Landfill for future widening of the Mitchell Freeway at Lake Monger

Main Roads Department

Report and recommendations
of the
Environmental Protection Authority

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Summary and recommendations

The Environmental Protection Authority has assessed a proposal by the Main Roads Department (MRD) to place sand (surcharge) to a height of 4.5 metres along a 1.9 kilometre length of the Mitchell Freeway adjacent to Lake Monger. The sand is to be piled to consolidate peat and an old sanitary landfill site for works associated with the widening of the Mitchell Freeway and the provision of a median strip for the proposed Northern Suburbs Rail Link. Because of the presence of peat and sanitary landfill, the ground is relatively spongy and would create an unsuitable base for the freeway and the rail link without treatment.

Included in the proposal for surcharging were six options for the landscaping and redevelopment of a section of the Lake Monger foreshore affected by the freeway widening proposal. The MRD's preferred option (option 1 in the Public Environmental Review) for this facet of the proposal involves filling approximately 9 000 square metres of the lake including the creation of an island for tortoise breeding purposes (see Figure 2). It is then proposed to landscape and revegetate the filled area, including the translocation of existing reed beds and the planting of native vegetation to create wildlife habitat. The existing path (dual use path) that circumnavigates the lake will be maintained at all times during the project.

The proponent, the Main Roads Department, has presented the Environmental Protection Authority with reasons why other alternatives for the railway (such as a tunnel or viaduct) were unsuitable. A summary of the proponent's reasons is appended (see Appendix 2 section 2), but it would have been better if the proponent had included thorough explanations in its original public report.

After consideration of the six options, and taking into account the fact that Lake Monger is a highly modified environment, the Environmental Protection Authority decided that while all the options have potential environmental impacts on the lake, they are manageable.

However, there are costs associated with the options investigated. For example, the preferred option as presented involves temporary loss of habitat and a reduction in the area of Lake Monger. Option 3 requires the construction of a large (4m high) stone wall on the lake shore with a consequential reduction in the aesthetic qualities of the area and option 5 involves the resumption and destruction of some 25 residential dwellings on the east side of the freeway.

Therefore, while the impact on the lake of all the options are manageable, the Environmental Protection Authority believes option 1 is the most acceptable alternative for the long term preservation of the attributes of this section of the Lake Monger foreshore because this option offers the most environmental benefits.

However, filling of a portion of the lake without compensation for the area lost cannot be justified due to the already substantially reduced size of Lake Monger and the loss of wetlands generally on the Swan Coastal Plain since European settlement. The Authority has therefore recommended that a new equivalent area of lake be constructed. This could be accomplished by excavating and constructing an area of previous wetland which has been filled in the past with sanitary landfill.

The Authority also recognises that Lake Monger is extremely important to the Aboriginal community and the proponent has sought the approval of the Hon Minister for Aboriginal Affairs for the project. If the proposal is altered as a result of that (or any other) approval process, the Authority will offer the Main Roads Department additional advice on the proposal in relation to the changes.

Given the environmental impacts and public interest in the proposal, the Authority decided to assess the proposal under Part IV of the Environmental Protection Act 1986. The level of assessment was set at a Public Environmental Review (PER) with a public review period of 8 weeks which commenced on 9 December 1989 and finished on 2 February 1990.

Recommendation 1

The Environmental Protection Authority has concluded that while all the options presented have manageable environmental impacts upon the modified Lake Monger wetland, the proposed preferred option as amended during the process of interaction between the proponent, Environmental Protection Authority, the public and the government agencies that were consulted, is seen as the most acceptable with respect to the Lake Monger environment because of the environmental benefits it offers compared with the other options.

In reaching this conclusion, the Environmental Protection Authority has considered that:

- **a new area of wetland needs to be created to replace any wetland area that is lost;**
- **more rehabilitation than originally proposed is required;**
- **there must be action to protect the water quality of the lake during the surcharging operations;**
- **the Environmental Protection Authority must be consulted during construction work to minimise impacts on flora and fauna; and**
- **action needs to be taken by the proponent and other relevant bodies to work towards improving the water quality of the lake.**

The Environmental Protection Authority notes that these environmental factors have been adequately addressed by either environmental management commitments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

Accordingly, the Environmental Protection Authority recommends that the proposal and preferred option for rehabilitation could proceed, subject to:

- **the proponent's environmental commitments; and**
- **the Environmental Protection Authority's recommendations in this report.**

Should an option other than the proponent's preferred option be pursued, the Environmental Protection Authority could offer additional advice.

The Authority considers that the filling of wetlands without compensation by the creation of new, or extension of existing wetlands, can not be justified given that over 80% of the wetlands on the Swan Coastal Plain have been destroyed in the past 160 years.

Recommendation 2

The Environmental Protection Authority recommends that the proponent, in liaison with the City of Perth, be required to excavate a portion of the lake shore so that an additional surface area of lake is generated which is at least equivalent to that being filled. The plans for this additional area should be approved by the Minister for the Environment before excavation commences.

The Environmental Protection Authority sees advantages in the excavation being in the south east corner adjacent to the Vincent Street interchange. The excavation area would then be adjacent to or may include the area composed of sanitary landfill. The proponent should therefore devise measures, satisfactory to the Environmental Protection Authority, to prevent the further contamination of Lake Monger by the previous sanitary landfill.

The Authority believes a vegetation buffer between the freeway and the lake will have many advantages including the reduction of visual impact of the freeway and the creation of wildlife habitat.

Recommendation 3

The Environmental Protection Authority recommends that the proponent, in liaison with the City of Perth, be required to rehabilitate the eastern edge of Lake Monger from the Powis Street interchange south to the Vincent Street interchange, to the satisfaction of the Environmental Protection Authority.

The original groundwater testing conducted in 1985 concluded that there should not be a pollution problem with the groundwater displaced from the peat and sanitary landfill. However, additional testing should be undertaken to confirm this.

Recommendation 4

The Environmental Protection Authority recommends that prior to the commencement of construction, the proponent develop and implement a water quality testing program to the satisfaction of the Environmental Protection Authority, in the lake, peat and sanitary landfill areas. The results should be submitted to the Environmental Protection Authority.

Should the Environmental Protection Authority determine that the groundwater movement from the peat or old sanitary landfill site would have adverse effects on the Lake Monger environment, the proponent should be required to put in place ameliorative measures to the satisfaction of the Environmental Protection Authority.

To ensure there is a minimum period of disruption to the lake wildlife and that work is being carried out in an environmentally sensitive manner, the Authority should view and approve detailed plans before commencement of construction.

Recommendation 5

The Environmental Protection Authority recommends that detailed plans for work associated with any lake modification, rehabilitation and wildlife management be approved by the Environmental Protection Authority prior to the commencement of work.

As pollutants from the freeway such as grease, oils and potential chemical spills may pose problems, the Authority believes it is appropriate that drainage from the freeway should not be permitted to flow directly into Lake Monger.

Recommendation 6

The Environmental Protection Authority recommends that the proponent either ensures stormwater drainage off the surcharge area, widened freeway and the new rail link in the vicinity of Lake Monger is not directly discharged into the lake, or if it is, that it should be treated to a standard acceptable to the Environmental Protection Authority.

There has been discussion for some time regarding the formation of a Lake Monger Environmental Management Committee, but to date, nothing has eventuated. The Lake Monger environment will continue to deteriorate, or at best the status quo will remain, until management strategies to address the environmental problems are formulated and implemented.

Recommendation 7

The Environmental Protection Authority recommends that the City of Perth in conjunction with the Main Roads Department and the Water Authority of Western Australia form a committee with the aim of identifying and implementing measures to manage pollutant inputs to Lake Monger.

1 Background

The existing Mitchell Freeway was originally constructed over 10 years ago. In the Lake Monger area the freeway that was constructed was intended to be the eventual southbound carriageway. A temporary crash barrier (still existing) was erected as the freeway median. Original planning for the freeway was on the basis that a second carriageway would be constructed within the existing freeway reserve, which includes a small portion of the north east corner of Lake Monger.

The State Government has made a commitment to open the Northern Suburbs Rail Link in 1992. The railway is to be located within the median strip of the freeway. Early construction of the second carriageway on the freeway is needed to create the median required for the rail link. The actual freeway widening work will consist of one extra lane being created in each direction.

It is proposed that the freeway reserve on the western side of the existing freeway will be utilised for the expansion of the freeway and the creation of a median strip. Testing of the area confirmed the existence of peat (from swamps that used to exist on the site) and an old sanitary landfill area in the south east corner of the lake. These ground conditions were considered unsuitable for construction work. If not treated or removed, the peat and sanitary landfill would settle after freeway construction and cause cracking and undulations in the road surface and an uneven surface for construction of the railway.

The Main Roads Department (MRD) proposes to treat the peat and sanitary landfill on the area between Lake Monger and the existing freeway by the process of surcharging (piling sand on the area for a period of time to compact the peat/sanitary landfill). The proposal also incorporates filling a portion of Lake Monger to increase wildlife habitat and recreational attributes and maintaining the lake/freeway separation in the north east corner of the lake.

The Environmental Protection Authority considered the environmental impacts were sufficient to warrant assessment under Part IV of the Environmental Protection Act 1986. The level of assessment was set at a Public Environmental Review (PER).

2 Project description

To carry out ground consolidation work on the eastern edge of Lake Monger associated with the widening of the Mitchell Freeway and the construction of the Northern Suburbs Rail Link, the MRD proposes to pile sand (surcharge) to a height of approximately 4.5m along a 1.9 km length adjacent to Lake Monger (see Figure 1). The surcharge dumps will form a continuous mound of sand for the length described above in a similar fashion to work carried out on the Mitchell Freeway around the Cedric Street interchange over the past few years. It is expected the surcharge would be in place for approximately 12 months. The surcharge would be clean sand from the northern end of the Mitchell Freeway.

Alternative consolidation treatments of the site were considered such as excavation of the peat and sanitary landfill and stone column supports for the freeway. These alternative options were dismissed by the MRD on engineering and cost grounds.

As a facet of the surcharging work, six options for the rehabilitation of the shoreline area affected were presented in the PER and these are summarised below. The lake filling and island creation are proposed to be carried out before the surcharge stockpiling is commenced.

Option 1

This is the MRD preferred option and involves filling approximately 9 000 square metres of the lake including the creation of an island for tortoise breeding purposes.

It is then proposed to landscape and revegetate the filled area, including the following sequence of events:

- the installation of a mesh fence in Lake Monger offset from the proposed new lake shore and the translocation of aquatic fauna to the lake side of this fence;

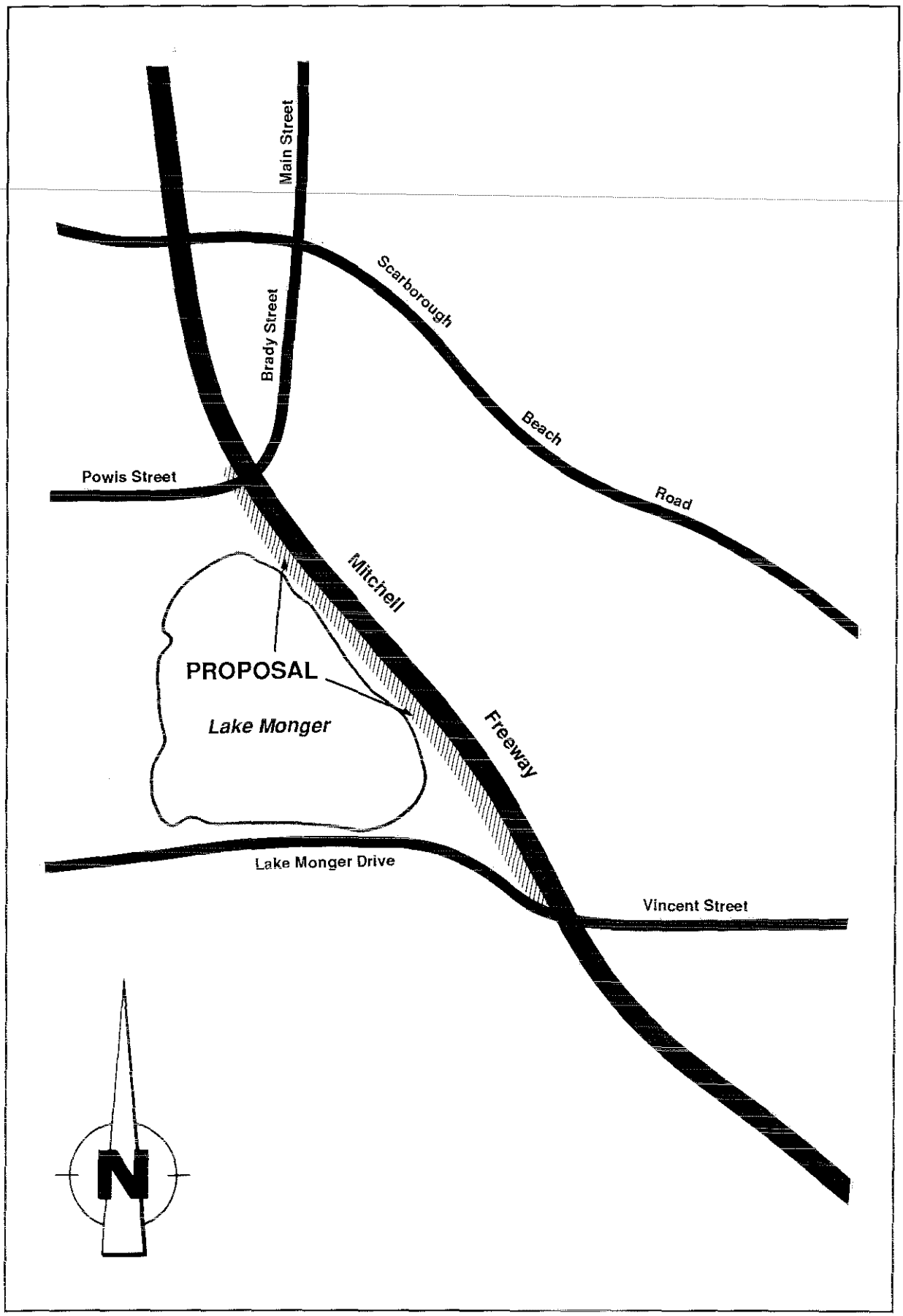

Figure 1: Location map of Lake Monger showing extent of surcharging (shaded area)

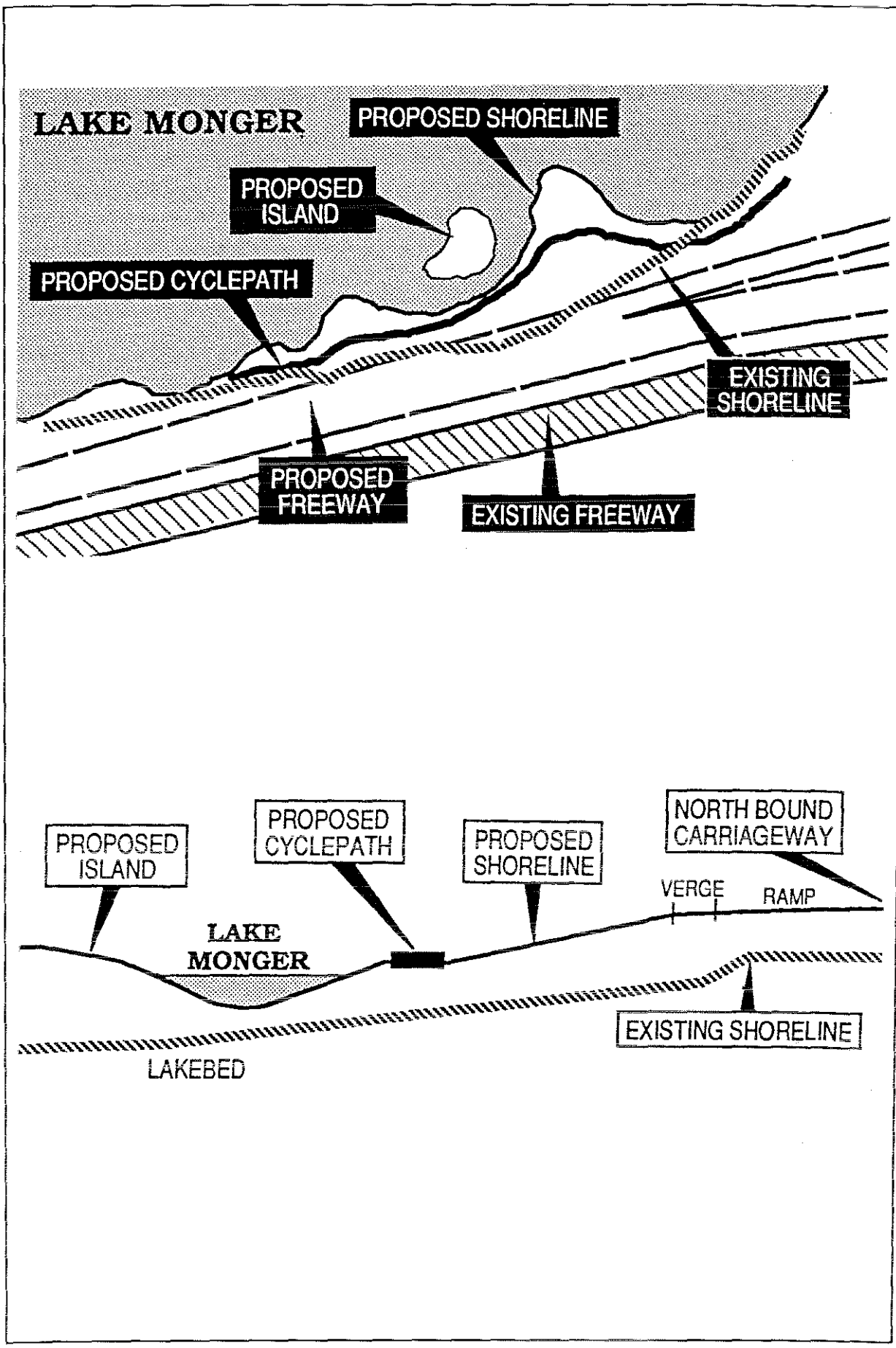

Figure 2: Proposed shoreline changes

- creation of an island approximately 50m x 20m;
- the translocation (and temporary storage if necessary) of existing reed beds to the new lake edge;
- the completion of earthworks between the existing dual use path (to be used by pedestrians and cyclists) and the new lake edge;
- installation of the new dual use path on its final alignment;
- installation of new boundary fence on the final boundary; and
- landscaping and revegetation.

Option 2

Option 2 involves filling a much smaller portion of the lake (0.1%) out to the freeway reserve boundary. The freeway alignment would remain the same as option 1, but there would be a reduced separation distance between the freeway and the lake shore. A steep embankment would be placed directly above the dual use path leading up to the freeway with a guardrail separating the freeway from the embankment. Due to the reduced separation distance, there would be less opportunity for revegetation and improving the amenity of this area.

Option 3

Option 3 does not require any filling of the lake. The dual use path would be located directly on the lake foreshore backed over a distance of about 200m by a sheer 4m high retaining wall with the freeway at the top of this. Along this section there would be no scope for a vegetative buffer between the path and the freeway and thus the aesthetic impact of the wall may be substantial. The freeway would have to be realigned within the existing freeway reserve and some design changes made.

Option 4

This option also does not require any filling of the lake. The main component of this option is the lowering of the freeway under Powis Street. Changes to the freeway alignment similar to those needed for option 3 would be required, with the main advantage of the option being the vertical distance between the lake and the freeway would be greatly reduced. Thus an embankment or retaining wall would not be necessary but noise levels from the freeway would be significantly increased. However, the lake/freeway separation is still greatly reduced from its present level.

Option 5

Option 5 maintains the existing separation between the lake and freeway by realigning the freeway further to the east. Consequently, the existing environment could be re-created and improved. However, this option requires the resumption of residential properties (at least 25) to the east of the existing freeway with consequential social impacts.

Option 6

Option 6 again involves no lake filling but would require a boardwalk over the lake for the dual use path. A retaining wall similar to option 3 would be required on the lake edge. Modifications to the freeway alignment would not be needed for this option, with the extra space needed being created by reducing the width of the railway corridor within the freeway system.

The Environmental Protection Authority considered that the environmental implications of all the above options could be acceptably managed, but the proponent provided good reasons for preferring option 1 so the recommendations have been framed in that light.

Other alternatives that did not require filling of Lake Monger were briefly considered, namely:

- tunnelling to construct the rail below existing ground levels:
- construction of the rail system on an elevated viaduct; and
- construction of the railway to the east or west of the existing freeway.

These alternatives were dismissed by the MRD on the grounds of:

- cost;
- engineering difficulties which preclude further investigation; and
- environmental and social impacts.

The actual surcharging component of the work is the same for all the options presented and it anticipated that the dual use path will be maintained continuously throughout the construction phase.

3 Existing environment

In the Authority's Bulletin 227 "Draft Guidelines for Wetland Conservation in the Perth Metropolitan Region" Lake Monger is identified as a category 3 wetland, defined as:

"Wetlands which have been highly modified but which are considered to play important roles in their urban and/or rural settings."

Lake Monger has several important roles including recreation (cycling, walking, bird feeding, picnicking etc), wildlife habitat for fauna (waterbirds, tortoises) and being an important component of the local drainage system. In addition, the lake is a very important summer refuge for black swans and other waterbirds.

The Lake Monger Reserve environment has been extensively modified from its natural state over many years and the lake is in fact only one third of its original size due to filling for agricultural purposes, roadworks and a rubbish dump. There is little native vegetation remaining in the Lake Monger reserve, it having been replaced with lawn and other exotic species. The water quality is extremely poor, and this is due predominantly to the eutrophic (nutrient enriched) conditions that currently exist. The nutrients are derived from several sources including septic tank effluent, urban stormwater, lawn fertilisers and leachates from old sanitary landfill sites adjacent to the lake.

The lake shows many symptoms related to the poor water quality and these include:

- excessive algal growth and related effects such as fish kills and odour problems; and
- seasonal outbreaks of botulism amongst waterfowl at the Lake.

The vegetation of the area affected by the proposed surcharging works consists largely of lawn areas of Kikuyu (*Pennisetum clandestinum*) and other exotics such as Pampas Grass (*Cortaderia selloana*) and Castor Oil Plant (*Ricinus communis*). However, fringing reed beds exist along the water's edge and are important to many species of fauna for breeding, feeding or shelter. The reed beds also play an important part in nutrient cycling in the Lake. Some of these reed beds are located on the eastern edge of the lake which will be affected by this proposal.

Various species of fauna inhabit Lake Monger including the Western Long Necked Tortoise (*Chelodina oblonga*) and the Western Banjo Frog (*Limnodynastes dorsalis*). Observers have counted 20 species of avian fauna utilising fringing reed beds including the Dusky Moorhen (*Gallinula tenebrosa*) and the Black Swan (*Cygnus atratus*) (Porter, 1987).

The Lake Monger Reserve is heavily patronised as a recreation area and the weekly visitor total is in excess of 12 000 people. This makes it one of the most significant wetlands in the Perth Metropolitan Region in terms of human use attributes. Various recreational pursuits are undertaken including walking, cycling, and jogging as a sealed path circumnavigates the lake. Handfeeding of swans and ducks at Lake Monger is also a popular pastime with visitors.

The area is widely recognised as important for its Aboriginal Heritage value and is a registered site with the Department of Aboriginal Sites. The importance of Lake Monger is primarily mythological but activities such as hunting, camping and fishing in the pre-European and to a lesser extent post-European contact periods were also undertaken.

The Mitchell Freeway currently runs along the eastern edge of the lake and at the site of the proposed filling in the north east corner is approximately 40m from the shoreline. The freeway at present is highly intrusive into recreational pursuits along the eastern edge due predominantly to visual and noise pollution aspects.

In summary, the Lake Monger environment has social and to a lesser extent environmental value at the present time, but these values are under threat due to lake pollution problems partly resulting from another important function of the lake, that being local drainage management.

4 Submission review

The PER prepared by the MRD was released for public comment for a period of 8 weeks from 9 December 1989 until 2 February 1990. In that time, 91 submissions were received by the EPA from different sectors of the community as represented below.

Source of submission	Number of submissions
Conservation groups	4
Community groups	4
Government departments/local authorities	3
Individuals	80

Table 1: Submission source by group

The majority of individual submissions were from people residing in the vicinity of Lake Monger but responses were received from further afield, including Capel in the south west of the State.

The submissions reflected a wide range of community concern, and the following table presents a breakdown of concerns by issue groups. A more detailed breakdown can be found in Appendix 1.

Issue group	Number of submissions raising the issue
Public review procedures	9
Alternatives	79
Water quality	17
Flora/fauna	52
Planning issues	13
Lake integrity	71
Social environment	25
Criticism of PER	13

Table 2: Submissions by issue group

The most frequently raised issue in submissions was that of alternatives to filling Lake Monger. Further encroachment on the lake was strongly opposed and many submissions stated that other alternatives should be investigated more thoroughly, particularly the options of a rail tunnel or a viaduct system to raise the railway above the freeway.

Concern for flora and fauna affected by work associated with the MRD's preferred option was also raised in a high proportion of submissions.

Support for the options presented by the MRD was generally low with no submissions unequivocally supporting the preferred option and only three submissions giving conditional support. No submissions supported options 2 and 6 while options 4 and 5 received the support of 3 submissions each. Option 3 received support from 1 submission.

From the submissions received, a list of questions/concerns were compiled and sent to the proponent. The proponent's response is given in Appendix 2.

The Authority has carefully considered the submissions received and has specifically reflected some of the concerns raised in its recommendations on the proposal.

5 Environmental impacts and management

Based on its own investigations, information in the PER and submissions received during the public review period, the Environmental Protection Authority has identified the following environmental issues:

- Reduction in the surface area of Lake Monger;
- Additional rehabilitation work;
- Quality of water displaced by surcharging;
- Flora and fauna;
- Freeway drainage management;
- Drainage management;
- Temporary impact of surcharge dumps;
- Dust control;
- Sediment disturbance during lake filling; and
- Increased noise.

Aboriginal interests were also identified as an important issue.

After considering all of these issues, the Authority has concluded that the environmental impacts of this proposal are manageable and the project can be made environmentally acceptable.

Recommendation 1

The Environmental Protection Authority has concluded that while all the options presented have manageable environmental impacts upon the modified Lake Monger wetland, the proposed preferred option as amended during the process of interaction between the proponent, Environmental Protection Authority, the public and the government agencies that were consulted, is seen as the most acceptable with respect to the Lake Monger environment because of the environmental benefits it offers compared with the other options.

In reaching this conclusion, the Environmental Protection Authority has considered that:

- **a new area of wetland needs to be created to replace any wetland area that is lost;**
- **more rehabilitation than originally proposed is required;**
- **there must be action to protect the water quality of the lake during the surcharging operations;**
- **the Environmental Protection Authority must be consulted during construction work to minimise impacts on flora and fauna; and**
- **action needs to be taken by the proponent and other relevant bodies to work towards improving the water quality of the lake.**

The Environmental Protection Authority notes that these environmental factors have been adequately addressed by either environmental management commitments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

Accordingly, the Environmental Protection Authority recommends that the proposal and preferred option for rehabilitation could proceed, subject to:

- **the proponent's environmental commitments; and**
- **the Environmental Protection Authority's recommendations in this report.**

Should an option other than the proponent's preferred option be pursued, the Environmental Protection Authority could offer additional advice.

5.1 Reduction in surface area of Lake Monger

Given the substantial loss of wetlands in the Perth Metropolitan Region and the reduction in the size of Lake Monger by two thirds over the past 160 years, the Authority believes a further reduction in the surface area of Lake Monger cannot be justified. The Department of Conservation and Land Management is also extremely concerned at the incremental loss of wetlands and consequently believe Alternative 5 is the only acceptable option (see Appendix 4).

It is recognised that the MRD propose to rehabilitate the filled portion of lake to create a considerably improved environment with enhanced human use and wildlife attributes. Even so, the Authority believes an even greater opportunity to improve the Lake Monger environment exists by not only undertaking the proposed rehabilitation, but by extending the lake as well to compensate for the loss of surface area engendered by this proposal.

The Authority believes compensation for any lake filling is necessary to make the project environmentally acceptable.

Recommendation 2

The Environmental Protection Authority recommends that the proponent, in liaison with the City of Perth, be required to excavate a portion of the lake shore so that an additional surface area of lake is generated which is at least equivalent to that being filled. The plans for this additional area should be approved by the Minister for the Environment before excavation commences.

The Environmental Protection Authority sees advantages in the excavation being in the south east corner adjacent to the Vincent Street Interchange. The excavation area would then be adjacent to or may include the area composed of sanitary landfill. The proponent should therefore devise measures, satisfactory to the Environmental Protection Authority, to prevent the further contamination of Lake Monger by the previous sanitary landfill.

5.2 Additional rehabilitation work

There is very little separation along the eastern edge of Lake Monger between the freeway and the lake shore. Advantages in vegetating this strip include a reduction in visual and possibly noise pollution off the freeway, a reduction in fertiliser use (currently applied to lawn on the area) and the creation of further wildlife habitat. Although the MRD proposes to rehabilitate the area which it proposes to fill, the Authority believes this should be extended to incorporate the eastern edge of the lake down to the Vincent Street Interchange. The Authority believes rehabilitation work should be carried out using native species previously indigenous to the Lake Monger environment where appropriate.

Recommendation 3

The Environmental Protection Authority recommends that the proponent, in liaison with the City of Perth, be required to rehabilitate the eastern edge of Lake Monger from the Powis Street Interchange south to the Vincent Street Interchange, to the satisfaction of the Environmental Protection Authority.

5.3 Quality of water displaced by surcharging

In the area to be surcharged, testing of groundwater performed in 1985 indicated that samples taken from peat areas and the sanitary landfill site were of similar quality to the lake water. There were differences in some of the components tested, for example sulphate levels in the sanitary landfill were substantially higher than levels in the peat. A full comparison of test results is provided in Appendix 5.

Only one sample was taken from each of the sanitary landfill, the peat and the lake. From these observations, the engineers who undertook the sampling believed that there should be no environmental problems associated with groundwater movement which has the potential to transport pollutants to the lake. However, this position was qualified with the statement that:

"Additional sampling will need to be performed to confirm these observations."

The Authority considers that more extensive sampling and testing is required to properly determine the characteristics of the groundwater and lake water. Given the previous agricultural land uses in the vicinity, the Authority believes testing for pesticides should be undertaken in addition to the parameters tested for in 1985 (these included tin, lead, nitrogen, phosphorous and phenols).

Recommendation 4

The Environmental Protection Authority recommends that prior to the commencement of construction, the proponent develop and implement a water quality testing program to the satisfaction of the Environmental Protection Authority, in the lake, peat and sanitary landfill areas. The results should be submitted to the Environmental Protection Authority.

Should the Environmental Protection Authority determine that the groundwater movement from the peat or old sanitary landfill site would have adverse effects on the Lake Monger environment, the proponent should be required to put in place ameliorative measures to the satisfaction of the Environmental Protection Authority.

5.4 Flora and fauna

Habitat diversity at Lake Monger is currently extremely poor, and consequently the significance of the temporary disruption to the north east corner of the lake should not be underestimated as the eastern edge is environmentally important due to the reed beds present and their role in the lake environment.

Due to the noise and associated ground vibration of construction vehicles and the MRD's commitment to construct a fence to exclude aquatic wildlife, the Authority believes fauna will naturally avoid the area during the construction phase, thus the number of faunal deaths should be minimal.

The most severe impacts on wildlife will occur due to the loss of a breeding/feeding area for 1-2 seasons at the site of the lake filling. Given that:

- the affected area is not the sole breeding area for any of the species of fauna at Lake Monger;
- the shore length to be disturbed is only approximately 350m; and
- rehabilitation of the filled area (including the transplanting of aquatic flora) will commence immediately after the lake filling and island creation.

The Authority believes the long term benefits of the creation of new and additional habitats justify the short term loss of a breeding area in these circumstances.

In its response to concerns raised in submissions, the MRD has undertaken to employ "Specialist consultants" to supervise the translocation of aquatic flora and fauna and other rehabilitation work. It is anticipated that these consultants will work closely with officers of the Authority to ensure the objectives of the rehabilitation proposals are met.

Fencing of the freeway reserve at the completion of construction work will need to be undertaken with the objectives of preventing female tortoise deaths on the freeway and directing them to suitable nesting areas. The female tortoise death rate at Lake Monger is much higher than for males at present, due to the females leaving the lake to breed, and being run over by vehicles.

Recommendation 5

The Environmental Protection Authority recommends that detailed plans for work associated with any lake modification, rehabilitation and wildlife management be approved by the Environmental Protection Authority prior to the commencement of work.

5.5 Freeway drainage management

The freeway and railway construction work provides an opportunity to modify the drainage component of the existing freeway. Given this opportunity, the Authority believes it is inappropriate for drainage from the freeway and railway to directly enter Lake Monger. This is due to the possibility of pollutants from the freeway such as rubber particulates, grease, oils and potential chemical spills being discharged into the lake.

Recommendation 6

The Environmental Protection Authority recommends that the proponent either ensures stormwater drainage off the surcharge area, widened freeway and the new rail link in the vicinity of Lake Monger is not directly discharged into the lake, or if it is, that it should be treated to a standard acceptable to the Environmental Protection Authority.

This recommendation should be read in conjunction with Recommendation 7 relating to drainage into Lake Monger generally.

5.6 Drainage management

Many drains discharge into Lake Monger at the present time from surrounding urban areas comprising a significant source of pollution to the lake. The drains are controlled by the City of Perth, the Main Roads Department and the Water Authority of Western Australia. The importance of the lake as a drainage compensating basin is not in question but the Authority believes that these bodies have some responsibility to reduce the level of pollutants entering the lake from this source.

There has been discussion for some time regarding the formation of a Lake Monger Environmental Management Committee, but up to this time, nothing has eventuated. The Lake Monger environment will continue to deteriorate, or at best the status quo will remain, until drainage management strategies to address the major environmental problem of lake water quality are formulated and implemented.

Recommendation 7

The Environmental Protection Authority recommends that the City of Perth in conjunction with the Main Roads Department and the Water Authority of Western Australia form a committee with the aim of identifying and implementing measures to manage pollutant inputs to Lake Monger.

5.7 Aboriginal interests

The Authority notes that the MRD has applied for permission to commence works on the site under Section 18 of the Aboriginal Heritage Act 1972-80, and has had meetings with representatives from the Aboriginal community. If the decision by the Minister for Aboriginal Affairs results in modifications to the proposal, the Authority will offer the Main Roads Department additional advice in relation to any proposed changes.

5.8 Other issues

5.8.1 Temporary impact of surcharge dumps

The surcharge piles will be in place for approximately 12 months. This will result in a loss of lake views to freeway users and create unsightly views for residents and people utilising the lake reserve for recreation or other purposes. The area of land occupied by sand piles is also temporarily sterilised from any use for the time of surcharge, however, as the impact will be for a relatively short time, the Authority believes the environmental impact is not significant.

5.8.2 Dust control

In commitment 7.2 and 7.3 in the PER (Appendix 3) the proponent has undertaken to implement dust control measures including covering of trucks transporting fill material on the freeway and hydromulching of the surcharge dumps. Provided these measures are implemented effectively, the Authority believes that dust will not be a significant problem.

At all stages in the project, the proposal will have to conform with the pollution control requirements of the Authority.

5.8.3 Sediment disturbance during lake filling

It is probable that the process of filling a portion of Lake Monger will disturb sediments in the immediate area. It is also possible that this will result in the mobilisation of pollutants locked in the sediments and a temporary increase in turbidity. However, given the lake's existing poor water quality and the small area affected, it is highly unlikely that this will have any further or long term adverse effects on the Lake Monger environment.

5.8.4 Increased noise

MRD predicted noise level assessment of the various alternatives indicates that all the options except Option 4 will have a noise level rise of less than 3 dB(A) at the lake edge with Option 4 predicted to rise by 8 dB(A) (see 7.1 of Appendix 2 - proponent's response to concerns raised in submissions). The Authority notes that noise increases are marginal taking into account the existing noise climate of the locality and do not in themselves constitute a significant issue. The Authority also notes that Option 1 provides the greatest degree of separation between the dual use path and the freeway.

6 Conclusion

The Environmental Protection Authority has concluded that although the Main Roads Department's proposal is environmentally acceptable and could proceed without additions or alterations, the further loss of an area of wetland can not be justified. Therefore the Authority has made recommendations ensuring there will be no nett loss of water surface area and also that this opportunity to improve the Lake Monger environment is not lost.

References

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Golder Associates, 1985, "First Stage Report, Geotechnical Investigation, Widening of the Mitchell Freeway", Perth WA.

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Appendix 1

Submission issue matrix

Issue groups	Number of submissions raising the issue
Public review procedures	
Public review too short	3
Poor timing over Christmas/New Year	2
Inadequate public involvement in project	3
Preconception that filling is inevitable	1
Alternatives	
None of proposed alternatives acceptable - new alternatives should be developed (e.g. tunnel,viaduct, construction of railway to east of freeway)	6 4
Lack of serious consideration of alternatives	3
Prefer Option 1 with conditions	3
Prefer other presented option	7
Prefer combination of options	2
Water quality	
Pollution concerns (sanitary landfill, heavy metals, drainage off freeway, sediment disturbance, lawn fertilisers)	1 2
Management of lake needed to reduce pollution	5
Flora/fauna	
Important/unique area for flora and fauna	7
Site of work most important area for flora/fauna	1 4
Lake is environmentally fragile/in a sad state	6
Vegetation buffer needed between the lake and adjacent roads	5
Area disruption for 1-3 years	5
Area should be a bird sanctuary with restricted public access	3
Proposed tortoise island covered in too much vegetation for breeding	1
Not enough breeding areas at present	3
Proposed islands should be bird sanctuaries	1
Lack of scientific support for tortoise island/mesh fence	3
Lack of scientific support for vegetation translocation	2
Local native vegetation should be replanted	2
Planning issues	
Necessity of widening freeway and creating railway	8
Traffic management (source, destination)	1
More environmentally sensitive transport development needed	1
Fear that freeway will need to expand again	2
Freeway reserve should not encroach on Lake Monger	1

Issue groups (cont'd)	Number of submissions raising the issue
Lake integrity	
Opposed to any encroachment on lake	59
Opposed to destruction of wetlands generally	7
More islands needed	3
Proposed island location unsuitable	1
Islands needed regardless of rail/freeway option	1
Important recreational/educational area	8
Beautiful area	5
Only lake left close to city apart from Hyde Park	2
Monetary value is being placed on lake	5
Aboriginal rights have not been adequately addressed	4
Cost of putting railway underground too expensive	1
Criticism of PER	
Inadequate detail provided with regard to proposed works and rehabilitation and species lists	8
Object to haste of report composition	1
Impact on waterbirds has not been considered	2
Document ignores current management issues	1
Poor quality document	1
Other	
Sanitary landfill should be removed	1
Inferred support from Perth City Council for preferred option	3
Noise/visual pollution of freeway	9
Railway and freeway should not be compromised	1
Temporary relocation of dual use path	1
Intrusion into a Parks and Recreation area	1
Aesthetic views of railway wires has not been considered	1
Groundwater/lake level concerns	1

Appendix 2

Proponent's response to issues raised in submissions

The following is a list of questions and concerns sent to the proponent for a response following the receipt of public submissions. The responses in *Italics* are made by the Environmental Protection Authority (EPA).

1 Public review

1.1 Period of public review too short - request 6 week extension.

All proposals assessed at the Public Environmental Review (PER) level are required to undergo an 8 week public review period. The EPA believes this is an adequate time period for interested groups and individuals to prepare a submission on the proposal and also gives the proponent a set review period for planning the time scale of the development.

1.2 Public review coincided with the Christmas/New Year period when people are traditionally away on holiday.

The EPA believes there was sufficient overlap from the Christmas/New Year period (2 weeks in December and 4 weeks in January) to allow for people on holiday at this time to prepare a submission on the proposal.

1.3 A public meeting should be called so that concerned people can put their views forward, and a letter drop undertaken to provide more information.

Given that the PER only concerns placement of surcharge on landfill between Vincent Street and Powis Street on the Mitchell freeway, the Department considers sufficient opportunity was provided in the PER process for provision of information and opportunity to express concerns. When the EPA has recommended acceptance of an option to construct the freeway detailed design can begin. During the design process the public will be provided with the opportunity to view design plans and have questions answered in an "open house" display in the vicinity of Lake Monger.

2 Alternatives

2.1 Lack of genuine consideration of alternatives by MRD and Government.

Various alternative alignments for the railway and its effect on the freeway were considered prior to the development of the master plan for the Northern Suburbs Rail System. For the master plan the "railway in the median" was selected, thus effectively removing other alternatives, such as tunnelling, from further consideration. Numerous options for this proposal were considered of which the six most feasible are shown in the PER. Alternative alignments considered in the master plan are as follows:

2.1.1 Railway on the east side of the freeway - this alternative was not studied in detail because of effects of additional noise and land requirements on the adjacent residents. In addition, considerable problems were encountered in transferring the railway to the east side of the freeway on its exit from the City, crossing the various on and off ramps and returning to the median in the Glendalough/Osborne Park area.

2.1.2 Railway on the west side of the future freeway - this alternative encroached further into the Lake Monger than the selected "railway in the median". Again considerable difficulty was encountered moving the railway across the freeway and the on and off ramps.

2.1.3 Railway on the west side of the existing freeway (ie in the median of the ultimate freeway) - the cost of constructing the railway to the west of the existing freeway without upgrading the current road system was found to be similar to the scheme allowing for duplication of the freeway at this stage. Possible further improvements to the freeway at a later date would require expensive and difficult modifications to both the road and rail system.

2.1.4 Railway in the freeway median - this has become the selected scheme. The ultimate design of the freeway has always allowed for a rapid transit system in the median.

Various options have been considered for this alternative, six of which were presented in the PER. Our assessment of these options has included preliminary design drawings, budgetary costing, construction staging and environmental impact assessment. During the design stage the selected option will be examined in more detail to maximise opportunities to reduce environmental impact.

2.2 New alternatives must be developed and considered, e g tunnel system, viaduct rail system, construction of the railway to the east of the existing freeway.

The aim of these alternatives is to reduce the median width of the freeway and thereby reduce the encroachment of the freeway into Lake Monger. If the use of median barriers is to be avoided, a minimum median width of approximately 10 m is required between the freeway reference lines. This represents a saving of only 8.6 m over alternative 6.

2.2.1 Tunnel - Tunnelling the railway past Lake Monger has been considered. Construction of the tunnel is estimated to cost in excess of $20 M per kilometre. The tunnel would need to be at least 1.5 km long, extending beneath the existing Powis Street. Environmental problems and considerable additional costs are associated with removing and disposing of the sanitary landfill through which the tunnel would pass. Further problems relate to tunnelling below the water table, construction staging, delays to the project and providing maintenance access to the tunnel. The tunnel could be located either beneath the future freeway median or beneath the ultimate northbound carriageway. Because future development of the freeway may be required, the tunnelling option only saves about an 8.6 m wide strip of land along the lake edge when these future needs are allowed for, despite the enormous cost of the scheme.

2.2.2 Viaduct - Locating the railway on an elevated viaduct has not been considered in detail because of the increased visual and noise impact of such a scheme. A viaduct would need to be of similar length to a tunnel and would require a third level at Powis Street.

2.2.3 Railway to east Of freeway - This option has been discussed at 2.1.1. It requires additional structures to span the freeway and the various on and off ramps, plus extensive land resumption similar to Alternative 5.

2.3 A preconception exists that encroachment into Lake Monger is inevitable.

The ultimate freeway design and the reservation in the MRS have always been based on some encroachment into Lake Monger in order to reduce resumption in the Mount Hawthorn area. This was reviewed with a number of alternative alignments for the railway being considered before selection of the preferred scheme.

In considering the alignment options past Lake Monger for the preferred scheme (railway in the freeway median), it has not been assumed that encroachment into the lake is inevitable. Of the six alternatives detailed in the EPA report, only two encroach into the lake itself. It is, however, suggested that a more environmentally acceptable solution may involve some lake reclamation in order to provide a buffer zone between the freeway and lake and to upgrade the existing man made shoreline for both wild life and the general public. Perth City Council have, for many years, considered improving the lake and its surrounds. The work proposed by the MRD is seen as a start to this upgrading process.

2.4 EPA should insist that alternatives be developed for public consideration.

The EPA believes the proposal, as amended by the environmental assessment process, offers a good opportunity to improve the Lake Monger environment while enhancing other important attributes such as recreation and therefore believes it inappropriate to insist on the development of further alternatives. The Authority agrees however that other alternatives should have been more fully addressed in the PER.

2.5 Existing carriageway can be upgraded at a cheaper cost with emphasis being on rail system.

Further widening of the freeway could be warranted with continued traffic growth. If this happens and the freeway is not duplicated and widened at this stage, then additional costs will be incurred in providing temporary structures to get the railway into and out of the freeway median, and to give freeway traffic access across the railway. The cost of these temporary structures is in the same order as the cost of duplicating and partial widening the freeway at this stage.

The outermost lanes will be built first so that landscaping of the roadside can be completed. Future lanes will be added in the median without any further encroachment into the lake. The number of lanes constructed in the initial stage will be based on providing safe freeway operating characteristics, and a consistent level of service whilst still encouraging use of the rail system.

2.6 Additional cost of other alternatives would be worth it to preserve Lake Monger.

The preservation of Lake Monger is not a function of the alternatives suggested. The preferred alternative is offered as an opportunity to improve the value of the lake as a biological, social and recreational resource. Maintained in its present condition, evidence suggests it is doubtful if Lake Monger can be preserved in the long term and maintain the values placed on it by the public. Its long term value will depend on the improvement of the biological condition of the lake, the point addressed in the presentation of Alternative 1 as the preferred option.

3 Pollution of Lake Monger

3.1 The full extent of current drainage into Lake Monger is not known and thus the effect of more drainage (from the freeway and squeezed out of the peat/landfill) can not be predicted with any confidence.

The local movement of groundwater in the vicinity of the Mitchell Freeway at Lake Monger has not been studied and the effect on the proposed works on the movement of groundwater is not known. Advice received at officer level from the Hydrogeological Section of the Mines Department on the regional groundwater hydrology suggests that little effect is likely as Lake Monger occurs as a consequence of uplifting of the water table, the general flow of which comes from the north east and the flows north west and south, splitting at Lake Monger.

The consolidation of the peat and to a lesser extent the landfill will result in the release of water from these layers. The quality of this water will vary dependent on the composition of the landfill, which is unknown and likely to be variable. Assessment of this aspect of the project is provided in the referenced report by Golder Associates, 1985.

The volume of displaced water with consolidation has not been established to determine volume of flow into Lake Monger. The option of removing displaced water by pumping during construction is a possible alternative.

3.2 Lead concentrations but not the source have been recorded in Lake Monger. How many other sources of heavy metal are there?

The presence of heavy metals, other than lead, in the lake sediments has not been established as part of this study, or others which have been completed, within the last five years. The presence of lead in the old waste disposal site around the lake and in stormwater which flows into the lake, combined with airborne particulate lead, are possible sources of lead pollutant. The source and management of the heavy metal pollution should be addressed by the proposed lake management committee.

3.3 Disturbance of the eastern shoreline will result in increased pollution of the lake water body by releasing pollutants locked in the sediments.

It is possible that disturbance of sediments in the in-filling of the water body necessary to construct Alternative 1 or 2 may release pollutants locked in bottom sediments. Specific understanding of the bottom sediments makes it difficult to predict the degree of release of pollutants during in-filling. However this will occur over a very small area of the lake (<1.5% of total area) and it is expected the total lake volume will quickly restore pollutant levels to an equilibrium.

3.4 The preferred option (Alternative 1) would require a great amount of fertiliser which would further pollute the lake.

It is proposed that fertiliser would only be used in the establishment of grass and plants. The fertiliser used for plants would be a slow release tablet placed beneath the root ball of each plant. Fertiliser type, timing and method of application for grass establishment would be developed to minimise impact on the lake. The extent of grassed area proposed is less than presently exists.

3.5 No clear indication of sanitary landfill content is given.

Little work has been carried out on the composition of the existing landfill. City of Perth records might provide some information, however further investigation in the form of backhoe pits would be required if specific data on the landfill content was to be acquired. It is preferable to cause minimal disturbance to the landfill due to the uncertainty of its content.

3.6 The sanitary landfill should be removed with Aboriginal permission despite the unpleasant nature of the job.

Removal of the landfill will raise a number of environmental factors. Some of these were listed in the PER. Other issues include the release of contaminants into the groundwater when sanitary landfill was excavated below the level of the groundwater, haulage of the saturated landfill through the metropolitan area and the sanitary landfill under the existing freeway will remain. Considerable cost would be required to remove the landfill and maintain the integrity of the existing freeway structure.

Surcharging would still be necessary to consolidate the underlying peat. Excavation of the peat is possible and would require the adoption of special techniques to maintain the existing freeway for public use.

This suggestion would be unreasonably expensive and it is expected to be environmentally unacceptable.

3.7 What evidence is there that there will be improved water circulation around the proposed islands.

The PER does not suggest water circulation will be improved around the proposed island, but maintained to "eliminate the potential for "dead water" between the shoreline" (Refer p. 15, Section 6.4.1, Para. 6).

3.8 Bathymetric monitoring of the lake bottom needs to be undertaken.

Bathymetric monitoring of the lake bottom is considered part of the on going management of the lake. Management is the responsibility of the Perth City Council and a special management committee is proposed to provide the Local Government and Government with advice on how this popular recreational wetland can best be managed. Thus bathymetric monitoring is not considered a responsibility of the MRD, although it may be carried out immediately before and during the construction process to verify predictions made in the planning and design phases. If adverse impacts are observed, appropriate remedial measures will be put in place.

4 Flora/fauna concerns

4.1 Below water level tortoise fence could trap and drown other animals.

The placement of a fence in the lake would only be necessary during the construction phase of the project. The type of fencing used would be selected to exclude all aquatic life from the area during construction, with the fences being removed after construction. Any wildlife trapped within the fences will be translocated beyond the fence.

4.2 No scientific precedence for tortoise breeding island.

The proposal was based on the findings of a survey on tortoise breeding in the lake which indicates that tortoises are not selective in their breeding site as they nest around the entire periphery of Lake Monger and at a variety of distances from the lake edge.

4.3 Will tortoises naturally relocate to the artificial island?

The location, size and contouring of the island were designed to maximise opportunities for use as a tortoise breeding site inaccessible to most predators.

4.4 Eastern shore area is the most important area for waterbird and tortoise breeding and foreshore activity will be disruptive to this.

Foreshore activity is limited to the construction phase only. After construction a new shoreline, longer in length than the existing shoreline, will exist with re-established terrestrial and aquatic vegetation to ultimately increase the natural productivity of the section disturbed. The island will also increase these opportunities.

4.5 More islands are needed for waterbird breeding, especially if the north east section of the lake is to be disturbed.

Additional islands are one proposal suggested to reduce the nutrient levels in the lake in the long term (J. Davis, pers. comm.). These opportunities should be investigated by the proposed lake management committee.

4.6 Islands should be located on the west and south side of the lake away from the freeway noise and lights.

The island proposed is no closer to the proposed freeway alignment than is the existing shoreline to the existing freeway. In addition the increased vegetation proposed for establishment in the area will increase the potential for screening and habitat in the area.

4.7 The PER has failed to consider impact on waterbirds.

This statement is incorrect. The preferred option with its increase shoreline and island offers considerably more habitat for waterbirds than presently exists in the length of shoreline to be preserved.

4.8 The significance of effects of reed bed/ foreshore vegetation removal (increased eutrophication/turbidity, reduced wildlife breeding area) has not been adequately addressed.

The timing and sequence of new foreshore construction is critical to minimising the impact on existing lake wildlife. The construction period is proposed to coincide with the period of lowest demand on the lake by wildlife. The report by Dr Barbara Porter (see reference list in PER) discusses breeding seasons for tortoises and breeding season and nesting sites for the Greater Cormorant. Breeding patterns for other species requires further specific investigation, however it is assumed that the greater availability of standing water in the winter period would indicate lesser demand on permanent water for nesting sites during this period.

Advice from botanists indicates the winter seasons as optimum times for transplanting of foreshore vegetation. The use of stress protective devices with artificial watering makes transplanting flora more flexible than the requirements of fauna.

4.9 A comprehensive flora and fauna species list should have been included in the PER.

The Perth City Council management plan for Lake Monger discusses flora and fauna observed at the lake (p 17). The report of Dr Barbara Porter of June 1987 (Fauna Survey) contains lists of fauna observed in the lake study area. The list includes amphibians, reptiles, avifauna and tortoises.

4.10 How are existing flora and fauna to be relocated?

Prior to disturbance of the existing shoreline, the new shoreline and island will be established to allow direct transplant of existing desirable vegetation to the new edge. Any additional vegetation introduced will be species known to have existed around the lake prior to development of the lake and its environs. Some fauna is expected to relocate to the lake of its own accord. Specialist scientific advice will be sought on the removal of any fauna unable to translocate without assistance.

4.11 How are existing flora and fauna to be rehabilitated?

Rehabilitation of flora/fauna to be achieved by several measures including transplanting, translocating, protective devices such as fencing during construction, propagation and new plantings of appropriate species as well as follow up maintenance/management programmes.

4.12 Has the proposed movement and rehabilitation process outlined been successfully carried out in a wetland before?

Yes. Proposed movement and rehabilitation processes are not new, particularly with respect to transplanting of aquatic and foreshore vegetation. These processes have been successfully used for transplanting foreshore vegetation along the Canning River foreshore in the past, as part of works associated with the extension of Kwinana Freeway, south of Canning Highway. Techniques for the movement of tortoises and other animals from the construction area would need to be specific to this particular project. Advice on these techniques and implementation of the project would necessarily involve specialist consultant personnel.

4.13 Who and how many people will be involved in the translocation of tortoises and other aquatic life?

The translocation of tortoises and other aquatic life would need to be under supervision of specialist consultants, with the numbers of assistants to be determined by the consultants to minimise impact on lake life.

4.14 Who will monitor the relocated wildlife, rehabilitated foreshore, and for how long, after translocation?

Specialist consultants previously involved in surveys and translocation measures would be preferred for follow up monitoring which it is envisaged continue for a minimum of 3-5 years.

4.15 The tortoise island would be covered with too much vegetation to allow effective breeding.

Density and types of island vegetation considered will be the optimum for tortoises breeding and use by other animals reflected by their use of the present lake environs but will require monitoring and adjustments if necessary.

4.16 What measures are being taken to protect wildlife during the construction process?

In addition to temporary fencing to be established for this purpose, continuous surveillance by specialist consultants during all construction activities would need to be provided to maximise protection for wildlife.

5 Planning issues

5.1 Why is the freeway widening necessary if the railway is to be built?

Planning associated with the Mitchell Freeway has always provided for a central median to accommodate a rapid transit system of some nature. When the freeway in this section of Lake Monger was designed, it provided for stages of construction which allowed for modification of the carriageway alignments and size to cater for increases in traffic density in the future. This proposal to construct the next stage of the carriageway alignment is required to construct the rail system.

The existing northbound lanes are being relocated to what will be the west side of the proposed railway. Emergency breakdown shoulders and one extra traffic lane will be added to improve safety to

an acceptable level for this section of freeway. The extra facilities are warranted and it is economic to construct them in conjunction with works associated with the railway. The six (6) lanes left to the east of the proposed railway will be reduced to match the northbound carriageway.

These additional freeway lanes, plus the rail service, will relieve the current traffic congestion on the freeway and will provide capacity for future urban growth. The rail service on its own will not achieve these objectives because a large proportion of freeway trips have destinations which the railway cannot adequately serve, particularly destinations south of the river.

The reply provided at 2.5 details the sequence of development planned beyond this current project should it be warranted by future traffic growth.

5.2 Where will the extra traffic come from?

Future traffic increases are expected from the continued growth of the north west corridor.

5.3 Where will the extra traffic go?

The Mitchell Freeway is the major transport route which connects the north western suburbs to the central city area and the suburbs located south of the Swan and Canning Rivers. A large proportion of traffic between these areas travels along the Mitchell Freeway. This pattern is expected to continue in the future.

5.4 How will incoming and outgoing roads handle extra traffic?

Roads which provide access to the freeway are spaced at regular intervals along the freeway. In general the accumulation of traffic on these roads, therefore, tends to be less than on the freeway. Where these roads are near railway stations they will have significant use by feeder buses.

Areas such as Northbridge and the Perth CBD generate a high demand for access to and from the freeway. To cater for future growth provisions exist for future ramp connections at Wellington Street and for connections to the planned Burswood Bridge.

It is anticipated that traffic in central Perth itself will be eased somewhat by the connection of the northern suburbs railway to the Perth station.

5.5 If extra traffic is not anticipated, why are six extra lanes needed?

Six extra lanes are not proposed (see also 5.1) as part of this project. Only one additional lane in each direction is proposed for the Mitchell Freeway and this is only on the section between Loftus Street and Hutton Street. These lanes, plus the electrified railway, are expected to relieve the general traffic congestion on this section of the freeway.

For the remainder of the Freeway to the north there will be no increase in the number of lanes as part of this project. Modification of the on/off ramp network at the Vincent Street Interchange will require the provision of an on/off lane between Sutherland and Vincent Streets, which is outside the area of this project.

5.6 What long term strategies are planned to deal with increased traffic?

There are two long term strategies to deal with increasing traffic along the Mitchell Freeway corridor. The first, and current, strategy is to make greater use of public transport. This will be achieved by construction of the electrified railway along the freeway and the establishment of an integrated network of bus feeder routes to serve the railway.

The second, longer term strategy, is that planning allows for one extra freeway lane in each direction, should its construction be needed at some future date. The freeway reserve will not need to be increased to cater for this. The planning for this has been in place for many years.

5.7 What is the anticipated effect of the RTS on this section of freeway?

The RTS will help to relieve peak hour traffic congestion on the freeway. This should delay the need for further widening of the freeway and/or the upgrading of other arterial roads in the future.

5.8 If railway is not going to ease traffic, what is it for?

The railway encourages the use of public transport which in turn will reduce the growth in passenger car traffic.

The railway is expected to provide some easing of traffic.

The rail service will provide a very attractive alternative form of transport for many trips which would otherwise be made in private vehicles, particularly to the Perth central business area. However, the railway alone will not overcome all the traffic congestion problems that exist on the freeway during peak hours (see also 5.1).

5.9 Freeways are always found to be incapable of handling traffic and thus further encroachment on the lake in the future is likely.

The construction of the electrified railway and one additional lane in each direction along the freeway will provide a well integrated public/private transport system along this corridor. This system will have the capacity to satisfy transport requirements along this corridor for many years.

If there is a requirement at some future stage for additional freeway capacity one further lane in each direction could be built by widening the freeway into the central railway easement, not into the lake. The lake foreshore should require to be established and landscaped once only and would remain permanently without interference from any future freeway development.

6 Lake size/importance

6.1 Already 80% of wetlands have been destroyed and more of Lake Monger to be whittled away.

Concern at the loss of area/number of wetlands is appreciated. However where the wetland is in a very degraded condition the possibility of improving that condition should not be sacrificed for want of loss of some water area. In the case of Lake Monger the condition of the lake has been described as the most degraded wetland on the Swan Coastal Plain. It would appear logical that any improvement in the quality of the wetland would be beneficial albeit for the loss of area of waterbody (maximum 1.3%). The opportunity is available to extend Lake Monger toward Leederville, with the concurrence of the relevant authorities, as a result of proposed changes to the interchange design at Vincent Street and the Mitchell Freeway. The form of this extension would require some investigation and advice from specialist scientists to establish its most beneficial design to improve the lake environment.

6.2 None of the options are enormously deleterious to wildlife in isolation, but when viewed in the context of gradual destruction of wetlands, the loss of wildlife habitat is substantial.

No loss of habitat would result from the preferred option. Habitat improvement would result in the area disturbed by construction works along the foreshore area.

6.3 The social and environmental value of Lake Monger (beauty, recreational value, Aboriginal significance, educational value, one of the only two lakes near the city centre, wildlife refuge) is being underestimated.

The social and environmental values are accounted for and recognised in the PER. The options taken have considered both the social and environmental requirements of the people using the lake and that of regional community which demands the opportunity to travel into the city, or across the city, with reasonable ease.

7 Noise/visual pollution

7.1 None of the options show adequate protection from noise or visual pollution off the freeway/proposed railway.

Planting proposals developed for Option 1 provide for significant increase in shrub/tree plantings between proposed freeway/railway and lake edge. These proposals can be adapted to some of the other alternatives.

Noise level assessment of each of the Alternatives indicates the only significant change in noise levels at the lake edge, assessed at Chainage 5160 from which typical cross-sections are provided in the PER, will occur with Alternative 4 with a predicted rise of 8dB(A) based on L10(18 hour) predictions. All other Alternatives have a change of less than 3 dB(A) predicted. Predicted traffic growth will resulted in a predicted 1 dB(A) increase in noise level.

7.2 The freeway/proposed railway should be sunk or an earth barrier put up to stop this visual pollution.

Placing the freeway/railway in cut or tunnel could improve the visual quality for some users of the area and its facilities - recreators, residents, etc - but would not necessarily improve visual quality for freeway/rail users.

An earth barrier would help to screen traffic/trains from adjacent lake/open space users but could require more land, walls or other paving treatments.

7.3 An extensive area of vegetation should be developed between the freeway and lake as a noise buffer and bird sanctuary.

Planting proposals developed for Option 1 are considered to meet this need over the length illustrated - this treatment could be extended north and/or south to increase areas of vegetation for this purpose.

8 Other

8.1 Object to haste of report composition and inadequate attention to detail.

The general plan of the freeway was prepared in 1967 and updated after each construction stage of the freeway. It was again further reviewed for the railway project. The MRD, in consultation with the PCC, have engaged consultants to check the effect of the freeway works and proposed improvements to the lake since 1986. Further studies, combined with detailed design, will commence after completion of this review process.

8.2 MRD should delay project for a month or two to allow for proper consideration of environmental impacts.

See 8.1.

8.3 A simple monetary value is being placed on Lake Monger.

The main consideration of the Department has been one of improving the lake environment adjacent to the freeway. Upgrading of the freeway to accommodate the railway system can be contained within the road reserve. However, the Department's preferred option involving land reclamation beyond the road reserve boundary for construction of a new foreshore area is thought to give the best balance of environmental, social, economic and engineering needs.

8.4 Does the proposal have the support of the Perth City Council?

The landscaping improvements referred to in Alternative 1 were prepared in consultation with the PCC staff.

8.5 Who will be responsible for cleaning and maintaining the area covered by the proposal?

The MRD will be responsible for maintaining areas inside the freeway reserve. Areas outside this reserve will be the responsibility of the PCC.

8.6 What safeguards will be put into place to ensure that sand fill will not encroach onto those parts of the lake that are not to be affected by construction activities?

The working area for construction of the freeway embankment will only extend as far as the toe of the batters. At the lake site, the proposed shoreline (including the island for Alternative 1) will form the limit of construction. Below the water line the encroachment will be limited to the natural slope of the material used, that is nearly vertical for retaining walls and flatter slopes for sand material.

8.7 How will temporary relocation of the dual use path be undertaken?

The dual use path along the eastern shoreline will be maintained at all times during construction. A temporary DUP will be constructed prior to the closure of the existing path. Where possible the path will be constructed on its final alignment.

8.8 The impact of the complete transport corridor needs to be assessed.

Planning for the Mitchell Freeway has always allowed for some rapid transit system. This has been known for many years, and the Freeway north of Hutton Street has been built with a wide median and specially located bridge piers especially for this purpose. The Freeway south of Hutton Street has been planned for this, but was not constructed with the wide median. The reason for the majority of the new Freeway works is to provide this wide median.

The bulk of the proposed works along the Mitchell Freeway will be confined to land that has long been reserved for this purpose in the Metropolitan Region Scheme and without significant environmental impact. Therefore further assessment for areas other than Lake Monger is not warranted. Various transport assessments have already been completed.

8.9 What impact will the widened freeway have on groundwater flows?

Advice received from officers of the Hydrogeological Section of the Department of Mines on the regional groundwater hydrology indicates the freeway widening will have no effect on groundwater flows, other than that which results from consolidation of the peat by surcharging, as the flow is below the area of influence of the consolidated profile.

8.10 Will the artificial maintenance of Lake Monger's water level be affected by freeway works?

The lake level will not be affected by the freeway work.

Appendix 3

Environmental commitments

The following commitments can be made in relation to the Main Roads Department's preferred alternative (Alternative 1). These commitments can be wholly or partially applied to most of the other alternatives if the preferred alternative is not considered acceptable by the public review of the proposal.

1.1 Temporary visual impact

Surcharging will not exceed a height of up to 4.5 metres above the existing freeway level. This will create a temporary visual impact for 12 months from mid 1990 to mid 1991.

1.2 Sand fill transport

Trucks hauling surcharge material over public roads will be fitted with tight tailgates and loaded with adequate freeboard of not less than 75 mm without precarious cones or piles of material. Covers will also be used on all material transported.

1.3 Dust control for surcharge sites

Surcharge sites will be watered as required during construction. At the conclusion of the surcharge period, these areas will be hydromulched.

1.4 Protection of wildlife, particularly tortoises

The following proposed sequence of events will ensure minimal dislocation to the wildlife habitat at the eastern boundary of Lake Monger and will result in increased protection for breeding tortoises.

- installation of mesh fence in lake 5 - 10 metres offset from proposed new lake edge alignment;
- translocation of tortoises and other aquatic life to other side of this fence;
- creation of an island approximately 50 x 20 metres at water level;
- creation of new lake edge; and
- removal and temporary storage (if necessary) of reeds for translocation to new shoreline and island edge.

1.5 Protection of Lake Monger Reserve recreational values

Pedestrian and cyclist access to the dual use path which circumnavigates the lake will be maintained during the landfill period by the following proposed sequence of events.

- creation of new lake edge;
- completion of earthworks between existing dual use path and new shoreline;
- installation of new path on final alignment;
- installation of new boundary fence on final boundary; and
- installation of surcharge for ramps and carriageway.

Detailed design and sectional sketches of the lake foreshore are included at Figures 12, 13 and 14.

1.6 Consolidation leachate entering Lake Monger

Consultant tests (Golder Associates, 1985) of water quality of the landfill, peat and lake indicate similar water qualities from all test sites with the conclusion that the amount of water dislodged by consolidation will not significantly affect water quality in Lake Monger.

To ensure the findings of the consultant are consistent with water qualities present at the time of surcharging the Main Roads Department will establish monitoring boreholes to assess water displacement from under the surcharged areas, and the quality of water which enters Lake Monger.

1.7 Stormwater management

Stormwater drainage of the freeway pavement will be subject to detailed design currently underway for the new carriageway. This design investigation will include an assessment of the contribution freeway runoff contributes to the poor water quality in Lake Monger.

Cutoff drains may be required to prevent silt discharging into the lake during surcharging. The Mains Roads Department will install and monitor regularly this requirement in close liaison with the Water Authority of Western Australia.

1.8 Liaison with Aboriginal people

Lake Monger is recorded as an area of Aboriginal significance. The Main Roads Department will conduct on site discussions with the Aboriginal people with an interest in the area to allow the expression and documentation of their opinions. A report will then be submitted to the Aboriginal Cultural Materials Committee as requested when the Main Roads Department applied to disturb the recorded Aboriginal Site at Lake Monger. The discussion and report will be prepared in parallel with public comment on this Public Environmental Review.

The Main Roads Department will also conduct an investigation of the archeological status of the area with respect to the presence of artifacts derived from use of the area by Aboriginal people.

Appendix 4

Submission from CALM

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

HEAD OFFICE
HACKETT DRIVE CRAWLEY
WESTERN AUSTRALIA
Phone (09) 3868811
Telex AA94585
Facsimile (09) 3861578

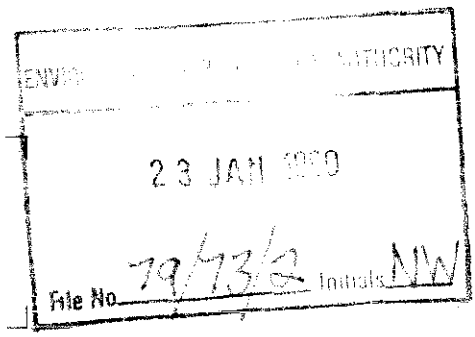
STATE OPERATIONS HEADQUARTERS
50 HAYMAN ROAD COMO
WESTERN AUSTRALIA
Phone (09) 367 0333
Telex AA 94616
Facsimile (09) 367 0466

Please address all correspondence to Executive Director, P.O. Box 104, COMO W.A. 6152

Your Ref:
Our Ref:
Enquiries:
Phone:

Chairman
EPA
1 Mount Street
PERTH WA 6000

Attention: Mr N. Wimbrush



Dear Sir

RE: Landfill for future widening of the Mitchell Freeway at Lake Monger - Public Environmental Review

Of the alternatives considered by the Main Roads Department in the PER, I regard Alternative 5 as the only satisfactory option. Although none of the options considered would have any enormously deleterious effects on wildlife when viewed in isolation, the accumulated effect of agreeing to a series of insignificant changes around wetlands on the coastal plain (such as the preferred Alternative 1 at Lake Monger) has been a very substantial loss of wetland and, thus, wildlife habitat.

I regard agreeing to any alternative other than Alternative 5 as a continuation of the highly undesirable incremental loss of wetlands.

Yours faithfully

Dr S.A. Halse
for EXECUTIVE DIRECTOR

January 19, 1990

Appendix 5

List of borehole results

APPENDIX 5

WATER QUALITY TEST RESULTS (Golder Associates, 1985)

		BH1/85 (Garbage) Sample 3 Peat	BH2/85 (Sand Fill) Sample 2 Landfill	LAKE MONGER
pH		7.97	7.51	7.35
Conductivity (siemens/cm)		665	762	803
Resistivity (ohms/m)		15.04	13.12	12.45
TDS (Calc)		425.6	487.7	513.9
Sodium (Na^+)	mg/1	82	77	97
Potassium (K+)	mg/1	10.5	5	10.5
Calcium (Ca^{++})	mg/1	16.5	71	34
Magnesium (Mg^{++})	mg/1	4.5	10.5	16.5
Soluble Iron	mg/1	0.15	<0.05	0.05
Chloride (Cl^-)	mg/1	133.5	132.1	160.5
Carbonate (CO_3^{--})	mg/1	<0.3	<0.3	<0.3
Bi-carbonate (HCO_3^-)	mg/1	128.1	189.1	137.3
Sulphate (SO_{4--})	mg/1	2	50	25
Nitrate (NO_3)	mg/1	0.2599	0.1239	0.5433
Total Nitrogen (N)	mg/1	-	0.05	0.3
Total Phosphorous (P)	mg/1	-	<0.05	0.4
Phenols	mg/1	-	0.145	0.074
Tin (Su)	mg/1	<0.05	<0.05	<0.05
Zinc (Zn)	mg/1	0.037	0.046	<0.001
Lead (Pb)	mg/1	0.007	<0.005	<0.005
Copper (Cu)	mg/1	0.012		0.015
Sum of Ions	mg/1	387.3	534.8	481.3