Residential Subdivision – Pt Lot 4 Underwood Avenue/Selby Street, Shenton Park

University of Western Australia

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1034
November 2001

ISBN. 0 7307 6660 8
ISSN. 1030 - 0120
Assessment No. 1403

Contents

Figures

Appendices

1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental issues relevant to the proposal to subdivide a portion of Lot 4 corner Underwood Avenue and Selby Street, Shenton Park, to enable residential development. The proponent for the proposal is the University of Western Australia (UWA).

The proposal was first submitted to the Department of Environmental Protection (DEP) as a subdivision application, by the Western Australian Planning Commission (WAPC) in January 2000, upon which the DEP provided early advice. It was later referred to the EPA for consideration under Part IV of the *Environmental Protection Act 1986* (the Act), by a third party in August 2000.

At the time of referral the EPA had limited information on the environmental issues associated with the proposal, particularly in respect of the implications of odour emissions from the nearby waste water treatment plant. The EPA decided to seek additional information before deciding whether or not to assess the proposal, and if so, the level of assessment. This collation of information has taken a considerably longer time than initially expected. Based on the information received, the EPA has decided that the proposal should be assessed under Part IV of the Act. Furthermore, as substantial information has been provided and the EPA has received considerable comment from the general public, it is not considered necessary to undertake a 'traditional' environmental impact assessment through a Public Environmental Review (PER) or Environmental Review and Management Program (ERMP) process. In recognising the special nature of this proposal, the EPA is setting the level of assessment as 'Formal Under Part IV'. Although the level of assessment (Formal Under Part IV) is not specifically set down in the *Environmental Impact Assessment Administrative Procedures Amendment 1999*, the EPA considers this level of assessment appropriate in the circumstances.

2. The proposal

The proposal is for the subdivision of approximately 32 hectares of land being a portion of Lot 4 bounded by Underwood Avenue to the north, Selby Street to the east, UWA's agricultural field station and research centre to the west, and the Water Corporation Workshop Depot Training Centre and Royal Perth Rehabilitation Hospital in the south. The Subiaco Waste Water Treatment Plant (WWTP) is located immediately to the south west of the site. The subdivision proposes 260 lots for residential use, and sets aside land for bushland protection (labelled as Bush Forever), public open space, drainage and road purposes. The subdivision layout is shown as Figure 1, and surrounding land uses in Figure 2.

The site contains extensive areas of bushland, recognized in the draft *Perth's Bushplan* (Government of Western Australia 1998) and partly identified for protection through a Negotiated Planning Solution in the final document, *Bush Forever* (Government of Western Australia 2000), as Bush Forever Site 119 Underwood Avenue Bushland, Shenton Park. The site of the proposed subdivision does not include the whole of the area recognised in the draft *Perth's Bushplan.*

The site is also affected by odour generated by the Subiaco WWTP located to the south west.

It is understood that the land was vested in the Trustees of University Endowment by the Governor in 1908. It has been zoned Urban under the Metropolitan Region Scheme (MRS) since the inauguration of the MRS in 1963 and zoned Development Zone in the City of Nedlands Town Planning Scheme (TPS) No. 2 since 1985. Both of these zones allow for a range of land uses, including residential.

The EPA is aware that there are a number of steps which are yet to be undertaken by planning authorities associated with the consideration of the subdivision proposal. Under the City of Nedlands TPS No. 2, the provisions relating to the Development Zone require that anyone seeking to develop land in the zone should submit an outline development plan (ODP) with the application. In line with this, an ODP has been submitted to the City of Nedlands for the whole of Lot 4, that is 62.9 hectares. However, the City of Nedlands and the WAPC are required to approve the ODP, in principle, prior to advertising. The ODP has not yet been approved by either the City of Nedlands or the WAPC and it has subsequently not been advertised formally by the City of Nedlands.

The WAPC, in considering the proposed subdivision, has sought the advice of various authorities including the City of Nedlands, which is awaiting additional information that it considers necessary to advertise the subdivision plan as part of the ODP. The WAPC has also requested advice on the impacts of odours from the WWTP on the subdivision site. It is important to note that, while there are a number of processes associated with the consideration of the subdivision application by the planning authorities, the WAPC is constrained from making a decision to approve the proposed subdivision until the EPA has finalized its consideration of the proposal and the Minister for the Environment has made a decision following examination of the EPA report.

It is also understood that the Department for Planning and Infrastructure has recently contracted consultants to undertake the *Shenton Park and Mt Claremont Land Use Study and Preparation of a Structure Plan* which is likely to be completed in the first half of 2002. This structure planning process relates to the broader area generally bounded by Underwood Avenue, Stubbs Terrace, Selby Street, Montgomery Avenue and Stephenson Avenue and comprises a collection of public infrastructure, hospitals, community service development and under utilised land. The aim of the study is to identify the existing land use and land tenure of the area, opportunities and constraints for future uses and, if necessary, recommend changes to zones and reservations in the Metropolitan Region Scheme and other statutory and non-statutory mechanisms. The preparation of the report will include the review of comprehensive stakeholder consultation.

Figure 1. Plan of subdivision

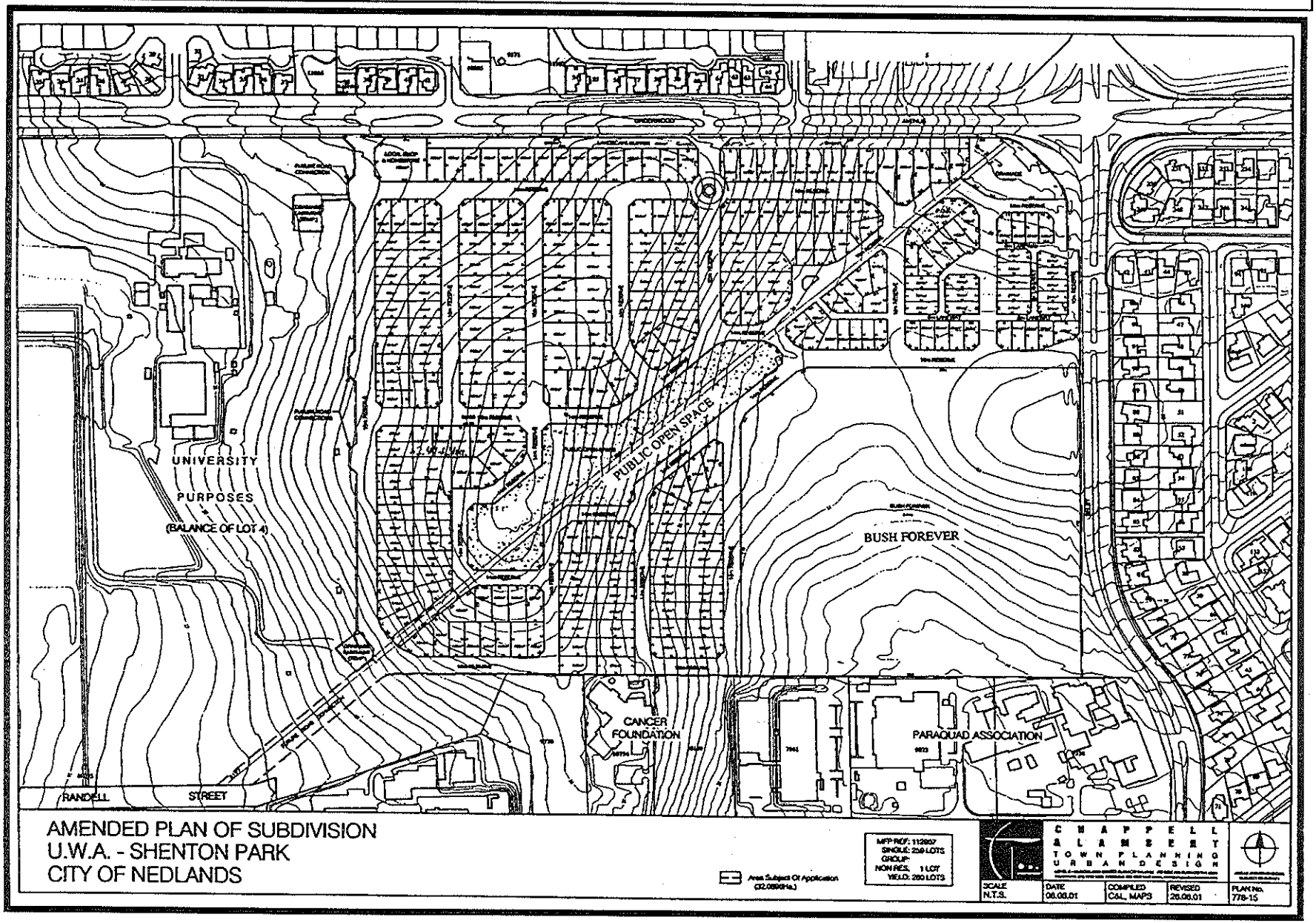
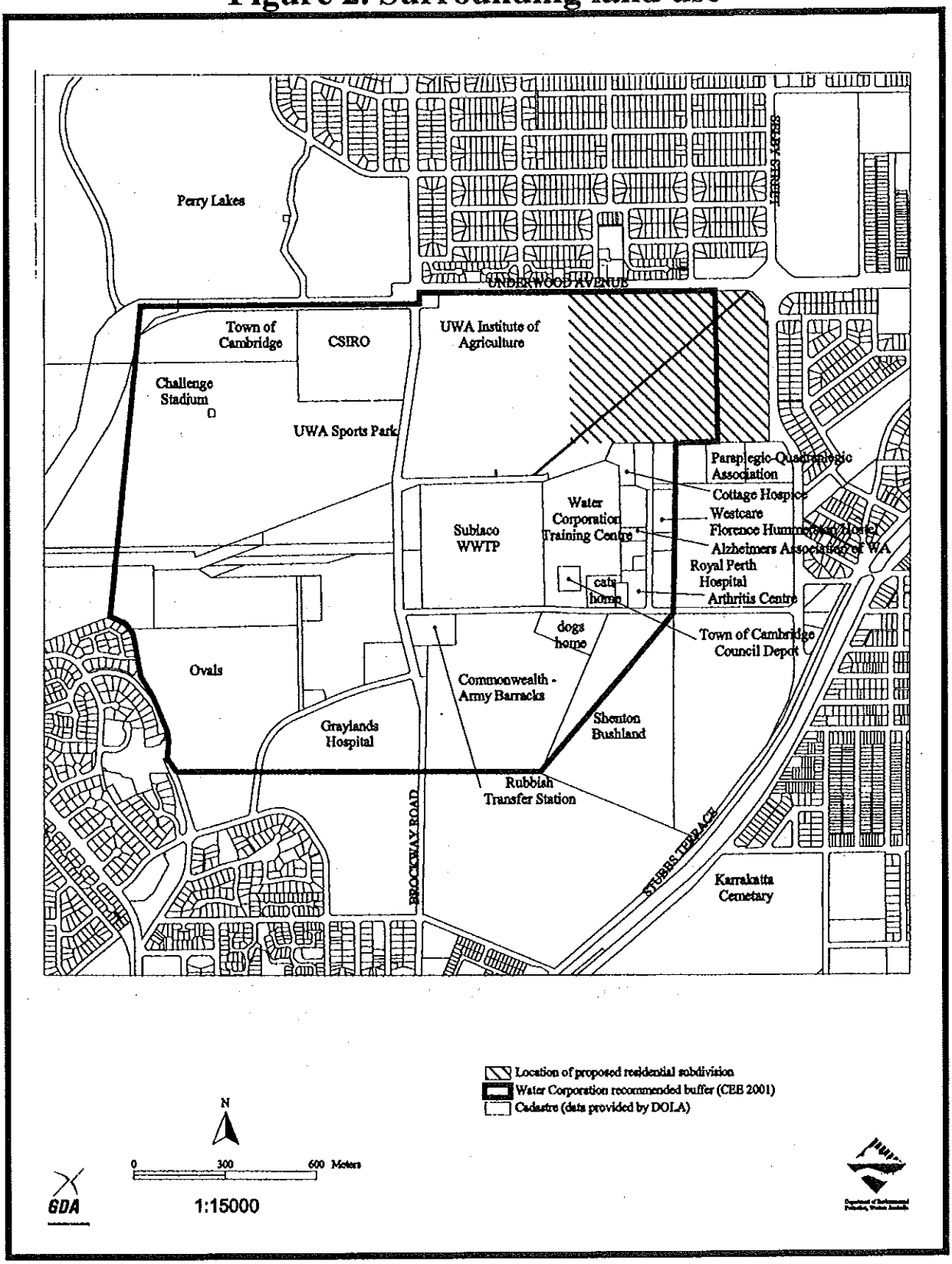


Figure 2. Surrounding land use



3. Process of EPA consideration

Prior to, and since, the referral of the proposed residential subdivision to the EPA in early 2000, there has been extensive consideration of the environmental issues of the bushland values and odour from the Subiaco Waste Water Treatment Plant as they relate to the proposal. The following is a summary of the process undertaken by the EPA, the information available and the key considerations which have contributed to this assessment.

3.1 Bush Forever

In consideration of the proposal, the EPA has taken into account the process already undertaken in the development of the draft *Perth's Bushplan* (Government of Western Australia 1998) and *Bush Forever* (Government of Western Australia 2000).

The draft *Perth's Bushplan* recognised the subdivision area as containing regionally significant remnant native vegetation and included the area as Bushplan Site 119 Underwood Avenue Bushland, Shenton Park. However, *Perth's Bushplan* also recognised that where land was already zoned Urban under the Metropolitan Region Scheme, as is the case for the Underwood Avenue Bushland, such sites were open to the possibility of development through the adoption of a negotiated planning solution, with the aim of striking a balance between conservation and development. Subsequent to discussions with the UWA and the participating departments, the final document, *Bush Forever*, identified the site as an agreed negotiated planning solution. However, the EPA understands that resolution of issues relating to the actual boundaries of the proposed conservation area had not been agreed by all of the agencies involved in *Bush Forever* at the time of its publication.

Shortly after the release of *Bush Forever*, the EPA published a report, *Advice on Aspects of Bush Forever* (EPA 2001a). With particular reference to those sites identified as negotiated planning solutions the report states that:

> *...the EPA would expect a reasonable outcome through the negotiated planning solution process administered by the Ministry for Planning. In this context the EPA considers that a "reasonable outcome" is where the core (highest conservation value) area/s and threatened ecological communities are protected. Recognising the constraints applying to these Sites, the objective should be to protect as much bushland as possible.*

Since referral of the original subdivision proposal in August 2000 and following discussions with the DEP, the proponent has amended the plan in an effort to retain the core conservation values of the bushland, within the constraints of the area that the proponent was prepared to retain as bushland. As a result, the 8.5 hectare proposed conservation area, identified as 'Bush Forever' in the revised subdivision plan (Figure 1), has been amended to protect a representation of the bushland that is in the best (very good) condition, in a single consolidated area to maximise its viability and to retain a connection with the current, but unprotected, bushland linkage to the Shenton Bushland (Bush Forever Site 218). The revised subdivision plan also retains connection to Tuart stands on the crest of the ridge in Public Open Space and limited canopy linkage through to the narrow strip of vegetation to be retained along Underwood Avenue.

3.2 Odour from the Subiaco Waste Water Treatment Plant

The Subiaco Waste Water Treatment Plant, which is located immediately to the south west of the land proposed for subdivision, currently serves approximately 310,000 people in the western suburbs of Perth, treating 58 million litres of waste water each day.

During the last 18 months or so, a substantial number of technical studies and reports have been provided for consideration by the EPA in respect of potential odour levels over the land proposed for subdivision, including those commissioned by the proponent and the Water

Corporation. These reports have been made available to both parties for review and comment and have been examined by air quality specialists within the DEP.

The Water Corporation has commissioned several reports to examine odour emissions and odour complaints (including modelling), and determine appropriate odour control measures for the WWTP. As part of the evaluation of the odour impacts of the Subiaco WWTP the EPA was originally provided with reports prepared by CH2M Hill for the Water Corporation in 1997, based on 1996 emissions data. On reviewing the report and the modelling contained therein, the DEP concluded that the use of Hope Valley meteorological data for modelling of site conditions was questionable. There were also uncertainties relating to measured odour emission data, and a need for a third party review of available information. The UWA also reviewed these documents and provided reports for the EPA's consideration (Chester Consulting Pty Ltd 2000, Alan Tingay & Associates 1999). These reports concluded that odour could be better controlled at the WWTP through improved management measures, allowing subdivision to proceed.

An additional report, *Subiaco Wastewater Treatment Facility – Documentation Review* (Air Water Noise 2001) was provided to the EPA by the UWA in May 2001. The review concluded that the improvements planned by the Water Corporation for odour control are best available technology, and that, with good engineering design practice, a buffer of 450 metres from the primary treatment area should be adequate. It is understood that 450 metres represents the distance between the major WWTP odour source and the nearest residential lot within the proposed subdivision.

An assessment of an appropriate buffer zone for the Subiaco WWTP was undertaken by Consulting Environmental Engineers (CEE) on behalf of the Water Corporation. The consultant's report (CEE 2001) was provided to the EPA in June 2001 and forwarded to the UWA for review and comment. The report concluded that, after planned odour control works, odour levels would still be unacceptably high in the proposed subdivision area.

The EPA considers that this process has provided substantial additional information on odour associated with the Subiaco WWTP and has allowed the opportunity for both the proponent and the Water Corporation to provide detailed submissions to the EPA on this issue.

3.3 Public involvement and input

To allow for public review and comment on the proposed subdivision the UWA voluntarily advertised its proposal and associated supporting documentation in *The West Australian* and the *Subiaco Post*. A four week public review was provided between 8 January and 2 February 2001 to comment on the proposed subdivision (prior to the amendments described above) and the following supporting documentation:

> ATA Environmental (2000) *Lot 4 Underwood Avenue Environmental Assessment (Updated)*
> Alan Tingay & Associates (1999) Subiaco *Waste Water Treatment Plant – Review of Odour Impacts Assessment and Response*
> CH2M Hill (1997) Odour *Impact Assessment Subiaco Waste Water Treatment Facility*
> Chester Consulting Pty Ltd (2000) Subiaco *Waste Water Treatment Plant – Review of Odour Control and Odour Management at the Plant*

Over seventy individual submissions and a number of petitions were received by the UWA and forwarded to the EPA. A large number of submissions were also sent directly to the EPA and the DEP. The UWA provided a summary of public comments and its response to these to the EPA on 23 February 2001 and this is included as Appendix 2.

In March, April and May the EPA received presentations from the UWA, the Friends of Underwood Avenue Bushland Inc and the Water Corporation.

Since referral of the proposed subdivision the level of public interest and concern has been high. The major issues of concern to the community include the following:

- Strategic positioning relative to Kings Park, Bold Park and Shenton Bushland;
- Issues related to the land being endowed to the University of Western Australia;
- Inadequacy of negotiated planning solution process in recognising whole area proposed to be developed by the UWA in proposed outline development plan;
- Contribution to air quality, function as a buffer to the Subiaco Waste Water Treatment Plant;
- Fauna habitat, particularly as a breeding site for the Australian Little Eagle (uncommon in the suburbs);
- Representation of three ecological communities of Jarrah, Tuart and Banksia woodland;
- Preservation for future generations;
- Aboriginal site;
- Protection of groundwater quality;
- Area not viable for conservation as a smaller site; and
- Use as an education site.

4. Environmental issues

It is the EPA's opinion that the following environmental issues are relevant to the proposal:

(a) Protection of regionally significant bushland; and

(b) Odour.

4.1 Protection of regionally significant bushland

In assessing the impacts of the proposed subdivision on the regionally significant bushland, and the adequacy of the proposed conservation area in protection of the core (highest conservation) areas of the Bushplan Site, the EPA has considered the values of the vegetation itself as well as the habitat and corridor values it provides for fauna.

4.1.1 Remnant vegetation

The remnant vegetation within the proposed subdivision area is representative of the Karrakatta – Central and South vegetation complex, on the Spearwood Dunes, as mapped by Heddle *et al.* (1980). While approximately 18% of this vegetation complex remains in the Perth Metropolitan Area of the Swan Coastal Plain, less than 10% of this complex is proposed for protection in designated conservation areas in *Bush Forever* (Government of Western Australia 2000). Compared with most other remnants of this vegetation complex, the Underwood Avenue Bushland is comparatively large and diverse.

On a regional floristic grouping scale the vegetation is considered to represent floristic community type 28, Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands which occurs on sands in upland sites on Spearwood Dunes.

At the local vegetation scale the bushland contains a diversity of upland woodland units typical and representative of the Spearwood Dune System. Eighty native (and 16 weed) species have been recorded in the bushland (ATA Environmental 2000). Significant populations of *Jacksonia sericea*, a Priority 3 species endemic to the Spearwood Dune System in the Perth Metropolitan Region, are found in the bushland (ATA Environmental 2000). The bushland also contains areas of *Banksia prionotes* Low Woodland, and while *Banksia prionotes* is typically found on the Spearwood Dune vegetation in the Perth Metropolitan Region, there are only two other areas in which this species is known to have a comparable abundance.

The majority of the bushland is in very good to good condition with areas in good and degraded condition (Government of Western Australia 2000, ATA Environmental 2000). Although the area of Jarrah/Tuart Open Woodland ranges from good to completely degraded condition, the Tuarts are of a mixed age indicating that this species is still able to regenerate well. The condition of the bushland is comparable to, and in many cases better than, other regionally significant areas on the Spearwood Dunes.

4.1.2 Fauna

The relatively large size of the bushland and the range of habitats over the varying terrain present provides significant habitat for a diverse vertebrate fauna. At least 37 bird species, 16 reptile species, and 3 amphibian species have been recorded in the bushland (P. Berry pers. comm.). The Common Brushtail Possum is also likely to occur in the Underwood Avenue Bushland as key elements of the habitat there are similar to other locations where it is known to occur.

Significant bird species observed at the bushland include the Carnaby's Cockatoo, listed under Schedule 1 of the *Wildlife Conservation Act 1950* as 'threatened'. The Weebil, Varied Sitella and Yellow-rumped Thornbill are bird species that are known to be habitat specialists with a reduced distribution on the Swan Coastal Plain and are present at the Underwood Avenue Bushland site. The Little Eagle, White-cheeked Honeyeater, Goshawk, Collared Sparrowhawk and Painted Button-quail are wide-ranging species with reduced populations on the Swan Coastal Plain and are present at the Underwood Avenue Bushland site (Government of Western Australia 2000). It should be noted, however, that the Little Eagle colonised the Swan Coastal Plain after the arrival of the rabbit (Storr and Johnstone 1988). Its survival on the Swan Coastal Plain is probably dependent on the continuing presence of the rabbit. If rabbit populations are reduced or eliminated then the Little Eagle is unlikely to remain in this locality.

It is known (Dell *et al.* in press) that specialist woodland insectivorous bird species have declined in both Tuart as well as other woodlands on the Swan Coastal Plain and some species, including those referred to above as of conservation significance, are now infrequently recorded in other vegetation associations on the Swan Coastal Plain. Tuart and other trees in Underwood Avenue Bushland also provide hollows for obligate tree hollow breeders as well as tall tree habitat for other species such as diurnal birds of prey.

The bushland supports four species of *Banksia* which flower in different seasons. This is important for nectar feeding birds, such as honeyeaters, that are able to utilise different nectar sources in different seasons.

In regard to reptiles, it has been demonstrated (How and Dell 2000) that there is a strong relationship between the number of different species occurring on bushland remnants and the size of the remnant. Smaller remnants have fewer species surviving long-term. The presence of the Gould's Goanna (*Varanus gouldii*) at the Underwood Avenue Bushland is considered significant as this large reptile species is only recorded in a few larger remnants in the metropolitan Swan Coastal Plain.

The Underwood Avenue Bushland is also part of a significant potential bushland/wetland linkage that is likely to facilitate movement of birds, some reptiles, frogs and insects between other conservation reserves including Kings Park, Shenton Bushland and Bold Park. The possible linkage with Shenton Bushland is particularly significant as species are able to move in response to fire or if they are eliminated by fire in one area they can re-colonise burnt sites thus increasing their regional survival. The prominent location and high visibility of the Tuart trees on the crest of the ridge is also likely to be a significant factor in maintaining the ecological linkage functions of the Underwood Avenue Bushland for the movement of birds through surrounding suburbs and bushland areas.

4.1.3 Evaluation of environmental impacts

In accordance with the EPA's *Advice on aspects of Bush Forever* (EPA 2001), the EPA's objective in regard to bushland sites identified as Negotiated Planning Solutions in *Bush Forever* (Government of Western Australia 2000) is to ensure protection of the core (highest conservation value) area/s of the sites.

In assessing the proposal in accordance with this objective, the EPA considers that the whole Underwood Avenue Bushland area is regionally significant, and was quite properly included in the *Perth's Bushplan* document. It is noted that the 8.5 hectare area proposed to be protected through the Negotiated Planning Solution equates to 26.5% of the total subdivision area, and is arguably below the area that could reasonably be expected to be retained as bushland through an Urban Negotiated Planning Solution within the *Bush Forever* process.

While the proposed conservation area of 8.5 hectares represents bushland in the best (very good) condition, not all bushland in very good condition is protected by the proposal. In addition, the proposed conservation area does not protect significant populations of the Priority 3 flora species *Jacksonia sericea* and a small population of *Eucalyptus decipiens*.

E. decipiens vegetation associations are restricted to areas with limestone in the soil profile and are generally considered to be poorly protected. This vegetation association is confined to a small area close to the western boundary of the property in an area where the vegetation is in very good condition.

The proposed conservation area does not protect the area dominated by *Banksia prionotes* which is largely confined to areas of lesser condition, with considerably less species diversity than the area proposed for conservation. The loss of this unit would reduce the seasonal feeding opportunities for honeyeaters provided by the presence of four *Banksia* species in Underwood Avenue. However, it should be noted that *B. prionotes* is a fire succession species, so populations may be transient. There are also *B. prionotes* trees scattered through the Jarrah Woodland within the proposed conservation area. The EPA considers that protection of this vegetation association is therefore not a priority.

The reduced area of bushland and more attenuated linkage to Bold Park would have some impact over time on the ability of the remaining bushland to retain some of the fauna species, particularly reptile and perhaps frog species, currently recorded from this area and will reduce the potential for recolonisation from Bold Park in the event that the whole of the remaining area is burnt.

The smaller area would also require more intensive management to maintain its conservation values over time.

The EPA recognises the principles of island biogeography, as described by Jarrad Diamond in the 1975 paper, *The Island Dilemma: Lessons of Modern Biogeographic Studies for the Design of Natural Resources* (Diamond 1975) and summarised below:

1. A newly isolated reserve/island will temporarily hold more species than its equilibrium number but species numbers will decline until equilibrium is reached.
2. The larger the area of a reserve, the slower the rate of species loss.
3. The larger the area of a reserve, the greater biodiversity at equilibrium.
4. The more remote or isolated the reserve, the lower the biodiversity at equilibrium.
5. A group of reserves that are tenuously connected to, or at least clustered near, each other will support more species than a group of reserves that are disjunct or arrayed in a line.
6. A round reserve will support more species than an elongated one.
7. Different animals have different minimum requirements to support an enduring population – generally, larger species require a larger area.

The EPA also recognises that those who hold the last remains of bushland have an important part to play in Perth's uniqueness of bush settings and retaining habitats for our plants and animals.

Noting the above, the EPA considers that the proposed 8.5 hectares identified for bushland conservation is considered inadequate to protect the core (highest conservation value) area/s of the Bushplan Site. The EPA is of the view that a larger area of the Bushplan Site, but not substantially so, should be set aside for conservation. The EPA would provide further advice on this subject through the structure planning process.

4.2 Odour

It is recognised by all relevant parties that the subdivision proposal area is currently affected by odour impacts from the Subiaco WWTP and that the resultant amenity would be unsuitable for residential development at present.

The main sources of odour at the Subiaco WWTP are:

- Inlet works and scrubber;
- Primary sedimentation tanks inlet channel;
- Primary sedimentation tanks;
- Aeration tanks;
- "Oil from Sludge" (OFS) plant.

In an effort to reduce odour emissions from the Subiaco WWTP, the Water Corporation has committed to implementing a number of improvements to be completed by January 2004. These improvements include the covering of primary sedimentation tanks, secondary aeration tanks and all open channels between the tanks, extracting odorous air from under all covers and treatment through appropriate scrubbing systems, and covering and treating fugitive odour emissions in the oil from sludge plant (Water Corporation 2001b) and include the technical improvements suggested in UWA's reports.

While the proponent is of the opinion that the Water Corporation would be able to reduce odour emissions to the subdivision boundary (Alan Tingay and Associates 1999, AWN 2001, Chester Consulting Pty Ltd 2000), the Water Corporation does not consider it practicable to reduce and maintain emissions to acceptable levels within 600 metres of the boundary of the plant, even after implementation of the above described improvements. The capacity of the plant is predicted to increase until 2040 and, with the expected increase in production of by-products, odour producing substances are likely to increase over time (Water Corporation 2001a). The Water Corporation's preferred buffer, as determined by Consulting Environmental Engineers (CEE 2001) is included in Figure 2.

On reviewing the Water Corporation reports, the UWA consultants' contend that the Water Corporation should operate its facilities to protect existing odour sensitive premises, such as the Cottage Hospice, Westcare and Alzheimer's facilities in Bedbrook Place, that are located closer to the Subiaco WWTP than most of the proposed subdivision area, and by not doing so the Water Corporation are in breach of the DEP licence which requires that the Water Corporation operate the WWTP "such that odours emanating from the premises do not unreasonably interfere with the health, welfare, convenience, comfort or amenity of any person at an odour sensitive premises".

The Water Corporation also commissioned a benchmarking study to determine how odour control measures at the Subiaco WWTP compare with similar facilities nationally and internationally (URS 2001). The study included comparisons with 11 other plants in five states of Australia, as well as plants in USA, Singapore, Japan and the Netherlands, which are considered to represent world's best practice. The study concluded that current odour control measures at Subiaco are equal to, or better than, those measures being used at other plants in Australia, but are significantly less than those being used in the other countries surveyed.

However, the proposed covering measures will provide similar levels of odour control to USA, Japan and the Netherlands, with Singapore having the additional measure of double covering to provide protection during periods of maintenance.

It is understood that the Water Corporation is also currently monitoring for metal emissions from the oil from sludge plant. The monitoring program is due for completion in November 2001, and is to be reported on soon after. It is expected that the monitoring will demonstrate that metal emissions from the plant do not cause unacceptable impacts off-site.

4.2.1 Evaluation of impacts

The EPA objective in regard to odour as it relates to the proposal is to ensure that the Water Corporation takes all reasonable and practicable measures to minimise odour emissions from the WWTP and that any new developments in the vicinity of the plant do not result in people being subject to odour levels that unreasonably interfere with their health, welfare, convenience, comfort or amenity.

In assessing the impacts of odour from the Subiaco WWTP that would occur on future residents in the proposed subdivision area, the EPA has drawn on a range of expert reports and odour modelling, the views of experts commissioned by the UWA and the Water Corporation, the EPA's draft Final Guidance No. 47, *Guidance Statement for Assessment of Odour Impacts* (EPA 2001b) and expertise within the DEP.

The EPA's draft Guidance Statement outlines the process to be followed when assessing new developments near existing odour sources, in addition to new proposals with the potential to cause odour impacts on sensitive land uses. Proponents must demonstrate compliance with either:

- a conservative two-part criterion that provides confidence that nuisance impacts are unlikely;
- an odour concentration representing a "distinct" odour intensity level, which requires an odour intensity study and would generally allow a less conservative criterion to be used.

Water Corporation consultants CH2M Hill and Consulting Environmental Engineers (CH2M Hill 2000, CEE 2001) have put forward odour criteria based on odour source sampling and/or modelling studies previously undertaken for the Subiaco WWTP and at WWTPs elsewhere in Australia. While these criteria have not necessarily been derived strictly in keeping with the EPA Guidance, this approach may be considered to be acceptable by the DEP under some circumstances. However, the development of appropriate criteria for the Subiaco WWTP would need to be revisited as part of future odour assessments.

Limitations of work undertaken to date include:

Inadequate meteorological data

Prior to the CEE (2001) report, modelling was undertaken using meteorological data from Hope Valley and Swanbourne. These areas are not necessarily considered representative of the meteorological conditions at the area of the Subiaco Waste Water Treatment Plant, being exposed sites closer to the coast they are likely to experience winds that would disperse odours thus underestimating actual odour impacts. The Subiaco WWTP is comparatively low lying in the landscape and likely to receive lower wind speeds for a significant portion of the year, and this is supported by complaints data.

In recognizing this inadequacy, the Water Corporation has installed a meteorological monitoring station at the WWTP site, on advice of the DEP. It is considered that at least one year of on-site meteorological data, and preferably 2 years, would provide more suitable data for modelling of odour impacts from the WWTP.

Emissions data

As previously described, the Water Corporation has committed to implementing a number of improvements to be completed by January 2004, and has estimated the odour emissions of the plant after these works (CEE 2001). Details of how the emission rates have been estimated have not been provided, and previous expected improvements have not always resulted in the expected reduction in odour emissions. It is therefore considered that specific odour emissions data are necessary to assess odour impacts after the planned improvements have been implemented.

Interpretation of complaints data

Complaints are received by the Water Corporation under a protocol arranged with the DEP. These data are important in determining the acceptability of odour levels in the vicinity of the WWTP. Most complaints are received from residents in Floreat to the north of Underwood Avenue, and the WWTP, and other complaints come from Mt Claremont to the south west and Daglish to the east.

After odour control improvements have been implemented at the WWTP, at least 12 months of complaint data would be desirable to enable reliable assessment of the effectiveness of the improvements in reducing odour impacts.

Based on available information, the EPA considers that it is has not been possible to demonstrate with reasonable certainty that the air quality within the proposed subdivision area would be appropriate for residential development in terms of odour, even following planned improvements to the WWTP. That is, the welfare and amenity of future residents may be adversely affected by odour from the Subiaco WWTP.

There is a need for detailed evaluation of the outcomes of proposed improvements to the Subiaco WWTP once complete, taking into account accurate meteorological data pertaining to the area and emissions and complaint data in response to the improvements, in order to properly assess the impacts on future residents. As the EPA does not have reasonable certainty that appropriate air quality can be achieved the subdivision area is considered unsuitable for either residential or other odour sensitive development.

The EPA considers that the most comprehensive current available information on the extent of odour impacts from the Subiaco WWTP is provided in the Consulting Environmental Engineers (2001) report. As a guide to general land use planning in the area, using currently available information, the buffer recommended by Consulting Environmental Engineers (2001) and shown in Figure 2 is considered to provide a reasonable interim approach for land use planning in the vicinity of the WWTP.

It is recognised that there are several existing land uses within the buffer proposed by the Water Corporation which may be odour sensitive. There does not presently appear to be significant conflict with these land uses, however, the potential does exist for conflict to occur even with the Water Corporation implementing all reasonable and practicable measures to minimise odours from the WWTP. The EPA does not consider that the presence of these existing land uses provides justification for establishing further odour sensitive premises within the area affected by odour from the WWTP.

The DEP is currently reviewing the license for the Subiaco WWTP, with particular reference to management of odour and other emissions, in consultation with relevant stakeholders.

It is recognized that the UWA has indicated that it is willing to stage the proposed subdivision to allow the Water Corporation time to implement improvements to the WWTP and reduce odour impacts to levels acceptable for residential development. However, the EPA considers that it would be inappropriate to adopt such an approach until the long term outcomes of the odour reduction works are clearly known. Should a new proposal come forward after this time, the EPA would assess the new proposal on the information then available.

5. Other advice

At the time that the subdivision application was first submitted to the DEP in January 2000, it was clear that there were two key environmental issues associated with the site, being regionally significant bushland and odour from the Subiaco WWTP. Extensive research and advice has been requested by the EPA since referral of the proposal in August 2000, to obtain information to enable the EPA to determine the required separation from the WWTP and the conservation values protected by the *Bush Forever* site boundary. The EPA considers that better mechanisms to resolve land use planning issues around major public infrastructure facilities, and disputes relating to *Bush Forever*, should be available. The EPA does not consider it appropriate for it to be dealing with such proposals on a case-by-case basis.

As detailed in Section 2, there is a structure planning process being undertaken by the Department for Planning and Infrastructure for the broader area surrounding the Subiaco WWTP and including UWA owned land. The EPA supports this process and considers that the key implications should include the following:

- Strategic opportunities for bushland protection, including wildlife corridors, especially between the UWA land and other key conservation areas; and
- Land use planning around the Subiaco WWTP to reduce the possibility of other potential conflicts.

6. Conclusions

The EPA has assessed the proposed residential subdivision with particular reference to the environmental issues of regionally significant bushland and odour from the Subiaco WWTP. The EPA considers that it is not acceptable to proceed with residential development at the proposed location.

While it is the EPA's expectation that the Water Corporation will continue to implement all reasonable and practicable measures to minimise odours from the Subiaco WWTP, the EPA considers that it has not been possible to demonstrate with reasonable certainty that acceptable levels of odour for residential development will be achievable in the medium to long term.

There is a need for detailed evaluation of the outcomes of proposed improvements to the Subiaco WWTP, once complete, taking into account accurate meteorological data pertaining to the area and emissions and complaint data in response to the improvements, in order to properly assess the impacts on future residents. Until the EPA has reasonable certainty that appropriate air quality can be achieved the subdivision area is considered unsuitable for either residential or other odour sensitive development. Should a new proposal come forward after this time, the EPA would assess the new proposal on the information then available.

The EPA also considers that the proposed 8.5 hectares identified for bushland conservation is inadequate to protect a number of key conservation values of the bushland on the site and a larger area of the Bushplan Site, but not substantially so, would be required to meet the EPA's objective of protecting the core (highest conservation value) area/s of the Bushplan Site and as much bushland as possible.

If alternative land uses are considered for the proposal area that are compatible with the levels of odour experienced, it is expected that any proposal would also provide for the protection of the core conservation values of the bushland area.

7. Recommendations

The EPA provides the following recommendations to the Minister for the Environment.

1. That the Minister notes that this report follows a decision by the EPA to set a level of assessment as Formal Under Part IV because:
   - A comprehensive level of technical information has been provided to the EPA to assess the potential environmental impacts of the proposed residential subdivision; and
   - The EPA assessment has included substantial consultation with the proponent and interested agencies and input from the community;
2. That the Minister considers the report on the relevant environmental issues as set out in Section 4;
3. That the Minister notes that the EPA has concluded that in its current form the proposed 8.5 hectares identified for bushland conservation is considered inadequate to protect the core (highest conservation value) area/s of the Bushplan Site. The EPA is of the view that a larger area of the Bushplan Site, but not substantially so, should be set aside for conservation;
4. That the Minister notes that the EPA has concluded that it is unlikely that the proposal could be implemented to meet the EPA's objective for odour as it has not been possible to demonstrate with reasonable certainty that acceptable levels of odour for residential development will be achievable;
5. That the Minister note that after the proposed improvements to the Subiaco WWTP have been completed and more accurate odour emission and meteorological data are collated, the EPA would assess any future proposal on the information available; and
6. That the Minister not issue a statement that the proposal be implemented, as outlined in section 45(5) of the *Environmental Protection Act 1986* (the EP Act), and notify the EPA, decision-making authority, proponent and referrer as prescribed by section 45(8) of the EP Act.

Appendix 1

References

Air Water Noise (2001) *Subiaco Wastewater Treatment Facility – Documentation Review.* Report No. U5/2. Unpublished report for the University of Western Australia, Perth, Western Australia.

Alan Tingay and Associates (1999) *Subiaco Waste Water Treatment Plant – Review of Odour Impacts, Assessments and Response.* Report No: 99/105. Unpublished report for Minter Ellison, Perth, Western Australia.

ATA Environmental (2000) *Lot 4, Loc 2103 Underwood Ave, Shenton Park - Environmental Assessment (Updated).* Report No: 2000/133. Unpublished report for the University of Western Australia, Perth, Western Australia.

CH2M Hill (1997) *Odour Impact Assessment – Subiaco Wastewater Treatment Facility.* Unpublished report for the Water Corporation of Western Australia, Perth, Western Australia.

CH2M Hill (2000) *Subiaco Wastewater Treatment Plant - Odour Sampling and Testing Survey.* AS02 – March 2000. Unpublished report for the Water Corporation of Western Australia, Perth, Western Australia.

Chester Consulting Pty Ltd (2000) *Subiaco Waste Water Treatment Plant – Review of Odour Control and Odour Management at the Plant.* Unpublished report for the University of Western Australia, Perth, Western Australia.

Consulting Environmental Engineers (2001) *Report on Buffer Zone for Subiaco Wastewater Treatment Plant.* Unpublished report for the Water Corporation of Western Australia, Perth, Western Australia.

Dell, J., How, R.A. & Burbidge, A.H. (in press) *Vertebrate Fauna of Tuart Woodlands. In: Proceedings of a workshop on Tuart Woodlands.* Department of Conservation and Land Management and Wildflower Society of Western Australia, Perth, Western Australia.

Diamond, J.M. (1975) The Island Dilemma: Lessons of Modern Biogeographic Studies for the Design of Natural Resources. *Biological Conservation* 7.

Environmental Protection Authority (2001a) *Advice on aspects of Bush Forever.* Advice to the Minister for the Environment from the Environmental Protection Authority under Section 16(e) of the *Environmental Protection Act 1986.* EPA Bulletin 1007, Perth, Western Australia.

Environmental Protection Authority (2001b) *Guidance Statement for Assessment of Odour Impacts.* Final Guidance No. 47 (final draft for stakeholder comment). EPA August 2001. Department of Environmental Protection, Perth, Western Australia.

Government of Western Australia (1998) *Perth's Bushplan.* Department of Environmental Protection and the Ministry for Planning, Perth, Western Australia.

Government of Western Australia (2000) *Bush Forever.* Department of Environmental Protection and the Ministry for Planning, Perth, Western Australia.

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

How, R.A. & Dell, J. (2000) Ground Vertebrate Fauna of Perth's Vegetation Remnants: Impact of 170 Years of Urbanisation. *Pacific Conservation Biology*, Vol 6: 198-217. Surrey Beatty & Sons, Chipping Norton, New South Wales.

Storr, G.M. and Johnstone, R.E. (1988) *Birds of the Swan Coastal Plain and adjacent seas and islands.* Records of the Western Australian Museum, Suppl. No. 28. Perth, Western Australia.

URS (2001) *Worldwide Review of Odour Control at Wastewater Treatment Plants.* Volumes 1 to 3. Report no. 34469-038-558. Prepared for the Water Corporation, Perth, Western Australia.

Water Corporation (2001a) *Environmental Protection Authority Briefing Subiaco Wastewater Treatment Plant Odour Buffer.* Water Corporation, Perth, Western Australia.

Water Corporation (2001b) letter to Mr K Taylor, Department of Environmental Protection dated 10 July 2001.

Appendix 2

Summary of Public Comments
(provided to the EPA by Minter Ellison, 23 February 2001)

BIOPHYSICAL

Loss of Bushland

1.1 The bushland is too valuable to be destroyed for development due to the diversity of vegetation communities, contains 112 plants species, most of the bushland is in very good condition, supports many bird and reptile species and is a breeding site for Little Eagles [2]

1.2 There are very few bushland reserves left. We should be saving all of the remnant bushland in Perth [2]

On environmental grounds it could be argued that there should be no further clearing of native vegetation on the Swan Coastal Plain. However, the planning process has protected land for conservation purposes and has also reserved land for urban development in a controlled manner that reduces the environmental and societal impacts of land management.

Although secure local bushland areas such as Kings Park and Bold Park help to sustain the image of Perth as the 'City in the Bush', continued urban expansion has led to a focus on the need to protect the integrity of natural systems and representative example of remnant bushland. Responding to these requirements successive State Governments have set aside area of regional significance for conservation and recreation with approximately 32,000ha reserved as 'Parks and Recreation' under the MRS in the past seven years. The Bush Forever project follows this example by ensuring that appropriate areas of bushland are reserved for the conservation of biological diversity and recreation. The preliminary phase of the Bush Forever project, Bushplan, recognised that a number of sites would be highly constrained by current land use zonings and that only a portion of the bushland at these sites is likely to be retained for conservation. On this basis, Bush Forever states that the objective for these sites is to protect the core conservation values and threatened communities while recognising the land use zoning at the local and regional level through a Negotiated Planning Solution.

1.3 Development will result in the loss of the last Jarrah stands in the metropolitan area [7]

The distribution of Jarrah (Eucalyptus marginata) ranges widely through the wetter regions of the south-west and eastwards to the eastern Wheatbelt and Cheyne Bay on the south coast. On the western coastal plain it extends just beyond Yanchep. In the Perth metropolitan region Jarrah is widespread on the sands (Spearwood and Bassendean) of the coastal plain and the laterite of the Darling Plateau (Powell, 1990). Stands of Jarrah are prominent in local reserves such as Shenton Park bushland, Bold Park and Kings Park and regional conservation reserves such as Yanchep and Neerabup National Park, Yellagonga Regional Park, Warwick Open Space, Wireless Hill, Whiteman Park, Piney Lake Reserve and Harry Waring Marsupial Reserve to name a few.

1.4 The development will result in the potential irretrievable loss of land with substantial bushland attributes and beauty.[9] The bushland can not be regained once lost and as more and more small pockets of undeveloped land in the surrounding area are being developed the role of the Shenton Park bushland takes on a greater significance environmentally. The link between Kings Park and Bold Park becomes even more tenuous. [17]

Bush Forever has identified a Negotiated Planning Solution (NPS) for the Underwood Avenue site which proposes a balance between development and conservation objectives. The NPS proposes to retain 22% of the bushland as a conservation reserve. Under this proposal the EPA

requires that a reasonable outcome is achieved where the core (highest conservation value) area/s and threatened ecological communities are protected (EPA, 2001). EXPAND

1.5 The development proposal would result in the loss of quality bushland close to the administration buildings on Underwood Avenue. Wasn't the quality of this bushland recognised as being significant? The quality of that area exceeds some of the areas within the 8.5ha set aside as POS (or reserve) the total tract of land for development is large as it is. One would ask if an exception could be made to incorporate this special area of bush? [10]

Site investigations conducted by ATA Environmental in 1998 and 2000 identified an 'L' shaped area of bushland along Underwood Avenue and Selby Street to be retained for conservation purposes as part of the preliminary development concept plan. This parcel would ensure the protection of good to very good quality bushland which is representative of the principal vegetation types occurring over the site. Subsequent discussions and a site meeting with officers from the DEP determined that the 'L' shape of the proposed reserve would diminish the bushland's conservation value in the long-term. An investigation of the bushland conducted by the DEP resulted in the recommendation to retain a rectangular parcel (as shown on the current concept plan) of bushland adjacent to Selby Street which conserves an area of better quality vegetation and decreases the area to boundary ration of the parcel. The location, shape and size of the conservation reserve was adopted by the Bushplan Interagency Coordinating Group and more recently as a Negotiated Planning Solution (NPS) in Bush Forever (Government of WA, 2000).

1.6 The longer-term effect of such wholesale devastation can be clearly seen in the rural areas, where city people are constantly criticising the farmers for their unnecessary clearing, almost never looking to the degradation they cause in their own backyards. [26]

Acknowledged, however it should be noted that comparative restrictions currently apply to bushland clearing in agricultural areas and in the metropolitan region. In the past, the EPA discouraged clearing in rural areas where the total amount of remnant vegetation was less than 20% (variable scale depending on rainfall) of the Shire area. More recently, the EPA released a final position statement which identified all existing remnant vegetation in rural areas should be protected and no further clearing proposals would be approved by the EPA when referred by the Commissioner for Soil and Land Conservation through the Notice of Intent to Clear process.

For urban zoned land under the MRS, landowners and developers must follow due process and secure all the necessary approvals before development and clearing can occur. Planning legislation and the MRS, do not specifically address clearing, except to the extent that it can be argued that clearing constitutes development under the Town Planning and Development Act, 1928.

1.7 The loss of the bushland will have a significant impact on the flora of Shenton bushland. The site is a possible source of plants that have become locally extinct within nearby areas of bushland. For example, the last surviving Bull Banksia (*Banksia grandis*) in Shenton Park bushland died following a bushfire in 1997. Bull Banksias in Underwood Avenue bushland would be close enough genetically to re-introduce to Shenton Park bushland. [46]

The flora survey of the Underwood Avenue bushland site revealed Bull Banksias (*Banksia grandis*) are not common at the site. The few trees that do occur on the site are predominantly protected within the 8.5ha conservation reserve along Selby Street. The University would support a proposal to reintroduce Bull Banksias to the Shenton Park Bushland using seed collected from the Bull Banksias in the proposed conservation reserve along Selby Street.

Site comprises regionally significant vegetation (Bushplan)

2.1 The bushland is of regional significance and yet it is proposed in Perth's Bush Forever plan to reduce it to a fraction of its current extent. This will inevitably lead to a reduction in its conservation values. This and other considerations of its regional significance have not been made clear in the ATA report. [13]

2.2 The land is of the highest conservation value in our expanding urban area. This is acknowledged in Perth's Bushplan where it is recorded as regionally significant. [20]

The Environmental Assessment recognises the site comprises regionally significant vegetation. However, Perth's Bushplan, released for public comment in 1998, identified that the conservation of regionally significant vegetation was constrained by existing planning processes at a number of site, including the Underwood Avenue Bushplan Site 119. As a result, Bushplan identified a Negotiated Planning Solution process would be implemented at these sites to achieve a balance between conservation and development objectives.

The release of Bush Forever identified the applicability of the existing local and metropolitan planning process and proposed a negotiated planning solution to protect the core conservation values of the site by retaining approximately 22% as a conservation reserve. The negotiated planning solution identified in Bush Forever achieves a balance between the needs of conservation and legitimate development expectations given the current local and metropolitan land use zonings for the site.

The maintenance of the conservation values of a parcel of bushland, irrespective of size, is dependent on the management strategies implemented in the short and longer-term. The University is committed to the preparation and implementation of a management plan for the reserve which will include strategies to prevent the impacts associated with edge effects and urbanisation. It is envisaged that access to the reserve will be restricted.

2.3 The long-term viability of Bush Forever Sites depends on the EPA being a fierce defendant of environmental values and the benefits of keeping bush in the city. The community relies on the EPA's independence to defend important sites on environmental grounds. [47]

Acknowledged. The proposal and comments received by the community will be submitted to the EPA to determine the environmental acceptability of the proposal and appropriate level of assessment.

Development ensures objective of conserving 10% of the Karrakatta Veg Complex is not achieved

3.1 The bushland comprises the Karrakatta-Central and South Vegetation Complex of which there is already less that the 10% target remaining. Under the Negotiated Planning Solutions used by the Ministry for Planning, at least 200ha of this complex (25% of the area of bushland recommended for protection under Bushplan) is at risk, thus falling even further behind the 10% target [7]

3.2 Underwood Avenue meets the Criteria for Bush Forever due to its representation of ecological communities. The Vegetation Karrakatta Complex-Central and South falls below the minimum of 10% of representation. Therefore it is essential that this relatively large area of bushland is preserved in its entirety. The EPA's recent draft Guidance Statement confirms this necessity. [19]

Within the intensively settled and developed area of the Perth Metropolitan Region (PMR) of the Swan Coastal Plain remnant bushland areas are generally fragmented. Several vegetation complexes are cleared to well beyond 90%, such that the target of retaining 10% of bushland in each complex can not be uniformly met as part of the Bush Forever project. The Karrakatta-Central and South Vegetation Complex is one example which retains more than 10% bushland at present, but is substantially constrained by existing development proposals and Urban/Industrial planning zones, to the extent that the target is unlikely to be achieved.

Bush Forever recognises that there currently exists the potential to increase the conservation of the Karrakatta-Central and South Vegetation Complex outside the PMR: '*It is notable that the Karrakatta-Central and South Vegetation Complex extends north from the PMR and there are better opportunities for conservation of this complex in these areas*' (Government of WA, 2000).

Bushland includes Priority Flora species, unique flora and habitat for significant / unique fauna

4.1 The bushland contains Priority 3 flora (*Jacksonia sericea*). [15]

The Priority 3 species, *Jacksonia sericea*, was recorded at a number of locations over the site. This species has been recorded in other nearby bushland area including, Shenton Park bushland, Kings Park and in the Banksia and Limestone Heath at Bold Park. At present, the listing of *Jacksonia sericea* as Priority 3 does not legally require the proponent to implement protection measures for this species as part of the development proposal.

4.2 The bushland provides a sanctuary and breeding site for a family of Little Eagles, Gould's Monitor and other birds and animals that are rapidly disappearing from Perth's bushland. [32]

4.3 An example of how the bush is so valuable for wildlife is that one of the last breeding pairs of Little Eagles left in metropolitan area nests in the bushland each year. [20]

4.4 No where else in the world do eagles nest so close to a major city. Other countries with similar parts of bushland have classed them as protected natural heritage areas because they are used as eagle nesting territories. Rehabilitation and research shows that the Little Eagle is a very shy bird requiring a large secluded area for nesting and hunting. If the Underwood Avenue bushland is destroyed the Little Eagle will not simply fly to another area to live, but will stay in its home territory then run out of food and die. The Little Eagle is not the only species that will suffer from the bushland being destroyed. The bushland is important in its significance for wildlife and the entire area is a whole separate gene pool of biodiversity. [31]

The ATA Environmental report identifies the first record of the Little Eagle in the Perth area is reportedly 1929, after the arrival of the rabbit (How & Dell, 1992). It is now known to occur over the coastal plain and the Darling Range and has been recorded recently at the following locations:

- Walyunga National Park (Van Delft, 1997)
- Bold Park (How & Dell, 1990)
- Perth Airport (How & Dell, 1992; Alan Tingay & Assoc., 1994)
- Victoria Park (How & Dell, 1992)
- Whiteman Park (CSIRO, 1991; How & Dell, 1992)
- Burns (Alan Tingay & Associates, 1999)
- Jindalee (ATA Environmental, 2000a & b)

- Kenwick (Keighery, 1995)
- Alkimos-Eglinton (Alan Tingay & Associates, 1997b)
- Guilderton (Alan Tingay & Associates, 1997c)
- Yanchep–Two Rocks (Alan Tingay & Associates, 1991)
- Melville (City of Melville, undated)
- Lake Clifton (Alan Tingay & Associates, 1998)
- Shenton Park (J.Dell, pers.comm., 2000)
- Wanneroo (How & Dell, 1992)
- Jandakot Airport (J.Dell, pers.comm., 2000)

These sightings represent breeding pairs as well as non-breeding birds that have entered the area looking for prey or are young birds dispersing from the nest. About 6 to 10 breeding pairs are known in the Swan Coastal Plain in the Metropolitan Region (John Dell, pers. comm., September 2000). These are known to occur at Perth Airport, Shenton Park, Neerabup National Park and Jandakot Airport, and probably at Whiteman Park.

The concept plan for the site proposes to retain a stand of Eucalypts currently utilised by the Little Eagles as a nesting site. The development of the surrounding area may affect the breeding potential at the site through increased human disturbance of the area. However, large areas of suitable habitat are retained within the conservation reserve at the site, the nearby Bold Park and Kings Park that could provide suitable breeding trees. The breeding pair at Shenton Park may relocate to the conservation reserve or to Bold Park or Kings Park as these areas are likely to be within the pair's current territory.

4.5 **A rare and beautiful bronze-coloured *Banksia menziesii* also grows in the area planned for destruction. No other is known from Kings Park or Bold Park.** [20]

The occurrence and location of this variety of *Banksia menziesii* at the Underwood Avenue bushland site will be confirmed by the University. The UWA will undertake discussions with CALM and the Botanic Gardens and Parks Authority to determine its significance.

The size of the proposed conservation reserve (8.5ha) is insufficient – The Negotiated Planning Solution (NPS) does not meet Bushplan criteria

1 **The proposed conservation reserve will not retain its conservation values (particularly biodiversity) in the long-term or act as an adequate corridor. Data on the vertebrate fauna of Shenton Bushland (Lemnos St) indicates that they (Shenton Bushland and Underwood Ave bushland) are functionally a single ecological unit comprising a combined area of over 50ha with movement of fauna between them** [6]

The Environmental Assessment report prepared by ATA Environmental identified the Underwood Avenue bushland site would largely only be of corridor value to some bird species, as the surrounding area is fully developed. However, the residential suburbs around the site are old, established suburbs with a high proportion of trees, both native and exotic that provide linkage between bushland patches and facilitate movement of some fauna species. It is expected that many species move throughout the area without requiring the use of vegetation and habitat at the Underwood Avenue site. Habitat provided at the site, therefore, is not a crucial component for the movement of all fauna species throughout the region.

The movement of other vertebrate fauna such as reptiles between the Shenton Park Bushland and the Underwood Avenue Bushland site is expected to be limited due to development of the

surrounding land and fencing of the Underwood Avenue site in 1995. In particular, the fencing of the site may have restricted movement of the Gould's Monitor to and from other bushland areas and the Underwood Avenue bushland site is likely to be too small to support a sustainable population by itself. Populations of Gould's Monitor continue to occur within the Perth area at sites with more extensive bushland such as Bold Park.

5.2 **The 8.5ha of bushland to be retained will be too small and lacking in diversity of land forms and vegetation types to have long-term viability.[7] The retention of a smaller fragment of the bushland fails to recognise the firmly established ecological principle that species are more likely to persist in larger habitat fragments than smaller ones. Typically smaller fragments support fewer microhabitats and are subject to greater edge effects than larger fragments, meaning that proportionally they will become more degraded and subject to greater influences from the surrounding developed habitat.** [52]

The maintenance of the conservation values of a parcel of bushland is dependent on the management strategies implemented in the short and longer-term. In general, the smaller the bushland the greater the management required to maintain the viability and conservation values of the parcel.

Site investigations and desktop studies by ATA Environmental have determined that the proposed conservation reserve protects a representative sample of the best quality vegetation at the site. In addition, fauna studies reveal the Underwood Avenue bushland site currently provides habitat to reptiles and birds. No native mammals are known to frequent the area. On this basis, there is no need to retain a larger parcel of bushland to maintain the bushland's long-term viability.

The University is committed to the preparation and implementation of a management plan for the reserve which will include strategies to protect flora and fauna and prevent the impacts associated with edge effects and urbanisation.

The development of the area adjacent to the conservation reserve will be implemented according to Bush Forever Practice Note 5 'Bushland-Sensitive Design Criteria for Urban Development' and will include strategies to prevent impacts that disturb the vegetation, soil, water and nutrient regime. To assist in maintaining the conservation values of the bushland, it is envisaged that access to the reserve will be restricted.

5.3 **Development will inevitably result in the introduction of domestic animals and weeds leading to the degradation of the conserved bushland.** [15]

The installation of a 2m high fence around the periphery of the Underwood Avenue bushland site in 1988 has assisted in restricting the access of domestic and feral animals and indirectly the invasion of weeds via human trampling of the vegetation and rubbish dumping. It is envisaged that a 2m high fence will be installed around the conservation reserve to ensure these pressures are prevented from impacting the smaller parcel of bushland.

5.4 **The Underwood Avenue bushland met, and still meets, Bushplan's Regional Significance Criteria. One of the key factors in meeting the Criteria is size. The NPS does not meet the Criterion for size. The finalised Bushplan, Bush Forever, states '*size is of key importance in determining the viability of natural areas for conservation purposes*'. Bush Forever's selection of bushland areas is guided by general principles which relate to size, shape, community types and linkages. All four of these principles apply to Underwood Avenue.**

All of these principles would not be met if the proposal to develop around two thirds of this Bush Forever Site were to proceed. [19]

The Negotiated Planning Outcome has aimed to retain the environmental values of the bushland within the context of an environmentally sensitive subdivision design. This has been achieved in the Concept Plan for the site by retaining an area of vegetation representative of the bushland which is in good to very good condition. The Plan identifies an 8.5ha conservation area in the eastern boundary of the site which will be managed for the purposes of conservation of flora and fauna.

It is reiterated that the maintenance of the conservation values of a parcel of bushland, irrespective of size, is dependent on the management strategies implemented in the short and longer-term. The University is committed to the preparation and implementation of a management plan for the reserve which will include strategies to protect flora and fauna and prevent the impacts associated with edge effects and urbanisation.

5.5 **The 2ha of POS is not conducive to natural fauna and flora and the 8.5ha of retained bushland is a noise buffer zone for the built up section. As this retained areas is alongside a busy thoroughfare its value as a bird life habitat is minimal.** [27]

The 2ha of POS identified in the concept plan has been set aside for the purpose of passive recreation rather than for the purpose of conserving native flora and fauna habitat. As identified in the plan, a number of mature Eucalypt and Banksia trees will be retained in this area of POS.

The original conservation reserve proposed in preliminary planning designs for the site selected an area of the best quality vegetation which was representative of the principal vegetation associations to be protected for conservation purposes. The proposed conservation reserve shown in the context of the proposed development of the balance of the site for residential purposes was presented to officers from the DEP and MfP. Following extensive discussions and site investigations, officers from the Conservation Branch of the DEP resolved that the integrity and long-term viability of the conservation reserve would be better maintained if the location and shape of the reserve was modified to that shown in the current concept plan.

5.6 **The ATA report provides no evidence that this bushland remnant (8.5ha) is viable in the long-term, how long the bushland will remain viable for, and what level of intervention is required to maintain this area in a viable condition.** [45]

Refer to Response 5.4

Loss of Fauna Habitat / important feeding, breeding and roosting site

6.1 **The Underwood bushland currently supports a diverse vertebrate assemblage. Studies carried out by the WA Museum indicate that most of the species present do not persist in non-bushland (urbanised) areas. Similarly, many of the birds common in the bushland are rarely observed outside the bushland. We can expect few, if any, to persist if the bushland is destroyed.** [52]

An assessment of the vertebrate fauna likely to occur at the study site is based on studies conducted at nearby urban bushland parcels including Bold Park (How and Dell, 1990) and a study undertaken in the Shenton Park Bushland in 1997 and 1998 (Berry and Berry, 1998). It was determined that a total of 77 species of vertebrate fauna are considered possible inhabitants

of the site. This is based on the size and range of habitat available, surveys of similar habitats in Lemnos Street bushland and Bold Park and the known distribution and habitat of species.

Although a number of the avifauna likely to occur at the Underwood Avenue bushland are rarely observed outside the bushland area, a number of species have adapted to the urban setting including the Short-billed Black Cockatoo (Schedule 1) which occurs within Bold Park and is known to regularly occur within the Metropolitan area on a seasonal basis, utilising native bushland and suitable vegetation along roads and within backyards.

6.2 The proposal will result in the destruction of the nesting site and surrounding bush of the Little Eagle which is believed to be the last nest in the metropolitan area. [11]

About 6 to 10 breeding pairs of the Little Eagle are known in the Swan Coastal Plain in the Metropolitan Region (John Dell, pers. comm., September 2000). These are known to occur at Perth Airport, Shenton Park, Neerabup National Park and Jandakot Airport, and probably at Whiteman Park.

The concept plan for the site proposes to retain a stand of Eucalypts currently utilised by the Little Eagles as a nesting site. The development of the surrounding area may affect the breeding potential at the site through increased human disturbance of the area. However, large areas of suitable habitat are retained within the conservation reserve at the site, the nearby Bold Park and Kings Park that could provide suitable breeding trees. The breeding pair at Shenton Park may relocate to the conservation reserve or to Bold Park or Kings Park as these areas are likely to be within the pair's current territory.

6.3 The ecological communities at the site provide a diverse source of food all year round to support the birds, reptiles and insects that live in the bush. Where will they go when the bush is destroyed? [23]

The development proposal will result in the loss of a portion of the bushland at the site. The concept plan proposes to retain 8.5ha of the site within a designated conservation reserve. This reserve will be managed to ensure that the current function of the bushland such as food source for birds, reptiles and insects is maintained in the long-term.

Potential animal sanctuary / nature reserve / ecotourism

7.1 Retain, restore and manage the bushland as a nature reserve for the protection of flora, fauna habitats, promote public interest and provide a model for the management of other areas of Perth's parklands in the future. [12]

Refer to Response 6.3

7.2 The bushland could be utilised for more people to enjoy by removing the existing fence, clearing the land as was done in the bush off Lemnos Street, creating tracks to walk along. [30]

The University fenced the site in 1988 following a fire that destroyed a portion of the bushland along Underwood Avenue. This area of bushland has since regenerated however, the University determined that the installation of a fence would preclude the dumping of rubbish and car bodies and the occurrence of fire potentially caused by human activities. In addition, it was considered

that the condition of the bushland could be better maintained, without active management, by the installation of a fence.

Represents Perth's natural heritage

8.1 **The Underwood Avenue Bushland represents a rare remnant of Perth's natural heritage. Its preservation would ensure that Perth's unique environmental is secured for current Western Australians, their descendants as well as visitors.** [52]

Refer to Response 1.1 and 1.2.

Bushland forms corridor / vital link between Kings / Bold Park

9.1 **The Shenton Bushland (Lemnos St) and Underwood Ave bushland unit may form a vital link between Kings Park and Bold Park, particular for bird species, frogs and large mobile reptiles such as Gould's Monitor, that contributes to sustaining the biodiversity of these important reserves** [6]

Refer to Response 5.1.

9.2 **The bushland provides a stepping stone between Kings Park and Bold Park, without it the distance for fauna movement is too great.** [18]

The Environmental Assessment report has determined that the Underwood Avenue bushland provides habitat for a variety of reptiles, amphibians and avifauna. As stated previously, the bushland would largely only be of corridor value to some bird species, as the surrounding area is fully developed. However, the residential suburbs around the site are old, established suburbs with a high proportion of trees, both native and exotic that provide linkage between bushland patches and facilitate movement of some fauna species. It is expected that many species move throughout the area without requiring the use of vegetation and habitat at the Underwood Avenue site. Habitat provided at the site, therefore, is not believed to be a crucial component for the movement of all fauna species throughout the region.

9.3 **The Underwood Avenue Bushland has been identified as forming part of a regionally significant bushland linkage for migratory native fauna in both the 1997 'Strategic Plan for Perth's Greenways' and the 1998 'Perth's Bushplan'.** [68]

9.4 **Proposals to protect bushland around Perth in the early 1970s as part of the Green Corridor campaign has not occurred as land set aside such as Hepburn Heights, land near the new Shenton College have been cleared for housing.** [18]

9.5 **It is ironic that the City of Nedlands has presented its Green Corridors concept plan in the same year, the idea being that areas of bushland can be connected through native street plantings. However, these linkages would become tenuous if some of those areas of bush were removed or diminished.** [53]

A Strategic Plan for Perth Greenways (Alan Tingay & Associates, 1997) identified a Greenway (No. 19) along the northern and eastern boundary of the Underwood Avenue bushland site. The Plan identifies the site as part of a green corridor between the river and the sea by consolidating the link between Kings Park and Bold Park.

The proposal to conserve a portion of the bushland along Selby Street will maintain the function of the greenway corridor as a passage of the movement of flora and fauna between Kings Park

and Bold Park. This is confirmed in the Bush Forever documentation which identifies the linkage and creation of a 8.5ha conservation reserve in the context of the proposed development (Bush Forever - Map 6, Volume 1).

Contributes to sustainability of biodiversity

10.1 The bushland represents a rare portion of Perth's biodiversity, and furthermore it contributes to the ecological integrity and sustainability of other urban bushlands such as Kings Park. [52]

Refer to Response 5.1.

Bushland assists in the protection of groundwater quality

11.1 Have studies been done to determine the impact on the groundwater following the potential loss of the bushland, including potential salinisation and decreased quality. [18]

On this basis, the depth to groundwater through the Spearwood sand and limestone at the site is generally significant varying from 38m at the central ridge, 17m at the western boundary and a low of 8m depth at the north-east corner of the site (Water and Rivers Commission, 1997). In general, the soil and limestone will act as a filter for runoff from the site before entering the groundwater.

Clearing of bush in high rainfall areas such as the Perth Metropolitan Area does not lead to salinisation in the way it does in the Wheatbelt region.

11.2 The death of mature Banksia and Jarrah from drought thought to be a result of the lowering of the water table is occurring at Hollywood Reserve. Private bores on any development of Underwood Avenue will have a similar effect on the groundwater reserves. [25]

Refer to Response 11.1. In addition, the significant depth to groundwater over the site means few bores would be installed. Groundwater extraction from a few private bores is unlikely to affect water table levels. Furthermore, Eucalypts and Banksias at a depths of more than 6m to the water table are not reliant on this as a source of water.

Bushland assists in mitigating global warming

12.1 Pollution resulting from heavy traffic utilising Underwood Avenue is mitigated by the UWA bushland. [18]

The UWA bushland and vegetated median strip along Underwood avenue is likely to assist in mitigating the effects of heavy traffic usage of the Underwood Avenue/Selby Street intersection to some extent. The retention of a parcel of vegetation in this low-lying area will assist in the dissipation of car exhaust following the development of the upland slopes of the Underwood site.

12.2 The bushland has important climate values that are not considered at all in the ATA report. It is well documented that bushland has a local climate effect (eg. Increase of moisture and reduction in temperature). There will be some greenhouse gas emissions

from the clearing of the bush and development of new homes. How does UWA propose to compensate for these? [44]

Replacement of the poorer quality upland vegetation with houses and gardens would not necessarily lead to microclimate changes or increases in greenhouse gases. However, the University in conjunction with the consultant planners, Chappell and Lambert, has investigated strategies to ensure the proposed development of the Underwood site is in accordance with the current guidelines and principles outlined in the National Greenhouse Strategy.

In particular, the development proposal has attempted to integrate sustainable urban planning strategies by integrating land use and transport planning initiatives. The development proposal for the site aims to reduce private transport demands by encouraging greater use of public transport, and improved opportunities for walking and cycling, particularly to local facilities.

It is important to note that there may be a greater impact on greenhouse gases if the development was created in outer suburbs where there was a far greater need for car usage and resultant exhaust emissions.

Maintenance of unique landscape character

13.1 Bushland forms part of the viewshed from vantage points within Bold Park and contributes to unique landscape character. Replacement of the bushland with residential development will interfere with the aesthetics of those views. [50]

The established nature of the urban area surrounding Bold Park ensures that the vegetation coverage of the area, whether remnant or introduced through landscaping, is significant. A number of new developments have occurred in the vicinity of Bold Park which have affected the viewshed from this vantage point. It is anticipated that over time the landscaping initiatives implemented at these sites will eventually be more prominent than the housing development. This is likely to be the case at Underwood Avenue, however the University aims to reduce the potential impact on the visual amenity by retaining a number of mature trees throughout the development so that the bushland setting is maintained.

It is important to note that the development of the Underwood Avenue site is positioned on the eastern slope of a relict dune and therefore the sloping nature of the site will protect the viewshed from Bold Park to some extent.

HERITAGE

Important vestige of Aboriginal heritage / archaeological potential of site not investigated

14.1 Anecdotal and physical (scarred tree destroyed during the 1985 fire, old water-carrying tins) evidence suggests members of the Bodney and Bropho families camped on and near the top of the hill in the bushland. UWA has totally ignored the archaeological potential of the site. [11]

14.2 The area forms part of areas which were used by Aboriginal people prior to settlement of Perth and they want it protected. [29]

In 1998, the university commissioned McDonald Hales to undertake an Aborignial Heritage Assessment of the site. The McDonald Hale report found that there were no impediments under

the Aboriginal Heritage Act, 1972 (as amended) to the proposed development. More recently, the University has been engaged in discussions with the Nyungah Circle of Elders to obtain an understanding of how they used the land and how their use might be recognised either in the public open space or land set aside for conservation.

SOCIAL

UWA is irresponsible / Proposal lacks credibility

15.1 The development of the bushland will breach the University's environmental policy document, which recognises UWA has environmental obligations locally and globally. UWA's reputation will be tarnished and will be regarded as an institution that cares more about finances that the environment, the local community or its own university members. [1, 2]

15.2 Areas of high quality native vegetation supporting a wealth of fauna and flora are becoming increasingly rare in the metropolitan area, and that a respected seat of research and learning wishes to contribute further to that status is regrettable. [36]

The University has agreed to set aside 8.5ha for conservation purposes. This is a significant donation of about $20 million to conservation which could otherwise be used to support the University's teaching and research programs for the benefit of the whole community. In addition, the University has agreed to conserve 34ha of regionally significant bushland identified in Bush Forever it owns at Kenwick, otherwise known as Yule Brook Reserve.

15.3 Find an alternative way to raise revenue, and covenant the bushland for conservation.[1]

The University is open to suggestions for alternative ways to raise revenue, however none have been provided in the submission.

The bushland proposed to be retained as a conservation reserve will be protected by the placement of a conservation covenant on the title of this area of land.

15.4 UWA should have the foresight to anticipate the needs of a more densely populated city and make the bushland available for public use. [17]

The ownership of a parcel of bushland in an urban setting has required the University to compromise on establishing a balance between public recreation, conservation and recreation. In most instances there is limited overlap between these objectives and usually one is implemented to the detriment of the other. As a result, the University has focused on maintaining the bushland for research purposes to the exclusion of public recreation.

Significant Community Value

16.1 The proposal will result in the loss of a buffer zone of peace and tranquillity surrounding the rehabilitation hospital, hospice and other similar hostels. [17]

16.2 The proximity of the bushland provides a welcome contrast to the adjacent commercial and housing developments and provides the opportunity for an escape from the pressures of modern busy lives. [29]

16.3 **Respect for the environment and animals that live in it is an experience that most suburban children of 2001 can not share in as their natural world becomes increasingly sterile and more impoverished as the years go by. While the monetary value of the site is considerable, in 100 years will our descendants consider its destruction a much greater cost, perhaps even criminal considering the present day calls for its preservation from a concerned public.** [34]

The 8.5ha conservation reserve proposed as part of the development is in a strategic position that buffers existing houses and traffic to the east. The rest of the bush is surrounded by animal pens and an agricultural research station and therefore is not really observable from the Hospice, hospital or hostels.

Inappropriate planning - proximity to Subiaco WWTP – strategy to address future impacts are not addressed

17.1 **The objective of the EPA's Industrial-Residential Buffer Area (Separation Distances) No. 3 Draft Policy (1997) is to ensure that where industrial land uses and sensitive land uses (residential development) are being developed in close proximity to one another, residents are not exposed to unacceptable levels of emissions from the industrial land uses. The WWTP requires an adequate separation distance from the property boundary to any adjoining or surrounding residential areas, namely the maintenance of the existing buffer.** [51]

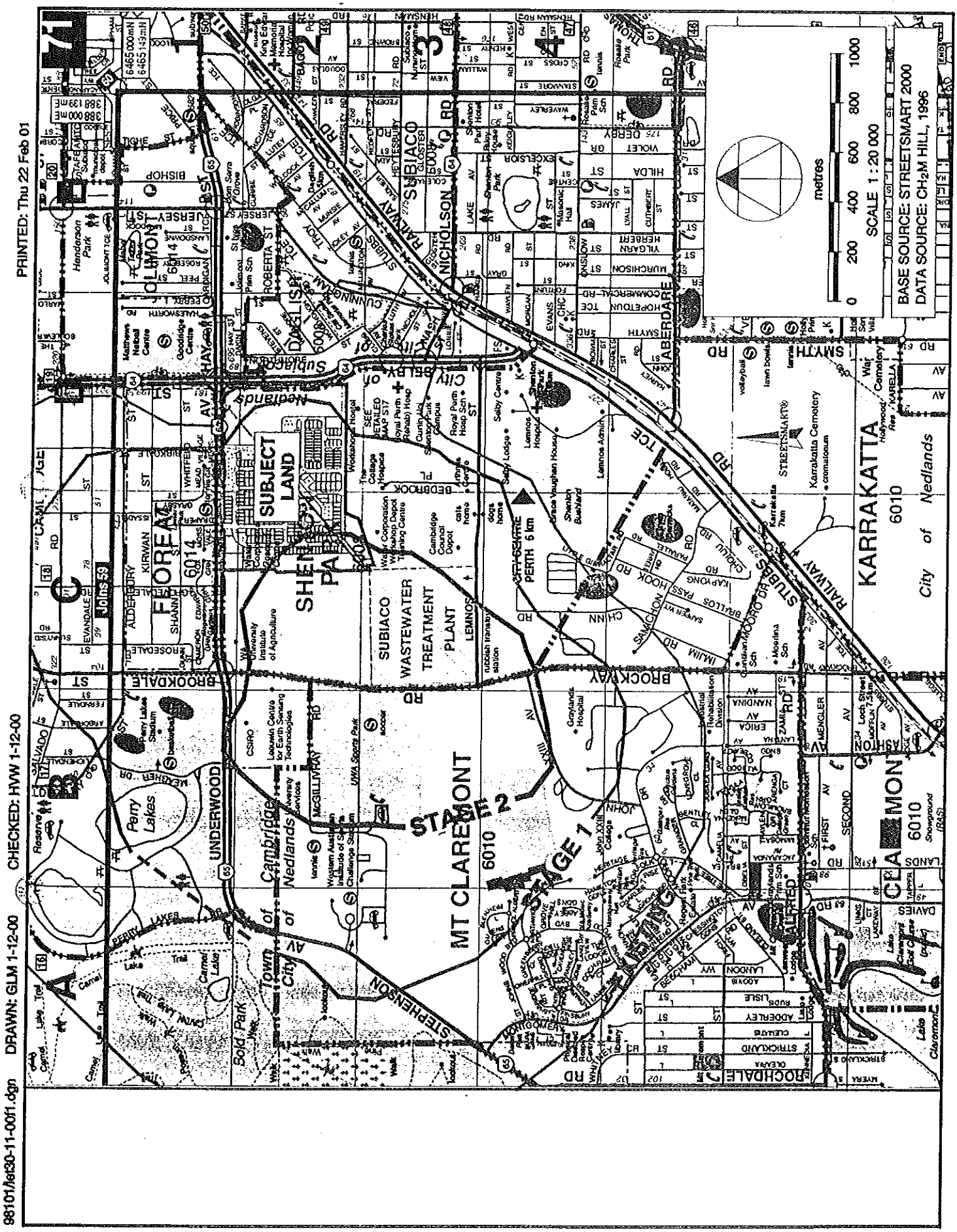
17.2 **The proposed residential development within the existing buffer zone around the WWTP represents an incompatible land use which, if implemented, is likely to detrimentally effect public amenity, public benefit or the aesthetic enjoyment of the residents.** [51, 11]

The EPA in its Policy, Guidelines and Criteria for Environmental Impact Assessment Industrial – Residential Buffer Areas (Separation Distances) No.3 (July, 1997) provides guidance in relation to new residential areas proposed within established buffer areas for existing non-heavy industries (Section 5.6).

Specifically the EPA states that '*in the absence of a proper scientific study based on site and industry specific information which would show the generic buffer distance could be relaxed, the EPA would advise against that encroachment in the buffer area.*'

The Water Corporation has undertaken a series of odour assessments incorporating dynamic olfactometry to assess the impacts of the operation of the SWWTP. Air Quality modelling, based on the outcomes of the odour assessment has identified areas of potential impact that include the subject land (the existing scenario).

The Water Corporation also assessed the impact on the area impacted by unreasonable odours under various abatement scenarios. The predicted outcome of implementation of these abatement strategies is shown in Figure 1. The proponent contends that, based on the outcomes of the Water Corporation's odour assessment and modelling, it can be concluded that odour can be managed such that the amenity of residents within the subject land can be protected.



Pt LOT 2103 UNDERWOOD AVE., SHENTON PARK
IMPACT ZONES, SUBIACO WWTP

PREDICTED 5 OU CONTOURS
EXISTING, STAGE 1 & STAGE 2 SCENARIOS

ATA Environmental
environmental scientists

FIGURE 1

17.3 The Water Corporation has large quantities of chlorine on site making it dangerous to build housing any closer than present. [11]

A risk assessment conducted for the chlorine storage on site indicated that a separation distance of 300m is required to sensitive areas such as residential developments. The proposed development of the Underwood Avenue site meets the recommended separation distance.

17.4 The proposed development would reduce the odour and safety buffer of the WWTP. The gradual process of buffer erosion that has occurred at several Water Corporation's facilities in the metropolitan area is unacceptable. Until a clear buffer policy for such facilities is in place, it is important that the existing distance is maintained. [19]

Refer to Response 17.2.

Bushland provides odour / safety buffer for the WWTP

18.1 Does the natural bushland already serve a purpose in minimising the smell from the sewerage plant on Brockway Road? Is this likely to increase with the clearing of the bushland? [18]

Bushland may assist in buffering odours from the SWWTP. However, the development would result in implementation of best management practices by the Water Corporation including a reduction in the odour emission levels from the SWWTP. This would benefit the existing residents near the plant who have consistently complained to the Water Corporation about the odours.

Important Educational Resource (existing and Future (ie. Shenton College)

19.1 The bushland provides a unique opportunity for students of the new Shenton College to become custodians and to utilise the site for related educational activities [4]

The educational opportunities afforded by the proposed conservation reserve to institutions such as Shenton College will be considered by the UWA.

ASSESSMENT PROCESS

Formal assessment required / assessment method inadequate

20.1 Due to the potential implications for the long-term retention of environmental values and ecological viability of Kings Park and Bold Park, it is recommended the EPA submit this proposal to PER level of assessment [6]

20.2 It is inadequate of the EPA to accept in principle on the one hand, 'Bushplan' as a strategy for the protection and management of remnants, and on the other indicate that a negotiated solution to the development of bushland in private ownership can provide a satisfactory outcome. The environmental issues are more regional than local and therefore a more thorough and penetrating environmental level of the relevant issues and environmental factors is required [9]

20.3 The Draft Guidance Statement states that Bush Forever Sites proposed for protection through a NPS, proposals resulting in the direct loss of bushland would be unlikely to be assessed if the proposal achieves a 'reasonable outcome' (where the highest conservation value area/s and threatened ecological communities are protected). The outcome, as proposed by UWA, is far from 'reasonable' and the proposal should be subject to EIA. [19]

20.4 The DEP provided an opinion in April 2000 that the proposal would have an unacceptable impact on the area of regionally significant vegetation, in effect the proposal was unlikely to be environmentally acceptable. [19] The highest level of assessment is needed before any development is considered and that such assessment should involve extensive community consultation – something missing to date. [59]

The EPA has identified Bush Forever Sites with an Urban NPS will require a reasonable outcome through the NPS process administered by the Ministry for Planning (MfP). A NPS agreed at the government agency level do not preclude the possibility of referrals pursuant to the EP Act under Section 38 or 48A (for scheme amendments).

If a proposal is referred to the EPA pursuant to Section 38, the Chairman would have to make a decision whether or not to assess it. This decision has to be made within 28 days and before doing so the Chairman would seek advice from government officers as well as others if necessary. A decision by the Chairman not to assess a proposal is appealable to the Minister for the Environment.

Most proposals for development on Bush Forever Sites identified for protection through an Urban Negotiated Planning Solution will require approval through a public planning process. The EPA in discharging its responsibilities under the Act is required to consider proposals on their merits. The EPA would, however, expect that officers would have made sound judgements and this would be an important factor in the EPA's consideration of a referral. The EPA would also take into account the regional context for individual Sites in arriving at its decision on a referral.

The EPA is unlikely to assess a proposal referred to it if the NPS achieves a reasonable outcome expected through Bush Forever.

The EPA will determine whether the SWWTP odour issues is significant enough to warrant formal assessment.

20.5 The advertising and consultation process undertaken by UWA is clearly inadequate. It does not ensure that the local community was fully aware that an Environmental Review had been lodged for the subject site, nor does it provide for a proper public consultation process for those who did manage to see the advertisement. [51]

Refer to response 20.4. The University has taken the unprecedented position of allowing the public to have input to the EPA on setting the level of assessment. The advertising period was not a formal advertising period as part of Section 38 of the Environmental Protection Act. This may or may not occur at a later stage.

20.6 Because of the finality of development (bushland habitat can not be re-created) at the very least the community must 'hasten slowly' on this matter. The prospective developers should be required to prove that the community will not be losing a valuable asset which can only appreciate in value as more people crowd into the inner suburbs. [57]

Bush Forever identifies the 'regionally significant' bushland areas in the Perth Metropolitan Region using a number of criteria. The 8.5ha of urban zoned land to remain as bushland has been accepted by the Interagency Working Group on Bush Forever.

Insufficient information to determine future of the site – further investigations are required.

21.1 Errors noted in the ATA report.

21.2 There is insufficient information on which to base a decision of the future of the Underwood Avenue bushland. Although there has been a botanical survey of the area it does not cover all seasons, nor does it include the non-vascular plants (fungi, mosses etc). Data on the fauna of the area are also limited. The significance of the area in the context of nearby uncleared areas such as the Shenton Park Reserve and Bold Park has not been fully assessment, in particular, as a network important in the survival of faunal populations. [16]

Refer to Response 21.9

21.3 Has the EPA, Botanic Gardens and Parks Authority, CALM, UWA Zoology and Botany Dept, and any other relevant group been able to inspect, make an inventory of flora and fauna and make recommendations for the future protection of this piece of bushland? [24]

DEP officers have inspected the site and agreed to the NPS outcome. The land is also freely available to the University's Departments of Botany and Zoology as well as the WA Museum.

21.4 The ATA report does not adequately address the environmental issues associated with the proposed subdivision. The report into the regional significance of the Underwood Avenue bushland was based on a 'desktop study' relying almost entirely on information gathered by other people, usually relating to areas of bushland other than the Underwood Avenue bushland. The proponents make misleading and unsubstantiated claims about the role of the bushland as a corridor and about the unique balance of flora it contains. [45]

Disagree. The findings presented in the Environmental Assessment have been based on site investigations as well as a 'desktop' review of relevant documentation and assessments.

21.5 The CH2M HILL odour study was designed for another purpose and was never intended to demonstrate that odour would not affect potential residents of the subdivision. A thorough study addressing this question would have considered a range of climatic and plant operating conditions likely to be experienced in order to ensure that a number of worst-case scenarios were considered. [45]

The University has never stated that the CH2M Hill report demonstrates that odour would not affect residents at the new subdivision.

21.6 The ATA report lacks consistency and similarity in reference to the study area and the nearby Shenton Park bushland site.[45]

Acknowledged. The author apologises for any confusion caused by referring to the Shenton Park bushland site as the Lemnos Street bushland site in some sections of the report.

21.7 The ATA report states that 'the abundance of Banksia prionotes in the northern ridge area along Underwood Avenue is possibly due to an increase in the frequency of fires in this area'. This is incorrect as B. prionotes is known to die out when exposed to frequent fires.[45]

Acknowledged. This statement would more accurately read: 'The abundance of *Banksia prionotes* in the northern ridge area along Underwood Avenue is possibly due to the occurrence of fire in this area in the past.' Anecdotal evidence suggests that *B. prionotes* was not as abundant on this site in the past, therefore the fire in 1988 provided the impetus for germination of the soil seed bank of *B. prionotes*.

21.8 **The ATA report claims that more than 22% of the site will be protected by setting aside 8.5ha of bushland to be managed by UWA for conservation purposes. The real area of the bushland to be protected is closer to 7.5ha (20% when bushland lost as a result of the Water Corporation easement and firebreaks.** [45]

A portion of the Water Corporation easement within the Underwood Avenue bushland site was cleared to implement sewerage works in the Floreat Park, Wembley area. These activities resulted in minimal damage to the bushland and as a result the area has regenerated consistent with the surrounding bushland. It is acknowledged that easements and firebreaks have not been integrated into the bushland retention equation, and as such the submitter should consider the area of firebreaks and easements in the balance of the bushland proposed for development.

21.9 **The list of native species found in the bushland is incomplete. For example, it omits native grasses such as *Austrostipa compressa, Austrostipa flavescens* and *Microlaena stipoides* which are found in nearby Shenton Bushland. The list of native species in Shenton Bushland has now reached nearly 120, and it is likely that the 112 listed for the Underwood Avenue bushland is incomplete. The report also ignores fungi, which are a very important aspect of the bushland. The incomplete nature of this list is a problem because it reflects a lack of thorough field studies conducted by the consultants. Thus, it is possible that the consultants have overlooked a species that may be threatened or endangered.** [45]

The final Environmental Assessment Report prepared by ATA Environmental in November 2000 was based on numerous site investigations including flora surveys conducted in January 1998, July 1998 and September 2000. The timing of the surveys allowed for the compilation of a comprehensive list of annual and perennial native and introduced plants occurring in the bushland. During the surveys the native grasses *Austrostipa compressa, Austrostipa flavescens* and *Microlaena stipoides* were not recorded in the Underwood Avenue bushland.

ATA Environmental has undertaken numerous flora and vegetation surveys which have been required as part of the preparation of formal environmental assessment documentation for review by the DEP / EPA. On no occasion has the DEP / EPA required the identification of species of fungi as part of these surveys. It is acknowledged that fungi form an important part of the bushland ecology however, preliminary review of the assessment by the DEP did not require the survey to provide this level of detail.

PROPOSAL – GENERAL

Development to derive funds is inappropriate, investigation other options ie land swaps

22.1 **The principle of utilising land with retained natural values for human settlement essentially as a means of deriving funds is an outdated concept. Rather, pursuit of urban consolidation should be through the redevelopment of already developed land** [9]

22.2 **The sale of the land for housing will in the end only provide UWA with a one-off financial return. Alternatively, adoption of a full conservation strategy will offer continued educational and research options to the longer-term benefit of the wider community** [9]

22.3 **Options to retain the bushland and prevent the need to sell the land for development include donations from staff, past students and wider community.** [15]

22.4 **Consideration should be given to alternatives such as a land swap for other public land so that any residential development occurs an already cleared land. Further, before any area of the bushland could be approved for clearing, the UWA must earn a biodiversity credit by securing the conservation of equivalent biodiversity values in other areas that are in greater biodiversity deficit.** [44]

The University is open to suggestions and has investigated the possibility of a land swap. Unfortunately none have been identified.

Inaccessibility of proposal documentation

23.1 UWA has not made it easy for interested members of the public to access the reports. [14]

The release of the Environmental Assessment report for public comment was undertaken on advice from the EPA to identify the level of community interest and nature of issues raised. Due to the informal nature of the release of the documents it was determined that the UWA was not required to prepare numerous copies of the report, as would be required under the formal assessment process. Instead, copies of the report were made available at the local authority libraries and the Reid Library at UWA.

Note – refer to list of submitters for summary of responses