under application is located within the Ellen Brook Sub-catchment. The area under application has a nil risk of salinity and is not located within a Public Drinking Water Source Area (PSWSA).

Given the low nutrient retention capacity of the soils; the high risk of nutrient export into the groundwater system; and the very high risk of eutrophication on nearby water bodies, including Breera Brook; the proposed clearing is considered likely to cause deterioration in the quality of surface or ground water. In addition, the proposal to remove 60 hectares of native vegetation is likely to contribute to the cumulative effects of clearing including eutrophication in the region, which may result in the deterioration in the quality of surface and ground water. It is therefore considered that the proposed clearing is at variance to this Principle.

Methodology

References:
- Northcote et al (1960-68)
- Hill et al (1996)
- Wells (1988)
- WRC (2001)

GIS Databases:
- Geomorphic Wetlands (Mgt Categories), Swan Coastal Plain
- Hydrographic Catchments - Subcatchments
- Hydrogology, linear
- Northcote et al (1960-68)
- Public Drinking Water Source Areas (PDWSAs)
- Salinity Risk LM 25m - DOLA 00

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments

Proposal is not likely to be at variance to this Principle

There are no wetlands or watercourses mapped within the area under application with the closest water body being Breera Brook (also mapped as a conservation category wetland), located ~110m south of the area under application; and as such it is considered that the clearing as proposed is not likely to cause or increase the incidence or intensity of localised flooding. Therefore, this clearing proposal is not likely to be at variance to this Principle.

Methodology

GIS Databases:
- Geomorphic Wetlands (Mgt Categories), Swan Coastal Plain
- Hydrography, linear

Planning instrument, Native Title, Previous EPA decision or other matter.

Comments

The Department sent a letter to the applicant on the 12 March 2009. A response letter was received from the applicant on 15 June 2009. The applicant outlined how the environmental issues were going to be addressed:
- Undertaking a detailed flora and fauna survey in September 2009;
- Conducting a land degradation assessment,
- Developing a nutrient & irrigation management plan, and
- Developing a land management plan.

Submission (2008) for the area under application was received. The submission considered land degradation issues including wind and phosphate eutrophication risk, and vegetation fragmentation. These issues were considered as part of the assessment. The submission stated that that the property falls within the Environmental Management Unit (EMU) of the Ellen Brook Catchment; the Catchment Management Plan for the Ellen Brook (2000) suggests that clearing of significant portions of the remaining vegetation in this EMU is to be strongly discouraged.

Planning consent from the Shire of Gingin (2008) is required for this clearing proposal.

The area under application is within the Proclaimed Groundwater Area of Gingin. Therefore any abstraction of groundwater would require a licence. As the proposed purpose of the clearing is for irrigated horticulture a groundwater licence is required.

There is no other RIWI Act Licence, Works Approval or EP Act Licence that affects the area under application.

Carnaby's Black-Cockatoo is classified as Endangered under Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999. The clearing as proposed may result in a loss of habitat and foraging sites for this species; therefore, the proposal is likely to require referral to the Commonwealth Department of Environment Heritage Water and the Arts (DEHWA) under the EPBC Act 1999 for Carnaby's Black Cockatoo.

There is one Aboriginal Site of Significance listed within the areas under application, the applicant will be advised of their obligations under the Aboriginal Heritage Act 1972.

The area under application is located within the Ellen Brook Sub-catchment. The Swan River Trust (2007) advised that as a general principle, it would not generally support this type of development as it will almost certainly result in increased nutrient inputs to the Ellen Brook, which currently contributes up to 37% of the phosphate load and up to 10% of the nitrogen load to the Swan River from coastal plain catchments.

The Swan River Trust's draft Healthy Rivers Action Plan identifies the Ellen Brook as a priority catchment for nutrient reduction and sets a target of 30% reduction in nutrient inputs to the Swan by 2015 (Swan River Trust, 2007).

In addition, the Swan Canning Cleanup Program recognises the Ellen Brook catchment as a major contributor to nutrient loading in the Swan-Canning system which is located downstream (Swan River Trust, 2004). Any additional clearing in the catchment will likely lead to further degradation of the catchments groundwater system and further impacts downstream.

It has been suggested that in order to reduce nutrient export from the Ellen Brook catchment to the Swan Canning Estuary by 50% for nitrogen and 20% for phosphorous, a reduction in the proportion of agricultural land of 20% with well targeted reafforestation of this 20% is necessary (Zammit et al, 2005). Considering this, further clearing of the Ellen Brook catchment is not recommended.

Lot 11 is freehold land and is zoned Rural under the local Town Planning Scheme.

Methodology

References:
- Shire of Gingin (2008)
- Submission (2008)
- Swan River Trust (2004)
- Swan River Trust (2007)
- Zammit et al (2005)

GIS databases:
- Aboriginal Sites of Significance
- Cadastre
- Hydrographic Catchments - Subcatchments
- Town Planning Scheme Zones

4. Assessor's comments

Comment

The assessable criteria have been addressed and the clearing as proposed is at variance to Principles (a), (b), (g) and (i), and may be at variance to Principles (c), (d), (f) and (h).

5. References

Wells, M. (1988) A Method of Assessing Water Erosion Risk in Land Capability Studies - Swan Coastal Plain & Darling Range. Resource Management Technical Report No. 73. Department of Agriculture, Western Australia. ISSN 0729 – 3135.

Commonwealth of Australia (2001) National Targets and Objectives for Biodiversity Conservation 2001-2005, AGPS, Canberra.

DEC (2007) DEC Fauna Habitat Notes.xls. February 2007. Department of Environment and Conservation, Western Australia.

DEC (2008) DEC Species and Communities Branch - advice for CPS 2701/1 on threatened and priority ecological communities, and rare flora. Department of Environment and Conservation (DEC), Western Australia. TRIM Ref DOC69706

DEC (2009) Site Inspection Report for Clearing Permit Application CPS 2832, Lot 11 Breera Road, Gingin. Site inspection undertaken 05/03/2009. Department of Environment and Conservation, Western Australia (TRIM Ref DOC78375).

EPA (2006) Guidance for the Assessment of Environmental Factors - Level of Assessment for Proposals Affecting Natural Areas Within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region. Guidance Statement No 10. Environmental Protection Authority, Western Australia.

Heddle, E. M., Loneragan, O. W., and Havel, J. J. (1980) Vegetation Complexes of the Darling System, Western Australia. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.

Hill, A.L., Semenuik, C. A, Semenuik, V. Del Marco, A. (1996) Wetlands of the Swan Coastal Plain. Volume 2b, Wetland mapping, classification and evaluation. Wetland Atlas. WRC and DEP. Perth WA.

Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.

McPharlin, I., Delroy, N., Jeffrey, B., Dellar, G. and Eales, M. (1990) Phosphorous retention of sandy horticultural soils on the Swan Coastal Plain, W.A. Journal of Agriculture, Volume 31, 1990.

Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68): 'Atlas of Australian Soils, Sheets 1 to 10, with explanatory data'. CSIRO and Melbourne University Press: Melbourne.

Shah, B. (2006) Conservation of Carnaby's Black-Cockatoo on the Swan Coastal Plain, Western Australia. December 2006. Carnaby's Black-Cockatoo Recovery Project. Birds Australia, Western Australia.

Shepherd, D.P. (2007). Adapted from: Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth. Includes subsequent updates for 2006 from Vegetation Extent dataset ANZWA1050000124.

Shire of Gingin (2008) Direct interest submission for Lot 11 Breera Road. TRIM Ref DOC72641

Submission (2008) Direct Interest Submission for CPS 2832/1. TRIM Ref DOC72636

Swan River Trust (2007) Swan River Trust advice on the Ellen Brook Catchment (email), Swan River Trust. TRIM Ref DOC56903

Swan River Trust. (2004). Swan-Canning Cleanup Program Action Plan Implementation 2004. Perth, Western Australia. http://portal.environment.wa.gov.au/portal/page?_pageid=973,2910566&_dad=portal&_schema=PORTAL. Accessed Tuesday, 5 June 2007.

Water and Rivers Commission (2001). Position Statement: Wetlands, Water and Rivers Commission, Perth.

Zammit, C., Sivapalan, M., Kelsey, P. and Vincy, N.R. (2005). Modelling the effects of land-use modifications to control nutrient loads from an agricultural catchment in Western Australia. Ecological Modelling. 187: 60-70.

6. Glossary

Term	Meaning
BCS	Biodiversity Coordination Section of DEC
CALM	Department of Conservation and Land Management (now BCS)
DAFWA	Department of Agriculture and Food
DEC	Department of Environment and Conservation
DEP	Department of Environmental Protection (now DEC)
DoE	Department of Environment
DoIR	Department of Industry and Resources
DRF	Declared Rare Flora
EPP	Environmental Protection Policy
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
TEC	Threatened Ecological Community
WRC	Water and Rivers Commission (now DEC)