

# **Carnarvon fascine development**

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**Shire of Carnarvon**

**Report and recommendations  
of the Environmental Protection Authority**

**Environmental Protection Authority  
Perth, Western Australia  
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## Summary and recommendations

In June 1990 the Shire of Carnarvon forwarded to the Environmental Protection Authority a proposal to construct an urban, recreational and canal development within the Fascine area adjacent to the Carnarvon townsite. In summary, the development involves dredging of the Fascine waterway, the filling of low-lying areas adjacent to the waterways and construction of urban development in eight stages, a canal estate, the establishment of a caravan park and hotel/motel facility, and the construction of a yacht club/marina facility. The site and details of the proposed development are illustrated in Figures 1 and 2.

In view of the potential environmental impacts associated with the development, the Authority determined that it should be subject to formal assessment under Part IV of the Environmental Protection Act as a Public Environmental Review (PER).

Several issues were raised by the public, involved government agencies and the Environmental Protection Authority following review of the proposal as described within the PER document. These issues, the proponent's response to the issues, and the Authority's assessment of this response is summarised as follows :

- ***Environmental management of the conservation values of Whitlock and Babbage islands***

The proponent has undertaken a commitment to prepare an 'Environmental Management Plan' for the construction phase of development. Following a review of the issues raised in the public submissions, the proponent has undertaken additional commitments to address the following issues in this Plan:

- definition of conservation areas and temporary fencing of these areas to control and prevent impact of construction activities;
- construction of bunds to contain dredge spoil within future development areas;
- monitoring the stability of dredge spoil bund walls;
- containment and monitoring of dewatering and dredging fluids for as long as necessary, prior to discharge, to ensure acceptable water quality is maintained within the Fascine waterway;
- management of 'dry' fill in development areas to ensure it is contained within the development site;
- containment of impacts of services associated with the construction within development areas, or where this is not possible, within service corridors, which can be rehabilitated following completion of construction; and
- temporary stabilisation of fill with vegetation or hydromulch to control dust and sand.

The Authority considers that the urban development as proposed on Whitlock Island may have an unacceptable impact on the identified conservation values on the island, which need to be protected. It also considers that the proposed urban development on Babbage Island is likely to have an indirect impact on areas which have been identified as having conservation value, and so need to be carefully managed.

- ***water quality within the proposed canal waterways***

The proponent has addressed in detail the anticipated flushing characteristics of the canal system, which concludes that tidally induced flushing mechanisms are anticipated to effectively maintain acceptable water quality within the canals, and a proposed 'Water Quality Monitoring (and remedial action) Plan', to include regular monitoring for specific parameters, removal of accumulated litter and control of polluted runoff from boat wash down areas. The proponent has also undertaken a commitment to connect any proposed development to a deep sewerage system.

Following consideration of this response, the Authority considers that the proponent has adequately addressed water quality monitoring requirements, however the issue of maintenance dredging needs to be addressed in more detail. This issue is considered to be important as localised deepening in some parts of the waterway may contribute to water quality problems, as has been experienced elsewhere in the State.

- ***long term management of the artificial waterways***

The proponent has indicated that the Shire of Carnarvon, as designated Waterways Manager, will assume final responsibility for the maintenance of water quality within the canal waterways. Day-to-day management could be undertaken by an owners association responsible to the Council, or directly by the Council from funding generated by a differential rate on canal front properties.

The Authority acknowledges the proponent's response to this issue. However, it notes that the issue has yet to be resolved to the satisfaction of all involved agencies. The Authority considers that the long term management of the canal waterways should address issues such as the structure, funding and operation of the management body, whose responsibilities will include water quality monitoring, maintenance of canals and canal walls, groundwater monitoring and management of adjacent public open space areas.

- ***water supply***

The proponent has raised this issue with the Water Authority of Western Australia, which has advised that further aquifers in the Carnarvon area have been identified which are capable of being developed to supply the proposed development.

The Authority considers that the proponent should continue to liaise closely with the Water Authority of Western Australia in determining future water sources to service the increase in population associated with the proposed development.

- ***management of dredge spoil***

The proponent has undertaken a commitment to construct bunds to contain dredge spoil within future development areas, and monitor the stability of dredge spoil bund walls.

The Authority considers that the proponent's response to this issue is adequate. However, the placement of dredge spoil resulting from periodic maintenance dredging should be addressed as part of an on-going Environmental Management Programme.

- ***drainage***

The proponent has indicated that run-off from road and verge areas will be directed towards a road drain system. Water would then be directed to grease and silt traps to infiltration and nutrient stripping basins, or to amenity areas, such as Public Open Space areas, for re-use.

The Authority considers that it is important to manage potentially nutrient rich stormwater run-off so that it is directed away from native vegetation areas.

- ***potential flood risk***

This issue was not addressed in the proponent's response to issues raised in public submissions, however the Authority notes that the proponent has undertaken a commitment to locate any proposed development on land at least 4.1 metres AHD to minimise flood risk.

The Authority recognises that the Gascoyne River has an enormous catchment area, which has been extensively cleared as a result of pastoral activities. If a major flood event occurs, the volume of water carried by the River has the potential to breach the existing southern levee bank. In the event that this occurs, the Authority acknowledges that a risk exists for damage to the proposed development in the form of flooding. However, in view of advice received from the Water Authority, this risk appears to be acceptable.

The Authority has concluded that the proposal as described, with the exception of proposed urban development on Whitlock Island (included within Stage 4 and the southern portions of Stages 1 and 2) is environmentally acceptable, subject to the following recommendations.

### **Recommendation 1**

The Environmental Protection Authority has concluded that the proposed Carnarvon Fascine Development, with the exception of the proposed urban development on Whitlock Island, is environmentally acceptable. This includes the urban development proposed for Stages 1 (on the north-eastern side of the waterway only) 3 and 5.

In reaching this conclusion, the Environmental Protection Authority identified the main environmental issues as:

- environmental protection and management of conservation values of Whitlock and Babbage islands;
- water quality of artificial water bodies;
- long term management of artificial waterways;
- water supply;
- management of dredge spoil;
- drainage; and
- potential flood risk.

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to the proponent's commitments listed in Appendix 4 (Recommended Environmental Conditions are listed in Section 5) and the Authority's recommendations.

The Authority considers an Environmental Management Programme should be prepared by the proponent to address potential environmental impacts pre- and post-construction of the proposed caravan park and tourist complex proposed on Whitlock Island as part of Stage 2, in view of the proximity to environmentally sensitive areas on Whitlock Island.

### **Recommendation 2**

The Environmental Protection Authority recommends the proposed tourist development on the south-east corner of Whitlock Island (as indicated in Stage 2), is environmentally acceptable. An Environmental Management Programme for this development should be prepared to the requirements of the Environmental Protection Authority prior to any construction being undertaken. This Programme should include but not necessarily be limited to the following matters:

- control of 4WD activity;
- clearly defined and controlled public access to adjacent areas of Whitlock Island;
- domestic animal and exotic weed control and rubbish management;
- location details of construction material stockpiles (lay down areas);
- identification of areas where dredge spoil resulting from periodic maintenance dredging is to be placed; and
- a clear indication of the responsible authority for works and on-going management costs.

The Authority notes that urban development proposed on Babbage Island does not directly impact on areas identified as having environmental value, however, it is adjacent to areas with identified environmental values. The Authority therefore considers that an Environmental Management Programme should be prepared for Babbage Island prior to any development occurring. Careful implementation of the programme will ensure that potential environmental impacts are minimised on adjacent environmentally sensitive areas.

### **Recommendation 3**

**The Environmental Protection Authority considers that urban development on Babbage Island is environmentally acceptable. However an Environmental Management Programme for should be prepared to the requirements of the Environmental Protection Authority prior to any construction being undertaken for Stages 5, 6, 7 and 8, to ensure that areas identified as having environmental significance are protected. This Programme should include but not necessarily be limited to the following details:**

- **details of areas to be retained for conservation, including Oyster Creek, during construction and following completion, following consultation with the Department of Conservation and Land Management and the Royal Australasian Ornithologists Union;**
- **control of 4WD activity and public access;**
- **domestic animal and exotic weed control and rubbish management;**
- **location details of construction material stockpiles (lay down areas);**
- **monitoring and protection of samphire and mangrove areas as they relate to waterbirds; and**
- **a clear indication of the responsible authority for works and on-going management costs.**

The Authority has concluded that urban development on Whitlock Island, as proposed within the southern portion of Stage 1 and 2, and all of Stage 4 is environmentally unacceptable due to the potential impact on the environmental value of the island. The Authority considers that the creation of urban residential subdivisions at the proposed locations may lead to significant direct and indirect environmental impacts on the islands, which would be extremely difficult to control and manage.

The Authority considers that the part of the proposal for urban development on Whitlock Island should not proceed in its present form. However, should the proponent wish to submit a revised proposal sometime in the future, then such a proposal should take cognisance of the Authority's concerns identified in Recommendation 4.

### **Recommendation 4**

**The Environmental Protection Authority recommends that urban and canal development proposed on Whitlock Island, as indicated within the southern portion of Stages 1 and 2, and all of Stage 4 is environmentally unacceptable.**

**The Environmental Protection Authority recommends that should the proponent wish to submit a revised proposal for separate assessment by the Authority at some time in the future, then the following environmental issues should be addressed, including details of protection and management of the important components of the environment:**

- **assessment of regional significance of samphire and mangrove ecosystems;**
- **survey of and for rare and endangered species;**

- long term monitoring of the use of mangrove and samphire areas by migratory waterbirds; and
- details of areas to be retained for conservation, during construction and following completion, following consultation with the Department of Conservation and Land Management and the Royal Australasian Ornithologists Union.

The Authority considers that the proponent should undertake regular surveys of the depth of the canal waterways, to avoid associated water quality problems as a result of some parts becoming deeper than other parts. These results should be incorporated within the proposed 'Water Quality Monitoring Plan'.

#### **Recommendation 5**

**The Environmental Protection Authority recommends that the proponent undertake regular monitoring of depth of canal waterways as part of the proposed Water Quality Monitoring Programme, to the requirements of the Department of Marine and Harbours.**

The Authority considers that it is important to manage potentially nutrient rich fresh stormwater run-off so that it is directed away from existing native vegetation areas, such as samphire and mangrove communities.

#### **Recommendation 6**

**The Environmental Protection Authority recommends that the proponent ensures that water is not discharged directly on or adjacent to existing samphire or mangrove communities, and prior to development occurring, the proponent submit a plan to the Environmental Protection Authority to describe how this requirement will be met.**

# **1. Introduction**

In June 1990 the Shire of Carnarvon forwarded to the Environmental Protection Authority a proposal to construct an urban, recreational and canal development within the Fascine area adjacent to the Carnarvon townsite, as indicated in Figure 1.

In view of the potential environmental impacts associated with the development, the Authority determined that it should be subject to assessment under Part IV of the Environmental Protection Act as a Public Environmental Review (PER). The PER document was prepared by the Shire of Carnarvon with help from the Department of Marine and Harbours as project manager and released for public review for a period of ten weeks ending on 25 January 1993.

# **2. The proposal**

The proposal is illustrated in Figure 2 and includes:

- creation of a permanent navigable waterway by dredging a 50 metre wide channel (to a depth of -2.5 m AHD) from the ocean entrance to the south arm of the Gascoyne River delta (at present tidal and river action causes on-going siltation of delta which prevents permanent boat access);
- use of dredge spoil to build up low-lying land (up to approximately 4.2 metres AHD) adjacent to Whitlock and Babbage islands and the shoreline of the existing Brockman subdivision, to make it suitable for urban/canal development;
- construction of standard urban and canal oriented subdivisions (incorporating 1250 residential lots);
- development of a 4ha caravan park and motel/hotel site;
- construction of a yacht club/marina, excavated from the east side of the Fascine; and
- reconstruct parts of the historic Tramway Bridge across the Fascine waterway as a tourist attraction.

The development is proposed to be undertaken in eight stages as indicated on Figure 2, over ten years.

During the public review period, a total of 12 submissions were received by the Authority, from conservation groups, interested members of the public, the Royal Australasian Ornithologists Group, Department of Planning and Urban Development, Department of Land Administration and Water Authority of Western Australia.

A list of individuals and organisations who forwarded submissions to the Authority on the PER document is included in Appendix 1. A detailed list of issues raised in the submissions is included in Appendix 2. The proponent's response to these issues is included in Appendix 3.

# **3. Environmental issues and their management**

Several environmental issues were identified by the Environmental Protection Authority and submissions following review of the PER. A summary of these issues, the proponent's response to them and the Authority's assessment of the issues is detailed in this Section.

Following consideration of these issues and the proponent's response to them, the Authority has concluded that the proposal as described, with the exception of proposed urban development on Whitlock Island (included within Stage 4 and the southern portions of Stages 1 and 2) is environmentally acceptable.



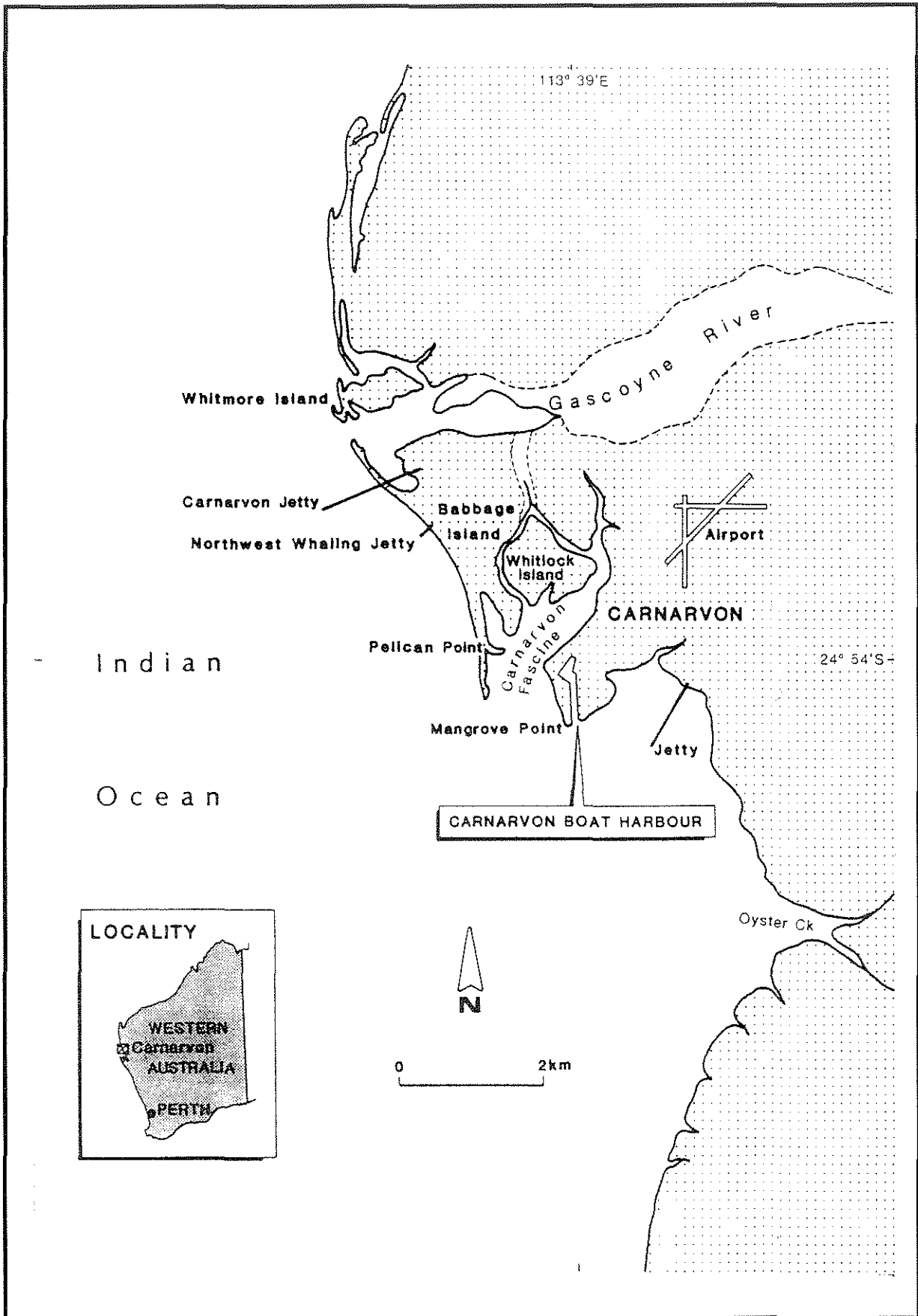


Figure 1. Location map, indicating Carnarvon townsite and fascine area  
 Source: Public Environmental Review 1992.

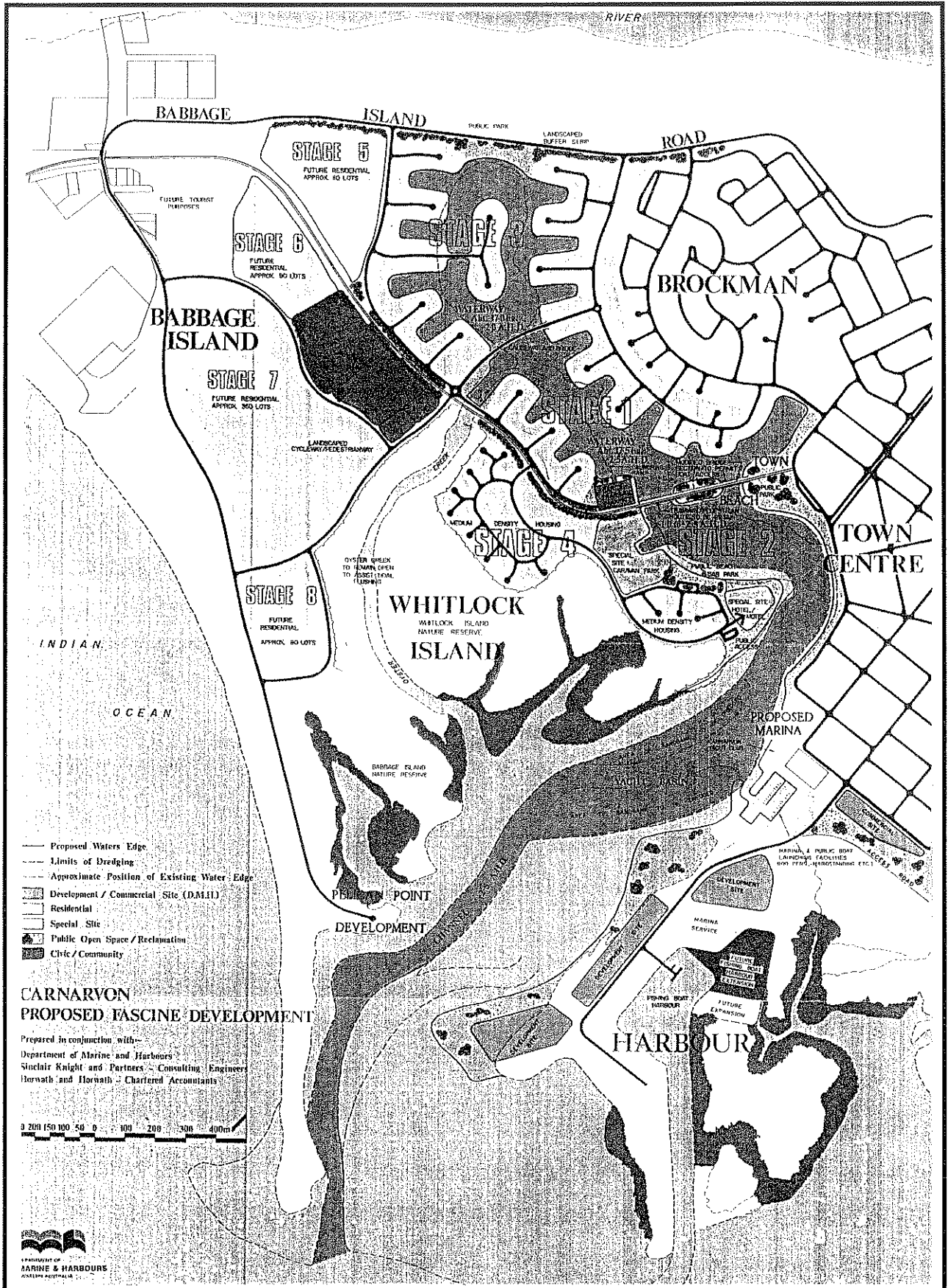


Figure 2. Proposed concept plan for development of Carnarvon fascine area  
 Source: Public Environmental Review 1992.

## **Recommendation 1**

The Environmental Protection Authority has concluded that the proposed Carnarvon Fascine Development, with the exception of the proposed urban development on Whitlock Island, is environmentally acceptable. This includes the urban development proposed for Stages 1 (on the north eastern side of the waterway only) 3 and 5.

In reaching this conclusion, the Environmental Protection Authority identified the main environmental issues as:

- environmental protection and management of conservation values of Whitlock and Babbage islands;
- water quality of artificial water bodies;
- long term management of artificial waterways;
- water supply;
- management of dredge spoil;
- drainage; and
- potential flood risk.

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to the proponent's commitments listed in Appendix 4 (Recommended Environmental Conditions are listed in Section 5) and the Authority's recommendations.

### **3.1 Environmental management of the conservation values of Whitlock and Babbage islands**

#### *Issue :*

The potential impact of the development on the conservation values of Whitlock and Babbage Island is of concern to the Authority, and was expressed in several submissions. It was claimed that there is no effective management of the islands at present, and uncontrolled 4WD activity has led to the degradation of some areas. The view was expressed that the proposed development, particularly the hotel/motel complex and caravan park as proposed within Stage 2 of the proposal will exacerbate an already existing problem, leading to the introduction of exotic weeds, feral animals, and contamination by the use of fertilizer and pesticides. Other submissions expressed concern regarding potential impacts of the development on waterbirds using the area, and the view that the importance of the area for use by waterbird populations is underestimated within the PER. Other submissions claimed that proposed development would impact on terrestrial fauna and native vegetation, including mangrove communities and samphire wetlands on the islands. These concerns are expressed in more detail in Appendix 2.

The Authority notes that the 'construction phase' of the development as described within the PER is proposed to be undertaken in several stages, for example dredging, road construction, sewerage pipe installation and urban development. In view of the proximity of Stages 1, 2, 4, 6, 7, and 8 to areas which have been identified as having environmental significance on Whitlock and Babbage islands, the Authority considers that construction activities need to be planned in detail so that indirect impacts do not have an adverse effect on the adjacent areas.

Discussion within the PER on regional values of vegetation and fauna on Babbage and Whitlock islands also fails to recognise that while other similar areas exist, they are presently located within extensive pastoral leases to the north and south of Carnarvon which are subject to intensive grazing. The vegetation existing on Whitlock and Babbage islands is relatively undamaged (apart from damage caused by rabbit grazing).

Further, native fauna is also relatively protected on the Islands, and development also represents a loss of habitat for animals such as waterbirds.

*Proponent's response:*

In the response to issues raised in the public submissions, the proponent makes reference to a proposed Environmental Management Plan for the construction phase of development, as discussed within Section 6.2 of the PER. In addition to details discussed in the PER, the proponent undertakes additional commitments to address the following issues:

- definition of conservation areas and temporary fencing of these areas to control and prevent impact of construction activities;
- construction of bunds to contain dredge spoil within future development areas;
- monitoring of stability of dredge spoil bund walls;
- containment and monitoring of dewatering and dredging fluids for as long as necessary, prior to discharge, to ensure acceptable water quality is maintained within the Fascine waterway;
- management of 'dry' fill in development areas to ensure it is contained within the development site;
- containment of impacts of services associated with the construction within development areas, or where this is not possible, within service corridors, which can be rehabilitated following completion of construction; and
- temporary stabilisation of fill with vegetation or hydromulch to control dust and sand.

Further, the proponent has acknowledged that no surveys to identify differences between the vegetation units located on the islands and those on adjacent pastoral leases have been undertaken. However, it is claimed that vegetation on the islands have already been extensively damaged due to previous grazing by animals, uncontrolled off-road vehicle activity, road and track construction, port related activities and past flood mitigation measures. It was also claimed that due to the proximity of the islands to Carnarvon townsite, native habitats have been severely degraded. The proponent also states that the closure of the south arm of the Gascoyne River has also had a significant impact on vegetation communities.

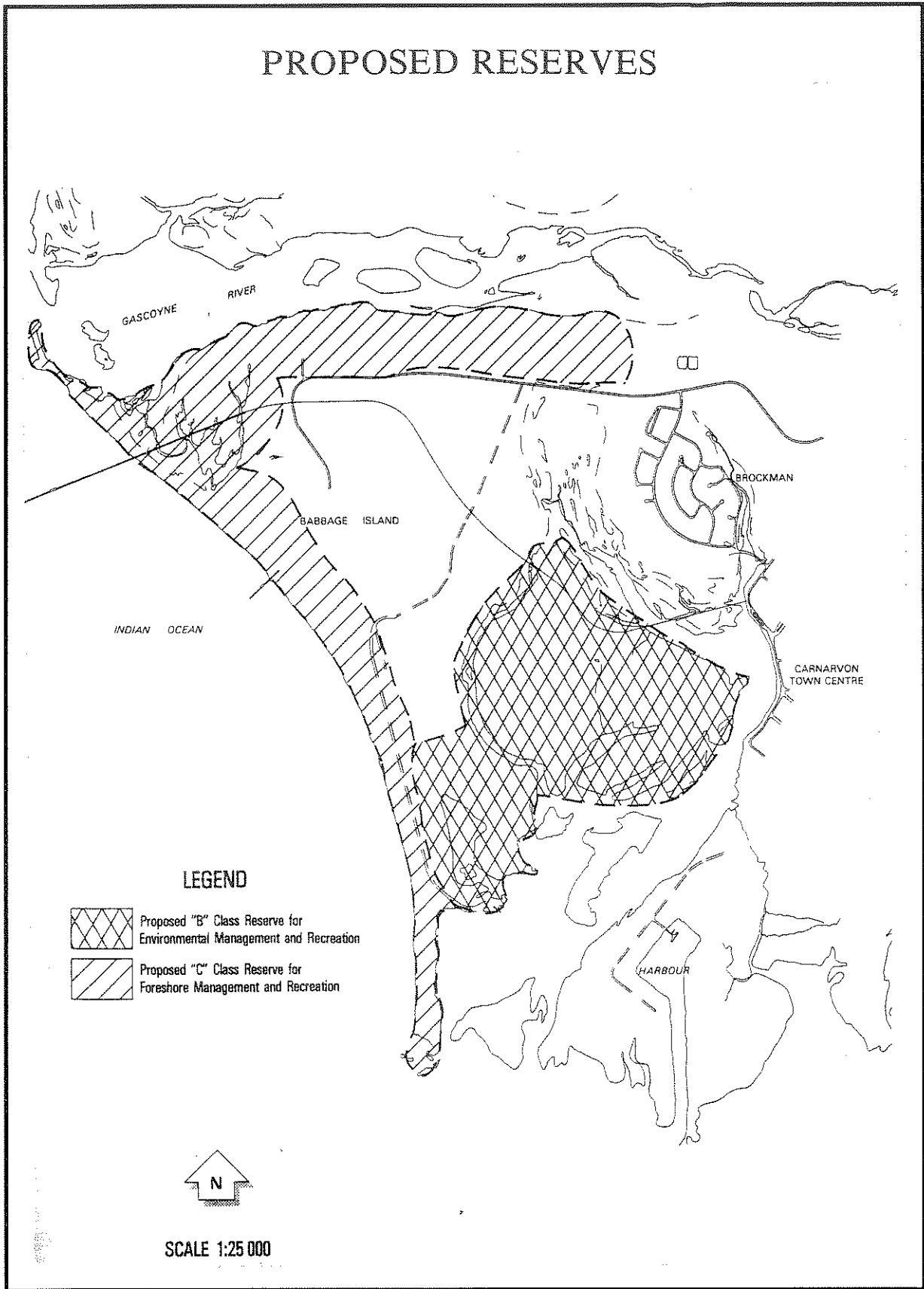
*EPA's evaluation:*

The Authority acknowledges the proponent's response, and the fact that the vegetation communities located on Babbage and Whitlock islands are now primarily subject to a tidal regime, rather than a combination of tidal and river flooding, due to the closure of the south arm of the Gascoyne River. However it considers that queries raised by the Authority following the public review period have not been fully addressed.

The Authority considers that the identified conservation values on Whitlock and Babbage islands need to be protected and carefully managed. A study undertaken by the Department of Land Administration in 1988 entitled 'Babbage Island Carnarvon - Planning Study' proposes that the majority of Whitlock Island, Oyster Creek and part of Babbage Island as indicated on Figure 3 be reserved as a 'B' Class reserve for 'Environmental Management and Recreation', due to the ecological importance, biological productivity, environmental complexity and habitat value represented on the islands. The Authority has noted the 'Carnarvon Fascine Development Constraints Study' undertaken by Le Provost Environmental Consultants (Appendix 2, PER). However, it acknowledges that issues such as the regional significance of the samphire and mangrove communities, and the importance of Whitlock Island for use by migratory waterbirds have not been documented in this Study.

The Authority notes that proposed development of Babbage Island does not impact on the areas identified as having environmental significance in the 1988 Babbage Island Study. However, proposed urban development on Whitlock Island included within Stages 1, 2 and 4 impact on areas which have been identified as having environmental significance.

# PROPOSED RESERVES



**Figure 3. Location of proposed 'B' Class Reserve for 'Environmental Management and Recreation' as proposed in Department of Land Administration 'Babbage Island Planning Study' (1988)**

The Authority has concluded that the proposed caravan park and tourist complex proposed on Whitlock Island as part of Stage 2 is environmentally acceptable, provided that an Environmental Management Programme is prepared to address potential environmental impacts pre and post construction, in view of the close proximity to environmentally sensitive areas. Issues such as construction activities and control of public access during construction (to control machinery, earth movement and dredging activity) and following construction will need to be included within this Plan.

### **Recommendation 2**

**The Environmental Protection Authority recommends the proposed tourist development on the south-east corner of Whitlock Island (as indicated in Stage 2), is environmentally acceptable. An Environmental Management Programme for this development should be prepared to the requirements of the Environmental Protection Authority prior to any construction being undertaken. This Programme should include but not necessarily be limited to the following matters:**

- **control of 4WD activity ;**
- **clearly defined and controlled public access to adjacent areas of Whitlock Island;**
- **domestic animal and exotic weed control and rubbish management;**
- **location details of construction material stockpiles (lay down areas);**
- **identification of areas where dredge spoil resulting from periodic maintenance dredging is to be placed; and**
- **a clear indication of the responsible authority for works and on-going management costs.**

The Authority notes that urban development proposed on Babbage Island does not directly impact on areas identified as having high conservation significance. However, urban development is proposed adjacent to areas which have been recognised as having environmental value, which are included within the proposed 'B' Class Reserve, indicated on Figure 3. The Authority therefore considers that an Environmental Management Programme should be prepared for this area prior to construction. Careful implementation of the programme will ensure that potential environmental impacts are minimised on adjacent environmentally sensitive areas.

### **Recommendation 3**

**The Environmental Protection Authority considers that urban development on Babbage Island is environmentally acceptable. However an Environmental Management Programme for should be prepared to the requirements of the Environmental Protection Authority prior to any construction being undertaken for Stages 5, 6, 7 and 8, to ensure that areas identified as having environmental significance are protected. This Programme should include but not necessarily be limited to the following details:**

- **details of areas to be retained for conservation, including Oyster Creek, during construction and following completion, following consultation with the Department of Conservation and Land Management and the Royal Australasian Ornithologists Union;**
- **control of 4WD activity and public access;**
- **domestic animal and exotic weed control and rubbish management;**
- **location details of construction material stockpiles (lay down areas);**

- **monitoring and protection of samphire and mangrove areas as they relate to waterbirds; and**
- **a clear indication of the responsible authority for works and on-going management costs.**

The Authority considers that the part of the proposal for urban and canal development on Whitlock Island should not proceed in its present form. However, should the proponent wish to submit a revised proposal sometime in the future, then such a proposal should take cognisance of the Authority's outlined environmental protection principles.

#### **Recommendation 4**

**The Environmental Protection Authority recommends that urban and canal development proposed on Whitlock Island, as indicated within the southern portion of Stages 1 and 2, and all of Stage 4 is environmentally unacceptable.**

**The Environmental Protection Authority recommends that should the proponent wish to submit a revised proposal for separate assessment by the Authority at some time in the future, then the following environmental issues should be addressed, including details of protection and management of the important components of the environment:**

- **assessment of regional significance of samphire and mangrove ecosystems;**
- **survey of and for rare and endangered species;**
- **long term monitoring of the use of mangrove and samphire areas by migratory waterbirds; and**
- **details of areas to be retained for conservation, during construction and following completion, following consultation with the Department of Conservation and Land Management and the Royal Australasian Ornithologists Union.**

### **3.2 Water quality in canals**

#### *Issue :*

The Authority considered that the PER did not include sufficient detail on water quality flushing characteristics within the proposed canal systems, or water quality monitoring and management details, remedial and contingency plans proposed to be undertaken in the event that monitoring results indicate unacceptable water quality. The need for maintenance dredging of the canal waterways was also raised.

#### *Proponent's response:*

In response, the proponent has discussed in detail the anticipated flushing characteristics of the canal system, which concludes that tidally induced flushing mechanisms are anticipated to effectively maintain acceptable water quality within the canals. Details are also included regarding the proposed 'Water Quality Monitoring (and remedial action) Plan', which includes regular monitoring for specific parameters, removal of accumulated litter and control of polluted runoff from boat wash down areas. The proponent has also undertaken a commitment to connect any proposed development to a deep sewerage system.

#### *EPA's evaluation:*

The Authority now considers that the proponent has adequately addressed water quality monitoring requirements. However, the issue of maintenance dredging of the canal waterways has not been fully addressed. This issue is considered to be important, to ensure that water quality problems do not develop as a result of localised deepening of parts of the canal waterways, which may lead to water quality problems, as has been experienced in other canals elsewhere in the State. In order to avoid this problem, the Authority considers that the proponent should undertake regular surveys of the depth of the canal waterways.

The monitoring results, and any ameliorative action proposed to be undertaken by the Waterway manager in the event that some parts do become deeper or shallower during use over time, should be incorporated within the proposed 'Water Quality Monitoring Programme', to be submitted to the Authority on an annual basis.

### **Recommendation 5**

**The Environmental Protection Authority recommends that the proponent undertake regular monitoring of depth of canal waterways as part of the proposed Water Quality Monitoring Programme, to the requirements of the Department of Marine and Harbours.**

## **3.3 Long-term management of artificial waterways**

### *Issue:*

The Authority considered that the long term management of water quality within the proposed canal developments was not adequately addressed within the PER. It is considered that information should be provided detailing proposed management of canal waterbodies after the first five years following construction, including who will undertake the work, how and to who's satisfaction.

### *Proponents response:*

The proponent has responded by clarifying that the Shire of Carnarvon will be the designated Waterways Manager and will assume final responsibility for the maintenance of water quality within the canal waterways. Day-to-day management may be undertaken by an owners association responsible to the Council, or directly by the Council from funding generated by a differential rate on canal front properties.

The final decision for management will depend on proposals put to Council by potential developers and will be detailed in the rezoning application under the Town Planning Scheme.

### *EPA's evaluation:*

The Authority acknowledges the proponent's response to this issue, however it notes that the issue has yet to be resolved to the satisfaction of all involved agencies. The Authority reiterates the view previously expressed when assessing other canal developments within the State, as follows.

**The Authority considers that the long term management of the canal waterways should address issues such as the structure, funding and operation of the management body, whose responsibilities will include water quality monitoring, maintenance of canals and canal walls, groundwater monitoring, and management of adjacent public open space areas.**

## **3.4 Water supply**

### *Issue:*

One submission questioned whether adequate water supplies will be available to service the demand which will be created as a result of the proposed development.

### *Proponent's response:*

The proponent has raised this issue with the Water Authority of Western Australia, which has advised that further aquifers in the Carnarvon area have been identified which are capable of being developed to supply the proposed development.



*EPA's evaluation:*

The Authority considers that the proponent should continue to liaise closely with the Water Authority of Western Australia in determining future water sources to service increased population as a result of the proposed development.

### **3.5 Management of dredge spoil**

*Issue:*

The view was expressed in several submissions and by the Authority that the discussion of dredge spoil management in the PER was too general. It was considered that more attention needed to be given to the protection of environmentally sensitive areas within proposed conservation areas. Further, no mention was made within the PER as to where dredge spoil resulting from 'periodic maintenance dredging' after completion of the proposed development is proposed to be placed.

*Proponent's response:*

This issue has been addressed as part of response to point 3.1 above, ie. the proponent has undertaken a commitment to construct bunds to contain dredge spoil within future development areas, and monitor the stability of dredge spoil bund walls.

*EPA's evaluation:*

The Authority considers that the proponent's response on this issue is adequate. However, the placement of dredge spoil resulting from periodic maintenance dredging should be addressed as part of the on-going Environmental Management Programme, as discussed in Recommendation 2 above.

### **3.6 Drainage**

*Issue:*

Drainage is a significant issue in Carnarvon due to the volume of annual rainfall it receives. Several submissions claimed that this issue was not adequately addressed within the PER document. It was not considered clear how urban stormwater run-off will be directed away from the Fascine waterway and existing samphire and mangrove communities. These types of vegetation are adapted to a saline environment, and freshwater run-off may have an impact.

*Proponent's response:*

The proponent has indicated that run-off from road and verge areas will be directed towards a road drain system. Water would then be directed to grease and silt traps to infiltration and nutrient stripping basins, or to amenity areas, such as Public Open Space areas, for re-use.

*EPA's evaluation:*

The Authority notes the proponent's response, and considers that it is important to manage potentially nutrient rich fresh stormwater run-off so that it is directed away from existing native vegetation areas, such as samphire and mangrove communities.

### **Recommendation 6**

**The Environmental Protection Authority recommends that the proponent ensures that water is not discharged directly on or adjacent to existing samphire or mangrove communities, and prior to development occurring, the proponent submit a plan to the Environmental Protection Authority to describe how this requirement will be met.**

### **3.7 Potential flood risk**

*Issue:*

The Authority is concerned about potential flood risk due to the location of the development on the south arm of the Gascoyne River delta. While it is acknowledged that a levee bank has been constructed along the south arm of the River delta to avoid flooding adjacent to the Carnarvon town site, flooding following high rainfall events in a catchment which has been extensively cleared may result in the breaching of the levee bank and widescale flooding. More detail regarding this issue is included in Appendix 2.

*Proponent's response:*

This issue was not addressed in the proponent's response to issues raised in public submissions.

*EPA's evaluation:*

The Authority notes that the proponent has undertaken a commitment to locate any proposed development on land at least 4.1 metres AHD to minimise flood risk, and has taken into consideration advice from the Water Authority of Western Australia. This advice states that in terms of flood protection, the development proposal is considered to be acceptable, and that a high degree of protection of dwellings included within the proposal is provided.

The Authority recognises that the Gascoyne River has an enormous catchment area, which has been extensively cleared as a result of pastoral activities. If a major flood event occurs, the volume of water carried by the River has the potential to breach the existing southern levee bank. In the event that this occurs, the Authority acknowledges that a risk exists for damage to the proposed development in the form of flooding. However, in view of advice received from the Water Authority, this risk appears to be acceptable.

## **4. Conclusion**

The Environmental Protection Authority concludes that the proposal is environmentally acceptable provided the proponent's commitments and the recommendations of this report are implemented.

The Authority has established an implementation and auditing system which requires the proponent to advise the Authority on how it would meet the requirements of the environmental conditions and commitments of the project. The proponent would be required to develop a Progress and Compliance report for this project as a section of the recommended audit programmes.

The Authority's experience is that it is common for details of the proposal to alter through the detailed design and construction phase. In many cases alterations are not environmentally significant or have positive effects on the environmental performance of the project. The Authority believes that such non-substantial changes, and especially those which improve the environmental performance and protection, should be provided for.

The Authority believes that any approval for the proposal based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Authority.

## 5. Recommended environmental conditions

Based on the assessment of this proposal and recommendations in this report, the Environmental protection Authority considers that the following Recommended Environmental Conditions are appropriate.

### 1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

- 1-1 In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Public Environmental Review and in response to issues raised following public submissions. These commitments are consolidated in Environmental Protection Authority Bulletin 703 as Appendix 4. (A copy of the commitments is attached.)

### 2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

- 2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

### 3 Proponent

These conditions legally apply to the nominated proponent.

- 3-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

### 4 Management of environmentally sensitive areas

- 4-1 The proponent shall protect vegetation in areas which have environmental value.

- 4-2 Prior to development, to meet the requirements of 4-1, the proponent shall prepare an 'Environmental Management Programme' for the following areas in consultation with the Department of Conservation and Land Management and the Royal Australasian Ornithologists Union:

- the south east corner of Whitlock Island proposed to be developed as a caravan park and hotel/motel site; and
- areas located on Babbage Island proposed to be developed for urban subdivision.

This Programme shall include but not necessarily be limited to consideration of the following details:

- areas to be retained for conservation, including Oyster Creek, during and following construction;
- 4WD activity;

- public access to adjacent areas of Whitlock and Babbage islands;
- domestic animal, exotic weed and rubbish management;
- location of construction material stockpiles;
- areas for placement of dredge spoil;
- monitoring of samphire and mangrove areas for waterbird protection; and
- an indication of who will take responsibility for works and on-going management costs.

4-3 The proponent shall not carry out the proposed urban development on Whitlock Island.

## **5 Water Quality**

5-1 The proponent shall maintain acceptable water quality within the canal waterways.

5-2 The proponent shall undertake regular monitoring of the depth of canal waterways as part of the commitment to prepare a Water Quality Monitoring Programme, to the requirements of the Department of Marine and Harbours.

## **6 Stormwater management**

6-1 The proponent shall ensure nutrient rich fresh stormwater run-off does not discharge directly onto existing native vegetation areas, such as samphire and mangrove communities.

6-2 Prior to development, the proponent shall submit design details of stormwater drains to the satisfaction of the Environmental Protection Authority to achieve the objectives of Condition 6-1.

6-3 The proponent shall construct the stormwater drains to achieve the objectives of Condition 6-1.

## **7 Time Limit on Approval**

The environmental approval for the proposal is limited.

7-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced.

Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

## **8 Compliance Auditing**

In order to ensure that environmental conditions and commitments are met, an audit system is required.

8-1 The proponent shall prepare periodic 'Progress and Compliance Reports', to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

## **Procedure**

The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.

If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.

## **6. References**

- Department of Land Administration (1988) 'Babbage Island Carnarvon - Planning Study'.  
Le Provost Environmental Consultants ((1992) 'Carnarvon Fascine Public Environmental Review' Report No. R353 to Department of Marine and Harbours

## **Appendix 1**

**List of individuals and organisations who forwarded a submission  
during public review of the Public Environmental Review  
document**

- Crossover Holdings Pty Ltd
  - ARKO Engineering, Carnarvon
  - Ms D Kingston
  - Dr T G D Shannon
  - Carnarvon Community Group
  - Local Environment Affinity Force of Hedland
  - Carnarvon Tree Society
  - Conservation Council of WA
  - Royal Australasian Ornithologists Union
- 
- Western Australian Tourism Commission
  - Department of Planning and Urban Development
  - Department of Land Administration

## **Appendix 2**

**Issues raised by public submissions and the Environmental  
Protection Authority following public review of the Public  
Environmental Review document**





AN ENVIRONMENT WORTH  
PROTECTION

Shire Clerk  
Shire of Carnarvon  
P O Box 450  
CARNARVON WA 6701

Your ref:

Our ref:

Enquiries: 100/92  
Ms Eve Bunbury

Dear Sir

**CARNARVON FASCINE DEVELOPMENT PROPOSAL PUBLIC  
ENVIRONMENTAL REVIEW (PER) - ISSUES RAISED IN PUBLIC  
SUBMISSIONS**

I write further to the completion of the public review period for the proposed Carnarvon Fascine Development Proposal PER. A total of 12 submissions were received by the Authority in relation to the PER during the review period. A summary of the issues raised in these submissions is enclosed for your information. These included submissions from the Department of Planning and Urban Development, Department of Land Administration, Tourism Commission, and the Royal Australasian Ornithologists Union. A copy of these are also enclosed.

In addition to the attached list, following the detailed review of the PER document, officers of the Authority require clarification on the following points.

1. Water quality

The PER does not provide the following details :

- water quality flushing characteristics within the canal systems (PER reference Section 7.2.2);
- water quality monitoring and management details, and remedial action and contingency plans proposed to be undertaken by the proponent in the event the monitoring results indicate unacceptable water quality (PER 6.3.2; 6.3.7.1); and
- a commitment to contain water run off from boat wash down area (PER Section 3.3.3).

It is noted that the proponent has undertaken a commitment to prepare this information in Commitment 7.2.2 and as part of the 'Fascine Waterways Management Plan' (Commitment 7.3.4.1). These issues are normally required to be addressed as part of a PER document. The information should be forwarded to the EPA as soon as possible.

## 2. Long term management of canal waterways

Discussion included within the PER indicates that the Shire of Carnarvon will be responsible for the maintenance of water quality within the proposed canal developments. Information should be provided detailing proposed management of the canal waterbodies after the first five years following construction of the canals. Details forwarded to the Authority should include who will undertake the work, how will it be undertaken, and to who's satisfaction. This is required as part of DPUD Policy No. DC 1.8. prior to rezoning of land for canal development under the local town planning scheme. The need for this issue to be addressed is acknowledged in the PER (Section 1.7.2, 1.7.3), however no discussion is included which indicates how the issue will be addressed.

## 3. Environmental Management Plan (Construction Phase)

The 'Construction Phase' involves several stages, for example - dredging, construction of roads, sewerage pipe installation, temporary siting of waste dumps, house construction etc. In view of the close proximity of environmentally sensitive areas to proposed development sites, these activities need to be planned for in detail, so that indirect impacts do not have an adverse effect on adjacent sensitive areas during construction. Sensitive areas need to be defined, fenced off and access controlled if they are to be effectively managed.

While a commitment has been undertaken to prepare this Plan (Commitment 7.2.4), no detail has been included in the PER.

## 4. Canal walls

While strictly not an environmental issue, the Authority questions the stability of the proposed canal walls in view of the sandy nature of the substrate in the Fascine. How will the stability of the proposed concrete walls be ensured?

## 5. Water Supply

It is acknowledged within the PER that Horticulture makes a significant contribution to Carnarvon's economy. This requires a high water demand for the irrigation of fruit and vegetable crops. Construction of the proposed development will lead to an expectation for greater water demands in the area. PER Sections 3.5.1 and 5.5.9 mention that the Water Authority of Western Australia is currently reviewing options for additional water supplies. In view of the potential increased demand, these alternative water sources need to be confirmed before development commences.

## 6. Drainage

PER Section 3.5.3 mentions 'Drainage and Run off control'. It is not clear how this will be directed away from the waterway, and whether it will also be directed away from samphire and mangrove communities, and the potential impact on these communities if water does drain to these locations.

## 7. Management of conservation areas (related to Point 3 above)

Identified conservation areas/nature reserves on Whitlock and Babbage Islands is a critical issue, as they need to be well protected, both during construction (machinery, earth movement, dredging etc.) and post construction (public access, domestic animals, weed control). Different stages of development obviously require different management controls. Potential impacts need to be identified and effectively controlled to make sure they work

PER Sections 3.4.4, 3.8.1 and 5 mention the need for management. It may be useful to allow the development of this plan to be a more public process, which involves the help of local conservation groups who are keen to ensure that these areas are well protected and managed.

#### 8. Management of dredge spoil

This issue is discussed in PER Section 3.6.2 and Section 5.2.1, however discussion is of a very general nature. Areas recognised as needing protection need to be effectively banded, particularly conservation areas. More detail as to how this is expected to be achieved should be forwarded to the Authority.

Mention is also made within the PER of the need to undertake periodic maintenance dredging (PER Section 5.3.4), however no mention is made of where this spoil is actually proposed to be placed. This issue needs to be addressed.

#### 9. Vegetation / Faunal Survey

The Authority acknowledges that a regional vegetation survey has been undertaken as part of the preparation of the PER document. This survey has identified similar areas in the Carnarvon region, however, the survey does not recognise the fact that these other areas are located within existing extensive pastoral leases to the north and south of Carnarvon and as such are subject to intensive grazing. Vegetation existing on Whitlock and Babbage Islands is relatively undamaged (apart from rabbit grazing) and so represents relatively pristine vegetation units. The loss of habitat associated with the proposed development has not been acknowledged within the PER.

Native fauna in the area is also relatively protected on these Islands. Accordingly, the loss of habitat issue associated with the development proposal may also be applied in relation to native fauna.

#### 10. Commitments

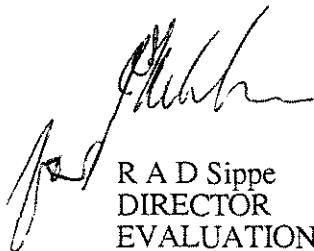
Please note that all commitments contained within the PER, particularly those listed in Section 6 should be incorporated in Section 7. This list of commitments will ultimately be attached to the Minister for the Environment's Conditions following the EPA's assessment of the proposal. As such, these commitments are the responsibility of the proponent and are enforceable by law.

A copy of the issues raised will also be sent to Mr Nello Siragusa at the Department of Marine and Harbours and Mr Peter Collins at LeProvost Environmental Consultants.

The Authority awaits your formal response to the matters raised in this letter and the attached list of issues before commencing preparation of its assessment report on the environmental acceptability of the proposed development.

For further discussion and clarification of these issues, please contact Ms Bunbury at the Authority on (09) 222 7036.

Yours faithfully

A handwritten signature in black ink, appearing to read 'R A D Sippe', written in a cursive style.

R A D Sippe  
DIRECTOR  
EVALUATION DIVISION

24 February 1993

Enc

cc. Department of Marine and Harbours  
LeProvost Environmental Consultants

## CARNARVON FASCINE DEVELOPMENT PROPOSAL ISSUES RAISED IN PUBLIC SUBMISSIONS

The public submission period for the PER commenced on 2 November 1992, and was extended to the 30 January 1993 in view of the difficulty experienced by some people in obtaining a copy of the PER document over the Christmas holiday period.

12 submissions were received by the Authority. These included:

4 from interested members of the public;  
4 from conservation groups;  
Royal Australasian Ornithologists Union;  
Department of Planning and Urban Development;  
Tourism Commission; and  
Department of Land Administration.

The following issues were raised in the submissions :

### Provision of residential land close to Carnarvon townsite

The provision of residential land close to the Carnarvon central business district is considered by one submission to be a commendable idea, and preferable to the establishment of a separate town structure to the east of the town, near Brown Range. It was considered that this alternative location would necessitate increases in rate payments. Another submission stated that it is good to encourage expansion of the town away from the existing airport.

One submission considered it important to leave some areas undeveloped and in as pristine condition as possible to promote the industry of 'Ecotourism'.

One submission claimed that development of the Browns Range option was too readily dismissed in the PER. Objections given for non-development were considered to be insubstantial and distance from the existing town centre should not be considered as a factor. The view was expressed that the demand for housing at Browns Range is currently high, and the provision of additional public services to meet population increases must be met no matter where development is undertaken. Furthermore, Browns Range is considered to be flood risk free.

### Aesthetic impact of development proposal

One submission claimed that the aesthetic impact of the proposal will spoil the existing charm of the townsite, especially views east of the town. It was claimed that many residents and visitors appreciate the views of native shrub, samphire and vegetation offered by Carnarvon, unlike views offered by most other WA coastal towns. The opinion stated in the PER that existing views are unattractive was considered to be a subjective one and detracts from objective assessment.

Another submission claimed that the development proposal would improve the visual appeal of the Fascine as well as the recreational, residential and tourism potential of Carnarvon.

### Viability of proposed development

One submission expressed the view that the main reason detailed within the PER for the proposed development appears to be to provide finance for the dredging of the Fascine (Section 2.5). However there is no detail given as to how the on-going maintenance which will be required will be financed. It is considered that it will be difficult to prevent development of the reserved areas in view of the large capital expenditure which would already be in place.

One submission claimed that the growth history of Carnarvon town site has been very slow and it appears difficult to justify over a thousand new building sites for the area within the next ten years. This justification is not provided within the PER document, nor in the Babbage Island (Department of Land Administration, 1988) study.

### Tourist potential

One submission suggested that the zoning for the proposed 2 ha hotel / motel site and 4 ha caravan park should be made more flexible. These areas should be zoned for 'Special Tourism' or 'Tourism Development' to allow for a more flexible planning option.

One submission stated that the proposed caravan park should be located on Babbage Island, close to the Mile Jetty and boat ramp facilities.

It was considered that some of the public beaches proposed to be developed as part of the Fascine project should be made into alternative white sand beaches.

### Management of Whitlock and Babbage Islands

One submission questioned the statement included within the PER which implies that the development of Whitlock and Babbage Islands may generate an income which could be spent managing the remnant conservation areas identified on the Islands. The implication is that unless development does take place, no funds would be available for this management. This implication is misleading and incorrect. The suggestion that local conservation groups should be involved in the management of Whitlock and Babbage Island nature reserves was also made in several submissions. This could be undertaken under the overall control of the Shire of Carnarvon, with expertise provided by the Department of Conservation and Land Management.

Concern was also expressed in several submissions that the Shire does not effectively manage the existing conservation areas on Babbage and Whitlock Islands. At present, no control is being exercised to manage degradation of land adjacent to Oyster Creek, leading to widespread erosion, particularly through 4WD activity. The fact that the Shire has been nominated as the management agency for the on-going management of the conservation areas, particularly in view of increased recreational pressure which will occur as a result of the proposed development is of serious concern. Further, it was considered that a hotel / motel complex, and caravan park proposed for Whitlock Island and described in the PER will exacerbate this management problem, as increased vehicle access will further push into environmentally sensitive areas, and is an inappropriate form of development for an area identified as having high conservation value. This proposed development will lead to the introduction of weeds, feral animals, fertiliser and pesticide run off, destruction of natural habitat, and increased incidence of fire. It was concluded that only pedestrian access should be allowed on Whitlock Island. Dry / wet samphire areas and mangrove communities should be included within the conservation areas..

Several submissions raised the point that no impact study has been undertaken to define conservation areas on either Island. Management of both Islands is extremely important. Both are significant as Island communities in their own right, particularly as other coastal areas representing coastal ecological units surrounding Australia are increasingly fragmented. Island areas such as these are potentially easy to protect, for example through fencing, and become sanctuaries to protect flora and fauna.

It was considered that specific and strategically placed fencing needs to be put in place, to protect the conservation areas, and degraded sand dunes on Babbage Island.

#### Retention of Whitlock Island

Several submissions strongly opposed the development of Whitlock Island (proposed as part of Stage 4). This Island is considered to be an important passive recreation area with significant stands of native vegetation including samphire. The view was expressed that this area should be reserved for conservation, and existing damage (including 4WD tracks) should be rehabilitated.

One submission stated that the only area suitable for development is the foreshore strip facing the Fascine.

Concern was expressed in one submission that the flora and fauna survey undertaken for Whitlock Island as detailed in the PER is inadequate.

#### Development of Babbage Island

Several submissions stated that only parts of Babbage Island should be allowed to be developed. Vehicle access should be restricted and unstable due areas fenced off for rehabilitation.

#### Impact on waterbird populations

One submission stated that the frequent passage of boats passing mudflat areas en route to the marina / yacht club and the ocean may create disturbance for waterbirds. This may be very significant, as it may interrupt feeding habits and so prevent them gaining the weight required before they commence migration.

One submission expressed concern regarding inadequate data. The statement contained in the PER which states: 'Assessing the conservation value to waterbirds of the Gascoyne River Delta is hampered by the lack of data from regular counts' (Appendix 4,1a)). This statement does not fill the reader with confidence, and the survey is considered to be inadequate.

The importance of the Fascine area for waterbird populations is considered to be under estimated within the PER (Appendix 4). Further, the survey undertaken on behalf of the proponent does not identify main bird feeding areas, or an indication of any seasonal pattern of use.

The suggestion was made that all powerlines should be located underground to avoid potential collisions with waterbirds.

One submission stressed the significance of the existing Lesser Pied Cormorant Roostery in a tidal creek south of the exiting boat harbour. No aspect of the Fascine development should be allowed to impact on the roostery.

### Impact on terrestrial animals

The areas proposed to be reserved on the Islands is considered by some submissions to be too small to sustain viable populations of animals. Further, medium density development adjacent to the small reserves proposed is not considered sensible as the disturbance from cats, dogs and people will lead to unacceptable level of disturbance, and destroy sensitive native fauna.

One submission expressed concern that there has been no survey or assessment of the significance of the site for bush birds. For example, the 'Striated Grass Wren', 'Orange Chat' are significant species and may occur at this site. Further studies are needed to determine whether the conservation areas proposed are adequate and appropriate for both bush birds and shoreline birds.

Concern was expressed that there have been no mammal or reptile surveys for the area and described in the PER.

### Impact on native vegetation

Several submissions expressed the view that the use of fertilizer in the gardens of the proposed urban development will have a detrimental impact on adjacent reserves through nutrient run-off. This vegetation is adapted to accommodate a harsh, dry nutrient poor environment and the nutrient rich run-off will change the flora.

It was also considered that claims made within the PER document that there are similar delta areas along the WA coastline (PER 4.3.2.4 B) pp 34/35) are inaccurate. There are no similar river delta areas in the Carnarvon proximity. Pilbara delta systems have different characteristics.

One submission stated that *Santalum* Spp. and *Cyananchem* Spp. (*Tylophorum*) are located in the dune areas proposed to be developed in Stages 5, 6, 7 and 8. These plants should be protected in parks large enough to ensure that degradation will not occur through increased public access. An additional flora study should be undertaken to establish the importance of the sites .

One submission stated that it disagrees with the implication made within the PER that 'dry samphire can be developed with no effect on the ecosystem'. It clearly is part of the ecosystem, and should not be sacrificed based on the inadequate data base provided within the PER.

Further surveys are considered to be required which will take time. It was concluded that development of the area should be deferred for at least two years to allow for additional survey work to be undertaken.

One submission states that every effort should be made to preserve as much of the mangrove community at Whitloch Island as possible, as it provides an important fish breeding habitat essential to fishing industry in Shark Bay. The area could be used for passive recreation by the construction of walkways and trails, providing controlled public access. It was also suggested that additional mangrove communities should be planted at Pickles Point to enhance appearance, and stabilise the foreshore and replace communities destroyed as a result of development taking place.

### Proposed dredging of Fascine / spoil disposal

One submission claimed that when the marina / yacht club facilities and water front accommodation is in place, there is likely to be strong pressure to maintain the deep water channel open along the Fascine. It is claimed that the Channel will have to be dredged on a more regular basis than is proposed within the PER, i.e. more often than the ten year interval proposed.



The following questions were raised : Who will pay for the on-going cost of dredging which will be required ? Where will additional spoil be disposed of ?

It was considered that any further filling of coastal areas will have a detrimental impact on waterbird / wader habitat. This is a crucial issue which needs to be addressed prior to any development taking place.

It was claimed that the PER has not stated how sensitive areas will be protected from dredge spoil disposal.

The view was expressed that dredging and deposition of dredged material may have an unacceptable impact on adjacent samphire areas, for example through spillage of material over bunded areas, as experienced during the recent harbour excavation activities. This may happen at Whitlock Island, which would have an unacceptable ecological impact

One submission claimed that the proponent should undertake a commitment to protect Oyster Creek from any degradation that would result from the increased activity over the Babbage and Whitlock Island areas following development of Stage 1, as a result of dredging operations.

One submission suggested that a secondary channel should be cut along the existing southern shoreline and an island be incorporated into the plan by using it as a spoil bank between the primary and secondary channels adjacent to the boat harbour leases. This could be vegetated and used as a waterbird refuge. A cutting, bordered and protected by stone moles through the Pelican Point spit should be included in the proposal to secure entrance to the Fascine, similar to those at Fremantle Harbour. This cutting may reduce maintenance costs and assist natural flushing mechanisms. Natural forces would then continue the southward migration of the sand spit without interfering in the proposal. Entrance could be angled northwards to reduce amount of seaweed blown in from weed banks to the south.

#### Proposed Marina/ Yacht Club

The concept of developing a yacht club and marina in close proximity to the existing Carnarvon Yacht Club facilities was strongly supported in one submission.

One submission expressed the view that the proposed number of pens within the Marina / Yacht Club is over emphasised within the PER, as sailing within the fascine during the summer is likely to be difficult due to the strong prevailing SW winds experienced at that time.

Another submission stressed the point that the marina / yacht club should not be linked with the existing Boat Harbour, due to the high risk of industrial pollution originating from the Boat Harbour.

#### Tramway Bridge

One submission stated that the Tramway Bridge is an important historic tourist attraction for Carnarvon, and as such it is important that it is not destroyed or replaced. It was suggested that the bridge be stabilised and repaired sufficiently so as to be utilised as a dual access foot bridge and bicycle path, thus providing access from Carnarvon townsite to Babbage, Whitlock Islands and Mile long Jetty.

### Water supply

One submission claimed that the water supply demand as detailed in the PER is exaggerated. A suggested water conservation method is to increase the river bed load in the catchment area by introducing stone baffles in the tributaries to slow down run off. This would also reduce flooding, promote replenishment of underground aquifers, allow longer periods of unlimited water access to the horticulture industry, and reduce land degradation through erosion and silting.

### Sewerage disposal

One submission claimed that the town is nearing its limit and further treatment works will soon be required, which is not adequately addressed in the PER. Consideration should be given to recycled sewerage water.

### Drainage / Flood control

Drainage is a significant issue in Carnarvon due to the high rainfall it receives. Several submissions claimed that this issue has not been adequately addressed in the PER. Greater detail is required as the town is already subject to local flooding due to poor drainage on an annual basis. This water source may perhaps be more efficiently exploited.

One submission suggested that flood control may be better managed if the existing tributaries to the north of the town site are opened up, to relieve pressure on the estuary.

It was also considered that inadequate consideration has been given to the impact on the hydrological characteristics of the area by the establishment of the causeway and closure of the south arm of the Gascoyne River, and the resulting effects. Future management and costs associated with maintenance of the area should be more thoroughly considered. The opinion was expressed that in view of the nature of the floodout regime and northerly coastal drift, a number of hydrological problems may have been better addressed if the Channel to the Gascoyne River had been left open.

The creation of a marina which requires dredging may create hydraulic changes which will create an on-going management problem for proposed Stages 1 and 3.

One submission expressed the view that the volume of water required to fill dredged areas within Stages 1 and 3 will be larger than required at present. This may create higher tidal water speeds, creating a high erosion effect along western edge of the Fascine and Babbage and Whitlock Islands, and increased erosion along Oyster Creek. It is likely that material eroded from this water movement will remain suspended and be washed into and deposited in the areas proposed to be dredged, thus silting the areas up again. Thus silting is considered to be an on-going problem, resulting in high maintenance costs for the Shire. Flushing mechanisms would have been more efficient if the southern arm of the Gascoyne had been left open.

### Mosquitos

The view was expressed that the development as proposed may create mosquito breeding grounds, which will require mosquito control measures. This will in turn have a detrimental impact on invertebrates in the area.

### Greenhouse Effect

One submission considered that inadequate consideration has been given to the implications of the Greenhouse Effect on the proposed development, particularly in view of potential tide surges associated with cyclonic activity. Increased depth in the Fascine as a result of the

proposed dredging activities will enhance potential effects of wave action. In view of this fact, one submission suggested that an 'embankment fixative system' be applied to the 19 metres of 'non-habitable area', that is between the 'habitable area' and the retaining walls on the proposed canal estate.

#### Water Quality

The water flushing analysis discussion within the PER was considered by one submission to be inadequate. Also, there are no details of proposed remedial action to be undertaken by the proponent in the event that water quality within the canals deteriorates.

## **Appendix 3**

**Proponent's response to issues raised by the Environmental  
Protection Authority and in public submissions**

# CARNARVON FASCINE

## RESPONSES TO POINTS RAISED BY THE ENVIRONMENTAL PROTECTION AUTHORITY

### 1. Water quality

#### **Flushing**

An estimate of the tidally induced flushing time for the Fascine and canal system has been made by the Department of Marine and Harbours, Western Australia, using the tidal prism method. This method assumes that the water basin is flushed only by the action of tidal fluctuations. The assumption is made that water and any entrained pollutant mass which leaves the area on the ebb tide does not return on subsequent flood tides.

Using the tidal prism method the rate of tidal flushing is given by:

$$N = \ln (M_N/M_O) / \ln(V_{LW}/V_{HW})$$

Where:

- N = number of tidal cycles
- M<sub>O</sub> = initial mass of pollutant
- M<sub>N</sub> = mass of pollutant remaining after N tidal cycles
- V<sub>HW</sub> = volume at High Water
- V<sub>LW</sub> = volume at Low Water

A characteristic flushing time has been defined as the e-folding time or the time required for the initial concentration of pollutant to fall to a concentration of 1/e where e is Napier's Constant. The e-folding time is then the number of tidal cycles required for the initial concentration of pollutant to fall to a concentration of 37% of its initial concentration.

Water volumes of the Fascine and canal areas have been determined for a platform area of approximately 37 ha at high water and 18 ha at low water. Assuming an average depth after dredging of 1 m (Chart Datum) and the following tidal elevations results in the volumes given:

		<u>Volume (10<sup>4</sup>xm<sup>3</sup>)</u>
Mean Higher High Water	1.4 m CD	90
Mean Lower Low Water	0.4 m CD	25
Mean Lower High Water	1.1 m CD	78
Mean Higher Low Water	0.7 m CD	60

From the above the ratio V<sub>LW</sub>/V<sub>HW</sub> is 0.28 for spring tides and 0.77 for neap tides. Solving the above equation results in an e-folding time of approximately 1 tidal cycle for spring tides and 4 tidal cycles for neap tides. As the tidal regime in

Carnarvon is mixed this tidally induced flushing time is equivalent to 1 to 4 days. This relatively low number is largely a result of the shallow bathymetry which causes large areas to dry out at low tide. The volume ratio  $V_{LW}/V_{HW}$  is consequently low.

Wind induced currents and density currents will also assist the flushing mechanism, however, given the relative effectiveness of tidal flushing no attempt has been made to quantify either.

### **Water Quality Monitoring and Remedial Action**

Proposed routine water quality monitoring will include quarterly monitoring of the following parameters:

- salinity
- temperature
- pH
- dissolved oxygen
- total nitrogen
- total phosphorus
- chlorophyll 'a'

As the waters of the Fascine will be used for direct contact recreation bacterial levels will also be monitored during the summer months.

Removal of litter from the shoreline will be responsibility of the adjacent landowner, in the case of residential lots, or the Shire, in the case of Public Open Space.

The proposed boat wash down area will incorporate a perimeter drain and soakage pit to control the run-off of pollutants to adjacent waters.

The results of the DMH flushing study indicate that flushing of the waterways will be very rapid and hence that nutrient accumulation and algal blooms are not anticipated. However, should such an event occur the source of nutrient will be identified and means of reducing it to manageable levels investigated. Options to be considered include improving flushing either by natural, e.g. modify circulation pattern, or artificial means, e.g. forced air circulation.

In the event of unacceptably high bacterial readings the waters will be closed to recreation. As the development will be fully sewerred, elevated bacterial counts would not be routinely anticipated and their occurrence would tend to indicate a fault or breakdown in the sewerage system. In this event the source of contamination will be traced and the fault repaired. The waterways will remain closed for recreation and water quality will continue to be monitored until such time as the water is shown to be fit for recreational purposes.

## 2. Long term management of canal waterways

The Shire of Carnarvon, as designated Waterways Manager, will assume final responsibility for the maintenance of water quality in the canals. Day to day management may be undertaken by an owners association responsible to the Council, or directly by the Council from funding generated by a differential rate on canal front properties. The final decision will depend on proposals put to the Council by potential developers and will be detailed in the rezoning application.

## 3. Environmental Management Plan (Construction Phase)

In addition to the items referred to in Section 6.2 of the PER the construction management plan would address the following issues:

- definition, by survey, of the boundary between conservation (non-development) and development lands and provision of temporary fencing where required to control vehicular access to conservation areas and ensure that development does not encroach on land set aside for conservation;
- construction of a bund system for the containment of dredge spoil within future development areas;
- regular monitoring of the stability of the bund walls to ensure that they are not breached;
- the containment of dewatering and dredging fluids for such time as is necessary to produce a quality suitable for discharge back into the fascine;
- monitoring of the quality of the contained water to confirm that the water quality is acceptable prior to discharge;
- management of the placement of 'dry' fill to ensure that it is contained within the development area;
- containment of the impacts of servicing the development to the developed area or, where this is not possible, to identified service corridors which can be rehabilitated on the completion of construction works; and
- temporary stabilisation of fill with vegetation or an inert seal, e.g. 'Hydromulch' or similar, to control dust and sand movement.

## 5. Water Supply

The Water Authority of Western Australia has advised that further aquifers in the Carnarvon area have been identified which are capable of being developed to supply the proposed development. In the short term the diversion of residential development to the Fascine from other areas (e.g. Brown Range) will have little

impact on water supply projections. Inevitably, however, there will be a need for a political decision with regard to the allocation of water between irrigated horticulture and residential expansion, which could affect the development beyond the initial stages.

## 6. Drainage

Road surface levels within the development will be slightly below the level of the adjoining lots (refer to PER Fig. 5). This will allow runoff from the road and verge areas to be directed toward the road drain system from which it can either be directed through grease and silt traps to infiltration and nutrient stripping basins or directed to amenity areas, e.g. POS, for re-use.

Additional freshwater run-off has been shown to lead to additional luxuriance of growth in mangrove habitats due to reduced salinity and additional nutrient availability (PER Section 5.3.5).

## 7. Management of conservation areas

Potential impacts and management requirements during the construction phase are discussed under point 3, above.

Post construction management issues include pedestrian and vehicular access points, provision and location of tracks or trails through the conservation areas, shoreline stability, dune stabilisation, rehabilitation of degraded vegetation, domestic animal management and stormwater run-off control.

Community input and support for the management programme is essential if it is to work effectively.

## 9. Vegetation/Faunal Survey

No structural study on the differences in habitat between the areas which are presently subject to grazing and those of Whitlock and Babbage Island, have been conducted. However, there are indications of past grazing activity on Babbage and Whitlock Islands, as evidenced by the presence of skeletal remains of grazing animals, although it is not known how intensively or for how long this activity was carried out. Other changes to Babbage and Whitlock Island which also have a long history include road and track construction, port related activities (including livestock shipments), and flood mitigation measures. The more recent permanent closure of the South Arm, to which the natural system has yet to equilibrate, will in the long term lead to the replacement of the samphire vegetation with terrestrial vegetation as a result of siltation of the channels and infilling with wind blown dunal sands.



The loss of natural habitat associated with the project is discussed in Sections 5.4, 5.5, 8.1 and 8.4 of the PER.

The level of protection provided to native fauna on Babbage and Whitlock Islands is less than might otherwise be expected in an island situation as both islands are naturally connected to the mainland at times other than when the Gascoyne River is in flood, and in addition both have a permanent connection to the mainland, Babbage Island by the causeway and Whitlock Island by the tramway bridge. Thus ready access is provided to both humans and feral predators, a situation which has persisted since the early years of European settlement.

The proximity of the residential developments of Brockman and central Carnarvon and to a lesser extent on Babbage Island exposes the area to predation by both feral and domestic cats at a level which is likely to exceed that of areas further from human habitation.

Babbage and Whitlock Islands are isolated from areas of similar habitat by the river bed and the developed parts of Carnarvon, which reduces the potential for migratory movement or replacement of terrestrial fauna.

#### 10. Modified list of commitments

The list of commitments provided in Section 7 of the PER summarise the various commitments made in the document under major headings of pre-construction activities, management plans and implementation. The detailed list of all commitments made in the PER is appended to the EPA assessment report.

## **Appendix 4**

### **Proponent's list of environmental commitments**

**CARNARVON FASCINE**  
**PROPONENT'S COMMITMENTS**

**INTRODUCTION**

The following commitments are made by the Proponent with respect to the proposed development of the Fascine, and Babbage and Whitlock Islands, at Carnarvon.

To illustrate the timing applicable to each task the commitments have been divided into pre-construction, construction and post-construction (operational) tasks, as appropriate.

**1 COMMITMENTS TO BE MET PRIOR TO CONSTRUCTION**

**1.1 Zoning**

The Shire will initiate a re-zoning of appropriate parts of the land to Canal Zone to comply with the requirements set out in State Planning Commission Policy No. DC 1.8, Procedures for the Approval of Artificial Waterways and Canal Estates.

**1.2 Waterways Manager**

The Shire of Carnarvon will be the designated Waterways Manager.

**1.3 Conservation areas**

The southern and western portions of Whitlock Island and the adjacent part of Babbage incorporating mangrove, wet samphire and dune habitats will be set aside as areas for conservation.

**1.4 Aboriginal Heritage**

The Proponent is aware of its responsibilities under the Aboriginal Heritage Act and undertakes to obtain the necessary clearances required under that Act before commencing work on site.

### **1.5 European Historical Sites**

The historic tramway and bridge will be restored to a condition suitable for use by pedestrians and cyclists.

### **1.6 Flooding**

A minimum fill level of 4.1 m has been adopted for the development. This figure has been accepted by the Water Authority of Western Australia as providing a high degree of flood protection.

### **1.7 Sewerage**

All parts of the development will be connected to deep sewerage.

### **1.8 Canal Circulation and Flushing**

Flushing predictions made in the PER will be confirmed for the finally accepted design, to the satisfaction of the EPA on advice from DMH.

### **1.9 Marina**

The current lease between the Council and the Carnarvon Yacht Club contains a condition requiring the provision of foreshore access around the club area. This condition will apply also to the proposed marina development.

Agreement will be reached between the Shire of Carnarvon, as proponent, the Carnarvon Yacht Club, as lessee of the proposed marina, and the DMH regarding any additional maintenance dredging which may be required as a result of the siting of the marina.

### **1.10 Preparation of Environmental Management Plan (Construction)**

An Environmental Management Plan will be prepared by the Proponent to the satisfaction of the EPA identifying those impacts which will occur during the construction period and the proposed method of managing those impacts. Impacts which will be addressed include:

- public safety during construction;
- construction dust and noise management;
- dredging management; and

- protection of conservation and foreshore areas during all phases of construction through adoption of the following measures;
  - definition, by survey, of the boundary between conservation (non-development) and development lands and provision of temporary fencing where required to control vehicular access to conservation areas and ensure that development does not encroach on land set aside for conservation;
  - construction of a bund system for the containment of dredge spoil within future development areas;
  - regular monitoring of the stability of the bund walls to ensure that they are not breached;
  - the containment of dewatering and dredging fluids for such time as is necessary to produce a quality suitable for discharge back into the fascine;
  - monitoring of the quality of the contained water to confirm that the water quality is acceptable prior to discharge;
  - management of the placement of 'dry' fill to ensure that it is contained within the development area;
  - containment of the impacts of servicing the development to the developed area or, where this is not possible, to identified service corridors which can be rehabilitated on the completion of construction works; and
  - temporary stabilisation of fill with vegetation or an inert seal, e.g. 'Hydromulch' or similar, to control dust and sand movement.

## **2 COMMITMENTS TO BE MET DURING THE CONSTRUCTION PERIOD**

### **2.1 Construction Related Activities**

#### **2.1.1 Public Access to Fascine and Foreshore Areas**

Public access to construction areas will be restricted for safety reasons during the construction period to the satisfaction of the Shire of Carnarvon.

#### **2.1.2 Temporary Protection of Foreshores and Conservation Areas**

The conservation areas, which include the mangroves at the mouth of the Fascine and the adjacent wet samphire areas, will be protected from development impacts by the construction of temporary fences where required. Bund walling will be constructed as necessary to protect these areas from overspill of dredge spoil or de-watering fluids.

#### **2.1.3 Dust and Noise**

Construction traffic will be confined to routes designated by the Shire of Carnarvon.

Hours of operation will be determined by the Shire of Carnarvon.

Dust suppression during construction will be by surface spraying or screen fencing. Cleared areas not immediately built-on, will be surface stabilised with a biodegradable emulsion or vegetation cover, to the satisfaction of the EPA.

#### **2.1.4 Spoil Disposal**

Dredge spoil will be contained within bunds which will aid the settlement and compaction process.

#### **2.1.5 Water Quality**

Water quality within the Fascine during dredging will be protected by containing the spoil within banded settling ponds to settle out suspended solids before the water is returned to the Fascine.

### **2.1.6 Dewatering and Groundwater**

De-watering fluids will be held in settling ponds, as necessary, to reduce the levels of suspended solids to meet EPA water quality criteria, before being discharged into the Fascine. An alternative option that may be considered is the discharge of dewatering fluids to the dry river bed of the Gascoyne River, adjacent to the development site.

### **2.1.7 Soil Stabilisation**

Areas which have been cleared and/or filled to provide a surface suitable for construction, but will remain exposed following the initial construction phase (i.e. earthworks and servicing), will be stabilised to prevent the development of a dust nuisance to nearby residents. Areas which will remain exposed for only a short time may be stabilised with a bio-degradable stabiliser, while those not expected to be developed within the first growing season will be seeded to bind the soil surface.

### **2.1.8 Reporting**

The construction monitoring report will be submitted following the completion of construction or, in the event of a protracted or staged construction programme, annually until the completion of construction.

The following items will be reported:

- management actions undertaken during the construction period;
- the results of construction impacts monitoring; and
- actions taken to remedy any unforeseen impacts detected during the construction period.

## **2.2 Preparation of Post-construction Environmental Management Plans**

Plans for the management of the Fascine waterways, and the Babbage and Whitlock Islands foreshore and conservation reserves will be completed by the Shire of Carnarvon to the satisfaction of the EPA prior to the completion of construction of the first stage of development.

### **2.2.1 Fascine Waterways Management Plan**

The Shire of Carnarvon, as Proponent for the project, will be responsible for the development and implementation of the Fascine Waterways management plan.

The objectives of the Fascine management plan are to ensure that the water quality is acceptable for the desired purposes, that the navigability of the waterways is maintained, and that the desired aesthetic standards are met to ensure that an environment which is attractive to residents and tourists is maintained.

- **Fascine Water Quality**

Water within the Fascine will be required to meet relevant health and environmental criteria for direct contact recreation.

All of the proposed development will be sewered to ensure that bacterial and nutrient contamination are minimised. A monitoring programme will be designed and implemented by the Proponent to confirm that these standards are being met.

- **Maintenance of Navigable Waterway and Sediment Movement**

Sediment accumulation over time may eventually reduce the depth of the entrance channel and waterway such that navigability is affected. This will be monitored by bathymetric survey at a frequency to be determined by DMH. In the event that the depth is found to be insufficient, maintenance dredging will be undertaken by the Waterways Manager.

- **Navigation Aids**

The Waterways Manager will be responsible for the installation and maintenance of navigation aids within and leading to the waterway.

- **Drainage**

All private lot drainage will be contained on site. Drainage from roads and other public areas will be discharged into infiltration basins within the development area. Allowance will be made for discharge to the Fascine in the event of extreme storm events.

- **Public Access to Development**

Public access will be provided to all parts of the waterway, and to all designated open space within and adjacent to the development. South of the tramway bridge all foreshores will be accessible to the public. North of the tramway public foreshores will be located at both ends of the tramway bridge, at the western end of the proposed causeway bridge and at the northern end of



the waterway adjacent to the South Arm levee. The frontages of canal lots will be private.

The management plan will define the type of access to be provided to each area, e.g. footway, cycleway, etc., the location of parking areas and the responsibility for their on-going maintenance.

- **Monitoring Programme**

*Water quality in the Fascine*

Water quality of the Fascine will be monitored on a regular basis for a range of physical and chemical parameters in order to confirm that appropriate water quality criteria are being met.

In the event that water quality is found to be inadequate the Shire will undertake whatever steps are necessary to achieve the required standard.

*Sedimentation in the Fascine*

The depth of the Fascine waterways and lateral movement of the navigation channel will be monitored by an annual hydrographic survey.

Maintenance dredging of the navigable channel/Fascine entrance will be the responsibility of the Waterways Manager. This responsibility may in part, however, be deferred to the Carnarvon Yacht Club Inc. under an agreement to develop a deeper water entrance and basin for the yacht marina. Responsibility for the maintenance of navigable channels in those parts of the Fascine developed for residential use will be the responsibility of the Shire of Carnarvon.

*Canal walls*

The condition of the canal wall and other retaining structures will be confirmed by annual survey undertaken by a qualified civil engineer.

The Shire will undertake to ensure that all structures are maintained by the owners to the required standard.

- **Contingency Plans**

*Fuel and oil spills*

The proposed waterways development will not incorporate any fuelling facilities and hence the potential for a significant fuel spill in this area is

minimal. Should the yacht club propose to incorporate fuelling facilities in their proposed marina facility, the club will be required to prepare an oil spill contingency plan to the satisfaction of the EPA on advice from the DMH.

### ***Storm and flood damage***

A storm damage contingency plan will be documented identifying responsibility for the repair of canal walls as a result of storm damage, and for maintenance dredging in the event that unforeseen sedimentation of navigation channels occurs.

## **2.2.2 Babbage and Whitlock Islands Foreshore and Conservation Reserve Management Plan**

The Babbage and Whitlock Islands foreshore and conservation management plan will be developed and implemented by the Shire of Carnarvon.

- **Public Access**

Public access to foreshore and conservation areas will be provided in a managed form consistent with protecting the natural habitats of Babbage and Whitlock Islands. The management plan will define the location of these accessways and the method of construction appropriate to each location or habitat.

- **Environmental Management**

### ***Non-navigable waterways - Oyster Creek***

Oyster Creek will be maintained as a flushing, non-navigable waterway. To ensure that the depth and ratio of intertidal to subtidal sands is maintained the profile of the upper reaches of the stream bed will be monitored. When necessary the channel and sand banks will be re-shaped to maintain flushing.

### ***Management of mangroves and wet samphire***

The principal threat to the mangrove and intertidal samphire areas is seen as uncontrolled access. To ensure that such access does not result in the destruction of these habitats it will be necessary to define appropriate walking trails, elevated where necessary, to prevent damage to pneumatophores and interference with natural drainage patterns.

### **3 POST CONSTRUCTION - IMPLEMENTATION OF THE OPERATIONAL MANAGEMENT PLANS**

The on-going waterway and conservation area management plans will be implemented by the Proponent at the conclusion of the construction phase.

A review of all activities carried out will be undertaken three years after the completion of the marine-based components of the development, making recommendations for any necessary amendments to the management programme. A similar review will be carried out at the end of the fifth year which will also identify the need for any ongoing monitoring.

An annual report will be submitted annually to the EPA detailing the previous year's monitoring, and recommendations for ongoing management and monitoring.

The following items will be reported:

#### **3.1 Fascine Waterways Management Plan**

- the results of the annual bathymetric survey and the need for any maintenance dredging detected by that survey;
- the results of the water quality monitoring programme and the need for any action required to improve water quality; and
- the results of the annual survey of retaining wall and other marine structures, and the need for any maintenance identified as a result of that survey.

#### **3.2 Babbage and Whitlock Islands Foreshore and Conservation Reserve Management Plan**

- the implementation of the management proposals contained within the management plan;
- the results of the monitoring of the condition of the mangrove and wet samphire communities and the bed profiles of Oyster Creek; and
- management actions recommended to remedy any adverse impacts detected.

**CARNARVON FASCINE**  
**PROPONENT'S COMMITMENTS**

**INTRODUCTION**

The following commitments are made by the Proponent with respect to the proposed development of the Fascine, and Babbage and Whitlock Islands, at Carnarvon.

To illustrate the timing applicable to each task the commitments have been divided into pre-construction, construction and post-construction (operational) tasks, as appropriate.

**1 COMMITMENTS TO BE MET PRIOR TO CONSTRUCTION**

**1.1 Zoning**

The Shire will initiate a re-zoning of appropriate parts of the land to Canal Zone to comply with the requirements set out in State Planning Commission Policy No. DC 1.8, Procedures for the Approval of Artificial Waterways and Canal Estates.

**1.2 Waterways Manager**

The Shire of Carnarvon will be the designated Waterways Manager.

**1.3 Conservation areas**

The southern and western portions of Whitlock Island and the adjacent part of Babbage incorporating mangrove, wet samphire and dune habitats will be set aside as areas for conservation.

**1.4 Aboriginal Heritage**

The Proponent is aware of its responsibilities under the Aboriginal Heritage Act and undertakes to obtain the necessary clearances required under that Act before commencing work on site.

### **1.5 European Historical Sites**

The historic tramway and bridge will be restored to a condition suitable for use by pedestrians and cyclists.

### **1.6 Flooding**

A minimum fill level of 4.1 m has been adopted for the development. This figure has been accepted by the Water Authority of Western Australia as providing a high degree of flood protection.

### **1.7 Sewerage**

All parts of the development will be connected to deep sewerage.

### **1.8 Canal Circulation and Flushing**

Flushing predictions made in the PER will be confirmed for the finally accepted design, to the satisfaction of the EPA on advice from DMH.

### **1.9 Marina**

The current lease between the Council and the Carnarvon Yacht Club contains a condition requiring the provision of foreshore access around the club area. This condition will apply also to the proposed marina development.

Agreement will be reached between the Shire of Carnarvon, as proponent, the Carnarvon Yacht Club, as lessee of the proposed marina, and the DMH regarding any additional maintenance dredging which may be required as a result of the siting of the marina.

### **1.10 Preparation of Environmental Management Plan (Construction)**

An Environmental Management Plan will be prepared by the Proponent to the satisfaction of the EPA identifying those impacts which will occur during the construction period and the proposed method of managing those impacts. Impacts which will be addressed include:

- public safety during construction;
- construction dust and noise management;
- dredging management; and

- protection of conservation and foreshore areas during all phases of construction through adoption of the following measures;
  - definition, by survey, of the boundary between conservation (non-development) and development lands and provision of temporary fencing where required to control vehicular access to conservation areas and ensure that development does not encroach on land set aside for conservation;
  - construction of a bund system for the containment of dredge spoil within future development areas;
  - regular monitoring of the stability of the bund walls to ensure that they are not breached;
  - the containment of dewatering and dredging fluids for such time as is necessary to produce a quality suitable for discharge back into the fascine;
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  - management of the placement of 'dry' fill to ensure that it is contained within the development area;
  - containment of the impacts of servicing the development to the developed area or, where this is not possible, to identified service corridors which can be rehabilitated on the completion of construction works; and
  - temporary stabilisation of fill with vegetation or an inert seal, e.g. 'Hydromulch' or similar, to control dust and sand movement.

## **2 COMMITMENTS TO BE MET DURING THE CONSTRUCTION PERIOD**

### **2.1 Construction Related Activities**

#### **2.1.1 Public Access to Fascine and Foreshore Areas**

Public access to construction areas will be restricted for safety reasons during the construction period to the satisfaction of the Shire of Carnarvon.

#### **2.1.2 Temporary Protection of Foreshores and Conservation Areas**

The conservation areas, which include the mangroves at the mouth of the Fascine and the adjacent wet samphire areas, will be protected from development impacts by the construction of temporary fences where required. Bund walling will be constructed as necessary to protect these areas from overspill of dredge spoil or de-watering fluids.

#### **2.1.3 Dust and Noise**

Construction traffic will be confined to routes designated by the Shire of Carnarvon.

Hours of operation will be determined by the Shire of Carnarvon.

Dust suppression during construction will be by surface spraying or screen fencing. Cleared areas not immediately built-on, will be surface stabilised with a biodegradable emulsion or vegetation cover, to the satisfaction of the EPA.

#### **2.1.4 Spoil Disposal**

Dredge spoil will be contained within bunds which will aid the settlement and compaction process.

#### **2.1.5 Water Quality**

Water quality within the Fascine during dredging will be protected by containing the spoil within bunded settling ponds to settle out suspended solids before the water is returned to the Fascine.

### **2.1.6 Dewatering and Groundwater**

De-watering fluids will be held in settling ponds, as necessary, to reduce the levels of suspended solids to meet EPA water quality criteria, before being discharged into the Fascine. An alternative option that may be considered is the discharge of dewatering fluids to the dry river bed of the Gascoyne River, adjacent to the development site.

### **2.1.7 Soil Stabilisation**

Areas which have been cleared and/or filled to provide a surface suitable for construction, but will remain exposed following the initial construction phase (i.e. earthworks and servicing), will be stabilised to prevent the development of a dust nuisance to nearby residents. Areas which will remain exposed for only a short time may be stabilised with a bio-degradable stabiliser, while those not expected to be developed within the first growing season will be seeded to bind the soil surface.

### **2.1.8 Reporting**

The construction monitoring report will be submitted following the completion of construction or, in the event of a protracted or staged construction programme, annually until the completion of construction.

The following items will be reported:

- management actions undertaken during the construction period;
- the results of construction impacts monitoring; and
- actions taken to remedy any unforeseen impacts detected during the construction period.

## **2.2 Preparation of Post-construction Environmental Management Plans**

Plans for the management of the Fascine waterways, and the Babbage and Whitlock Islands foreshore and conservation reserves will be completed by the Shire of Carnarvon to the satisfaction of the EPA prior to the completion of construction of the first stage of development.

### **2.2.1 Fascine Waterways Management Plan**

The Shire of Carnarvon, as Proponent for the project, will be responsible for the development and implementation of the Fascine Waterways management plan.



The objectives of the Fascine management plan are to ensure that the water quality is acceptable for the desired purposes, that the navigability of the waterways is maintained, and that the desired aesthetic standards are met to ensure that an environment which is attractive to residents and tourists is maintained.

- **Fascine Water Quality**

Water within the Fascine will be required to meet relevant health and environmental criteria for direct contact recreation.

All of the proposed development will be sewered to ensure that bacterial and nutrient contamination are minimised. A monitoring programme will be designed and implemented by the Proponent to confirm that these standards are being met.

- **Maintenance of Navigable Waterway and Sediment Movement**

Sediment accumulation over time may eventually reduce the depth of the entrance channel and waterway such that navigability is affected. This will be monitored by bathymetric survey at a frequency to be determined by DMH. In the event that the depth is found to be insufficient, maintenance dredging will be undertaken by the Waterways Manager.

- **Navigation Aids**

The Waterways Manager will be responsible for the installation and maintenance of navigation aids within and leading to the waterway.

- **Drainage**

All private lot drainage will be contained on site. Drainage from roads and other public areas will be discharged into infiltration basins within the development area. Allowance will be made for discharge to the Fascine in the event of extreme storm events.

- **Public Access to Development**

Public access will be provided to all parts of the waterway, and to all designated open space within and adjacent to the development. South of the tramway bridge all foreshores will be accessible to the public. North of the tramway public foreshores will be located at both ends of the tramway bridge, at the western end of the proposed causeway bridge and at the northern end of

the waterway adjacent to the South Arm levee. The frontages of canal lots will be private.

The management plan will define the type of access to be provided to each area, e.g. footway, cycleway, etc., the location of parking areas and the responsibility for their on-going maintenance.

- **Monitoring Programme**

- *Water quality in the Fascine*

- Water quality of the Fascine will be monitored on a regular basis for a range of physical and chemical parameters in order to confirm that appropriate water quality criteria are being met.

- In the event that water quality is found to be inadequate the Shire will undertake whatever steps are necessary to achieve the required standard.

- *Sedimentation in the Fascine*

- The depth of the Fascine waterways and lateral movement of the navigation channel will be monitored by an annual hydrographic survey.

- Maintenance dredging of the navigable channel/Fascine entrance will be the responsibility of the Waterways Manager. This responsibility may in part, however, be deferred to the Carnarvon Yacht Club Inc. under an agreement to develop a deeper water entrance and basin for the yacht marina. Responsibility for the maintenance of navigable channels in those parts of the Fascine developed for residential use will be the responsibility of the Shire of Carnarvon.

- *Canal walls*

- The condition of the canal wall and other retaining structures will be confirmed by annual survey undertaken by a qualified civil engineer.

- The Shire will undertake to ensure that all structures are maintained by the owners to the required standard.

- **Contingency Plans**

- *Fuel and oil spills*

- The proposed waterways development will not incorporate any fuelling facilities and hence the potential for a significant fuel spill in this area is

minimal. Should the yacht club propose to incorporate fuelling facilities in their proposed marina facility, the club will be required to prepare an oil spill contingency plan to the satisfaction of the EPA on advice from the DMH.

### *Storm and flood damage*

A storm damage contingency plan will be documented identifying responsibility for the repair of canal walls as a result of storm damage, and for maintenance dredging in the event that unforeseen sedimentation of navigation channels occurs.

## **2.2.2 Babbage and Whitlock Islands Foreshore and Conservation Reserve Management Plan**

The Babbage and Whitlock Islands foreshore and conservation management plan will be developed and implemented by the Shire of Carnarvon.

- **Public Access**

Public access to foreshore and conservation areas will be provided in a managed form consistent with protecting the natural habitats of Babbage and Whitlock Islands. The management plan will define the location of these accessways and the method of construction appropriate to each location or habitat.

- **Environmental Management**

### *Non-navigable waterways - Oyster Creek*

Oyster Creek will be maintained as a flushing, non-navigable waterway. To ensure that the depth and ratio of intertidal to subtidal sands is maintained the profile of the upper reaches of the stream bed will be monitored. When necessary the channel and sand banks will be re-shaped to maintain flushing.

### *Management of mangroves and wet samphire*

The principal threat to the mangrove and intertidal samphire areas is seen as uncontrolled access. To ensure that such access does not result in the destruction of these habitats it will be necessary to define appropriate walking trails, elevated where necessary, to prevent damage to pneumatophores and interference with natural drainage patterns.

### **3 POST CONSTRUCTION - IMPLEMENTATION OF THE OPERATIONAL MANAGEMENT PLANS**

The on-going waterway and conservation area management plans will be implemented by the Proponent at the conclusion of the construction phase.

A review of all activities carried out will be undertaken three years after the completion of the marine-based components of the development, making recommendations for any necessary amendments to the management programme. A similar review will be carried out at the end of the fifth year which will also identify the need for any ongoing monitoring.

An annual report will be submitted annually to the EPA detailing the previous year's monitoring, and recommendations for ongoing management and monitoring.

The following items will be reported:

#### **3.1 Fascine Waterways Management Plan**

- the results of the annual bathymetric survey and the need for any maintenance dredging detected by that survey;
- the results of the water quality monitoring programme and the need for any action required to improve water quality; and
- the results of the annual survey of retaining wall and other marine structures, and the need for any maintenance identified as a result of that survey.

#### **3.2 Babbage and Whitlock Islands Foreshore and Conservation Reserve Management Plan**

- the implementation of the management proposals contained within the management plan;
- the results of the monitoring of the condition of the mangrove and wet samphire communities and the bed profiles of Oyster Creek; and
- management actions recommended to remedy any adverse impacts detected.