

Port Mandurah Development

Esplanade (Mandurah) Pty Ltd

Report and Recommendations
of the
Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 378 April 1989

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PORT MANDURAH DEVELOPMENT
ESPLANADE (MANDURAH) PTY LTD

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i. SUMMARY AND RECOMMENDATIONS

Esplanade (Mandurah) Pty Ltd proposes to develop a canal estate at Halls Head Mandurah, called 'Port Mandurah'. This project would involve single residential water front allotments, fronting onto a network of canals, linked to the Mandurah Inlet Channel, and includes a tourist development site and a village centre, encompassing a total area of 113.8 ha. This proposal is located on the same site as Stage 1 of the former Halls Head Waterways proposal by Parrys (Esplanade) Pty Ltd in 1982. The Halls Head proposal was subject to environmental impact assessment by the Authority as an Environmental Review and Management Programme (ERMP) in 1982. At this time, the proposal was found to be environmentally acceptable subject to 33 recommendations.

The Port Mandurah proposal differs from the original Halls Head Waterways proposal. The changes relate to modification of the canal structure which may have groundwater and water quality implications, and proposed housing density.

The Authority determined that the impact of these changes could be environmentally significant, and called for the preparation of a Notice of Intent (NOI) and sought managed public input on it. This was prepared as a supplementary document to the original Halls Head Waterways ERMP. The NOI was released for comment to identified local ratepayer groups, and relevant local government and State Government departments, for a period of 4 weeks ending on March 10, 1989. Since preparation of the NOI, the proponent has amended the proposal by replacing the proposed 'Village Centre' with additional single residential waterfront allotments, and proposes to extend the canal network to include this area.

In assessing this proposal, the Authority was aware of the Minister for Environment's conditions set as a consequence of the Peel Harvey Stage II environmental assessment. In this regard, the Authority has concluded that this proposal is consistent with those Ministerial Conditions.

This assessment report was prepared following consideration of both the NOI and public and government department submissions received during the public review.

RECOMMENDATION 1

The Environmental Protection Authority concludes that the canal development proposed by Esplanade (Mandurah) Pty Ltd and described in the Notice of Intent is environmentally acceptable and recommends that it could proceed, subject to the proponent's commitments contained in the Port Mandurah proposal as listed in Annexure 1 of the Notice of Intent, and the following recommendations.

RECOMMENDATION 2

The Environmental Protection Authority recommends that as planning of the proposed development proceeds, the proponent should provide further details on engineering structures, canals, canal profiles, roads, culverts, connecting channels and beaches to the satisfaction of the Water Authority of Western Australia, Town of Mandurah, the Department of Marine and Harbours and/or the Peel Inlet Management Authority as appropriate. The design of these facilities should comply with the recommendations of the Government's Canal Guidelines (1981).

RECOMMENDATION 3

The Environmental Protection Authority recommends that localised dewatering associated with the construction of the canals is environmentally acceptable. Generalised dewatering is not, however, acceptable. Dewatering operations should be undertaken to the satisfaction of the Environmental Protection Authority following advice from the Water Authority of Western Australia. The proponent should prepare and implement an on-going monitoring programme for a period of five years to the satisfaction of the Environmental Protection Authority prior to construction commencing. The proponent should be required to institute immediate remedial action in the event that monitoring results indicate that, in the opinion of the Environmental Protection Authority, an adverse effect on the environment is occurring.

RECOMMENDATION 4

The Environmental Protection Authority recommends that, prior to commencement of development, details regarding connection of the proposed public boat wastewater facility to the reticulated sewage system be prepared by the proponent to the satisfaction of the Water Authority of Western Australia.

RECOMMENDATION 5

The Environmental Protection Authority recommends that, prior to construction commencing, the proponent provide contingency plans for the prevention of pollution of the canals, in the event of a failure of the sewage disposal system, to the satisfaction of the Peel Inlet Management Authority and Water Authority of Western Australia.

RECOMMENDATION 6

The Environmental Protection Authority recommends that prior to construction, the proponent should prepare to the satisfaction of the Waterways Manager contingency plans for the construction of a hydraulic link to the Inlet Channel via Paul Street. The proponent should retain a vacant block in this corner of the development to allow for the installation of the link. If, in the opinion of the Waterways Manager (Town of Mandurah), water quality monitoring results indicate unacceptable water quality in the north section of the canal development, the proponent should implement the plans for the hydraulic link.

RECOMMENDATION 7

The Environmental Protection Authority recommends that if in the opinion of the Waterways Manager there is inadequate flushing of the canals, and unacceptable water quality, thereby indicating a need for greater rate of flushing, the proponent should construct a second entrance channel to increase flushing rates in the south east of the canal estate.

RECOMMENDATION 8

The Environmental Protection Authority recommends that planning and operation designs for location of refuelling facilities, stormwater drainage and runoff containment be forwarded to the Peel Inlet Management Authority for approval when these are finalised by the proponent and before construction commences.

RECOMMENDATION 9

The Environmental Protection Authority recommends that the proponent prepare and implement a detailed water quality and sediment monitoring programme to the satisfaction of the Peel Inlet Management Authority before construction commences.

In addition to parameters listed by the proponent in the Notice of Intent, the programme should provide for :

- . monitoring of heavy metal concentrations in the sediments at sites both within and at a control site outside the canal waterways, as described in the Notice of Intent, commencing before the canals are constructed, and continuing for the first five years of the project;
- . monitoring to be carried out for a period of five years initially, then reviewed, with reports on monitoring and management submitted to the Peel Inlet Management Authority on an annual basis; and
- . reporting after five years on the operation of the canal development, with reference to the monitoring results obtained during the full five year period, including interpretation of the results, recommendations relating to future requirements and with a commitment to amend management in accordance with the monitoring results.

Sediment analysis should include apatite and non-apatite phosphorous and allow for assessment of potential release rate of phosphorous from sediments.

The Environmental Protection Authority further recommends that the monitoring programme also incorporate regular observation of fish movements within the canal waterways. This should be undertaken for one year, and be subject to review at the end of that year.

RECOMMENDATION 10

The Environmental Protection Authority recommends that canal wall structures be constructed to the satisfaction of the Waterways Manager, and to achieve at least a 30 year design life, as stated in the Canal Guidelines.

RECOMMENDATION 11

The Environmental Protection Authority recommends that prior to construction the proponent satisfy the Peel Inlet Management Authority that protective structures along the connecting channel between the canal waterways and the Inlet Channel would be expected to have a design life of 100 years.

RECOMMENDATION 12

The Environmental Protection Authority recommends that prior to construction commencing, the proponent prepare a programme to minimise noise emissions as a result of construction activities to the satisfaction of the Environmental Protection Authority, following advice from the Town of Mandurah.

RECOMMENDATION 13

The Environmental Protection Authority recommends that the proponent implement appropriate methods to minimise dust levels and stabilise soils during and after earth moving operations associated with the proposed development to the satisfaction of the Environmental Protection Authority.

The Environmental Protection Authority also recommends that the proponent undertake rehabilitation and stabilisation of areas designated as public open space, public recreation and street verges following completion of earthworks to the satisfaction of the Town of Mandurah.

RECOMMENDATION 14

The Environmental Protection Authority recommends that the proponent be required to document options for disposal of spoil unsuitable for residential landfill, to the satisfaction of the Waterways Manager and the Town of Mandurah prior to construction commencing.

RECOMMENDATION 15

The Environmental Protection Authority recommends that, prior to commencement of the project, the proponent develop a management plan which protects the floodways and foreshore areas from any adverse effects during the development of the project to the satisfaction of the Waterways Manager, the Peel Inlet Management Authority, and the Department of Marine and Harbours.

RECOMMENDATION 16

The Environmental Protection Authority recommends that the proponent reach an agreement with the Waterways Manager (Town of Mandurah) as to the time, or performance level at which responsibility for all or parts of the project are handed over to the Waterways Manager.

RECOMMENDATION 17

The Environmental Protection Authority recommends that the proponent conduct a survey of the depth of the canals and connecting channel, and the associated natural waterway to the satisfaction of the Peel Inlet Management Authority within one month of the canal construction, and continuing annually for five years.

The proponent should also provide for maintenance dredging of the canals and connecting channel from the Inlet Channel to the canal waterways to the satisfaction of the Peel Inlet Management Authority and the Waterways Manager. Results of the surveys and maintenance dredging works should be incorporated in the annual monitoring report to the Peel Inlet Management Authority, the Waterways Manager, and the Environmental Protection Authority, as referred to in Recommendation 8.

RECOMMENDATION 18

The Environmental Protection Authority recommends that the management area for the project should include sections of the adjacent Inlet channel that in the opinion of the Department of Marine and Harbours and the Peel Inlet Management Authority may be affected by the existence of the project.

RECOMMENDATION 19

The Environmental Protection Authority recommends that if any portion of the land included in Stage 1 of the Port Mandurah Development is intended to be developed by anyone else other than Esplanade (Mandurah) Pty Ltd, appropriate recommendations made by the Environmental Protection Authority in this Assessment Report should apply.

1. INTRODUCTION

In 1988 the Environmental Protection Authority received a proposal from Rule Group Ltd, to construct a canal development at Halls Head, Mandurah (see Figure 1). This proposal is located on the same site as the former Halls Head Waterways proposal by Parrys (Esplanade) Pty Ltd, which was subject to formal assessment by the Authority, as an Environmental Review and Management Programme in 1982. That proposal was found to be environmentally acceptable subject to 33 recommendations. Consequently, a legal agreement with the Shire of Mandurah (now Town of Mandurah) was also prepared.

The new project at Halls Head involves a revised residential canal development, to be developed over at least two stages. Only Stage I is addressed in this proposal. Waterfront residential allotments would range in area from between 700 m² to 1 400 m², along with a special residential design precinct containing smaller residential allotments in the 450 m² to 550 m² range, two waterfront villa sites, and a village centre and tourist development site, as indicated on Figure 2 are to be included.

Changes to the 1982 proposal relate primarily to redesign of canal structure, with associated groundwater and water quality implications, as well as changes in proposed housing density. The Authority determined that these changes were environmentally significant, and called for preparation of a Notice of Intent (NOI), with managed public input from identified local ratepayer groups and relevant local government and State Government departments. This NOI was prepared by Esplanade (Mandurah) Pty Ltd, a company of the Rule Group Ltd, as a supplementary document to the original ERMP. Following a 4 week public review, ending on March 10 1989, the Authority has prepared this assessment report. Since that date, the proponent has amended the proposal further by replacing the village centre with residential lots. This change has been considered in this assessment.

Assessment of this proposal necessarily involves discussion of the original proposal, to identify those significant environmental impacts which still apply to the current proposal.

This assessment report will:

- . briefly document the original Halls Head Waterways proposal as proposed in 1981;
- . identify the significant environmental implications of the original proposal;
- . review the 1982 EPA recommendations made following environmental assessment of the original proposal; and
- . identify new or altered impacts.

In making its recommendations on this variation to a previously assessed proposal, the Authority has reiterated its former recommendations where appropriate, and modified them to take account of the revised proposal.

Recommendations drawn at the conclusion of this report supercede the Authority's recommendations made in it's previous assessment report.

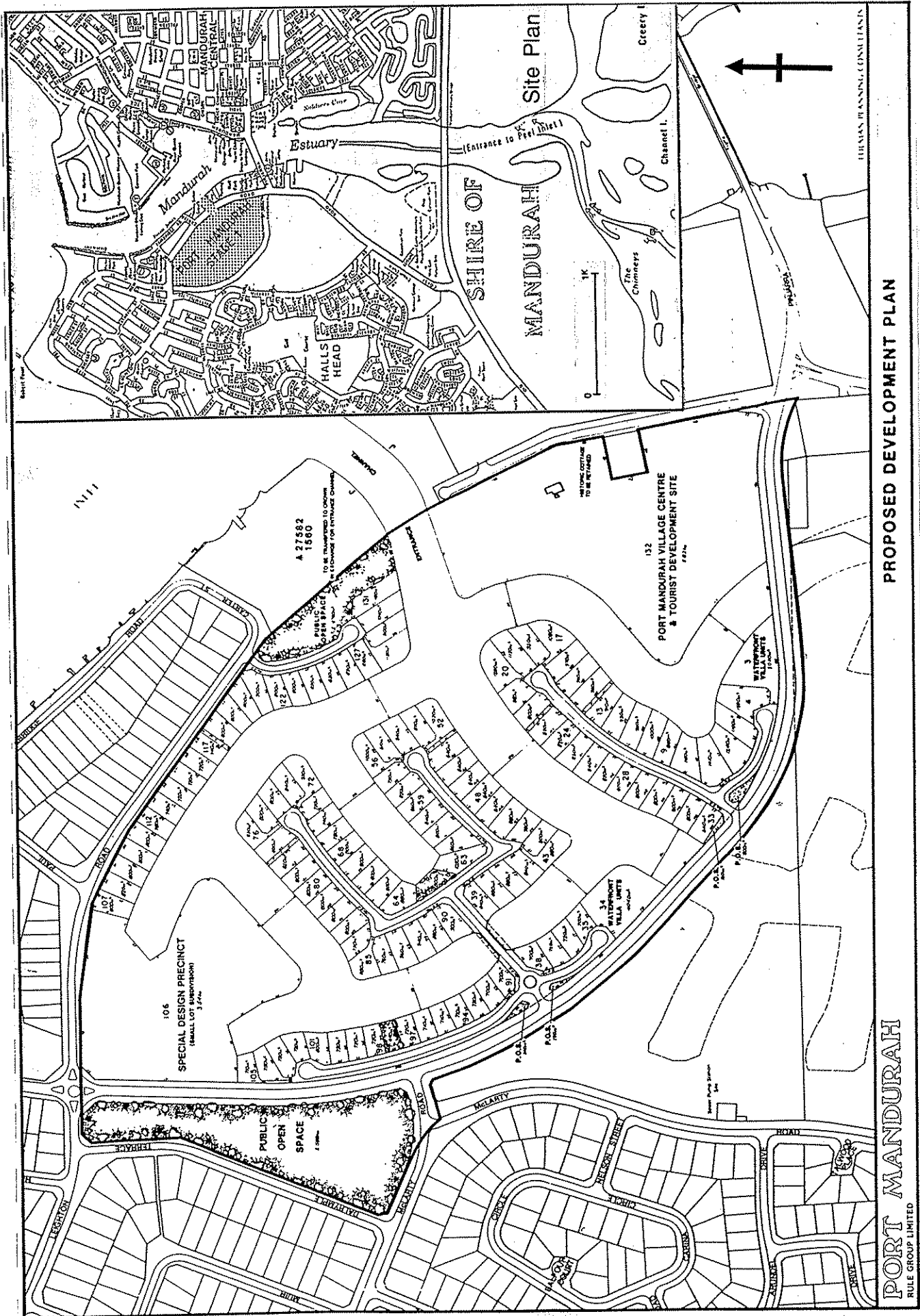


Figure 1 Area and design of Proposed Port Mandurah Waterways Development, as described in the Notice of Intent (February 1989) (Source: Esplanade (Mandurah) Pty Ltd : 1989)

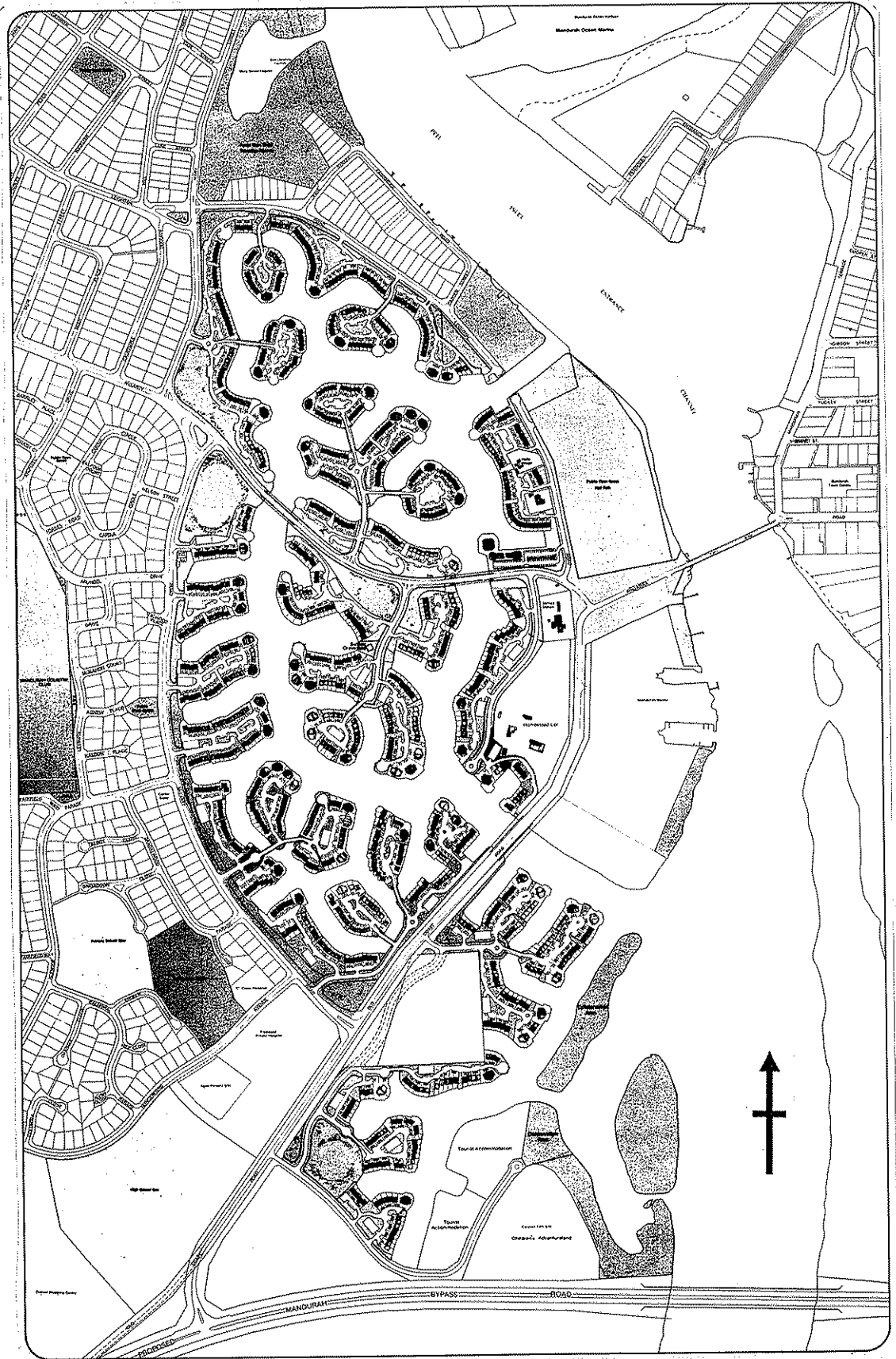


Figure 2 Area and design of original Halls Head Waterways Project (1981)
(Source: Parys (Esplanade) Pty Ltd : 1981)

2. BACKGROUND

A canal development on the land to the western side of the Mandurah Inlet Channel was originally assessed by the Environmental Protection Authority in December 1982. At this time, the proposal was a project of Parrys (Esplanade) Pty Ltd, and was known as 'Halls Head Waterways'. This was essentially for a grouped housing canal development. (See Figure 2).

The 'Halls Head Waterways' development proposed to create a canal estate development on 129 ha of land on the west side of the Inlet Channel. The Estate would form a series of interconnected islands within a large water body, and be joined to the Mandurah Inlet via two large connecting channels. Development would be staged over a period of ten years, with a total of 1 000 residential units. Canal widths would be varied from between 45 to 75 metres. Each residential unit was proposed to have a canal frontage and private mooring area. The proposal would be deep sewered (Fielman Planning Consultants, 1981).

The project area is generally flat and lies below the 2 metre contour level, with sections adjacent to the Inlet Channel being less than 0.5 metres above high water mark. A large depression exists at the northern end of the site, which is inundated during winter months and supports a stand of Melaleuca spp. Extensive filling of the site would be required to raise the site above flood levels to permit it to be suitable for residential development.

The majority of the site has previously and is still currently being used for agricultural activities. There has been widespread clearing, which has removed all but a few Tuart trees. The site is therefore considered to be degraded, however there is a healthy area of samphire marsh adjacent to the Channel.

An Environmental Review and Management Programme (ERMP) was prepared by Parrys (Esplanade) Pty Ltd, in view of the 'nature, location and possible impact of the project' (DCE, 1982a: 7). This was released for public comment for a period of 10 weeks.

In its assessment of the ERMP, the Authority limited itself to issues of environmental significance, and did not provide comment on planning issues. Assessment was made on the basis of :

- . initial suitability of the project site for canal development, on the basis of relevant environmental issues; and
- . suitability of the actual proposal in terms of environmental impact at a local and regional level.

The following environmental impacts were identified :

2.1 IMPACT ON THE EXISTING PEEL HARVEY ESTUARINE ENVIRONMENT

Development of the canal estate may have the potential to degrade the existing environmental resources, eg areas of conservation value, groundwater resources, landscape, and fisheries. The estuarine ecosystem was seen to be already under considerable pressure. Implications of the development needed to be viewed in both the short and long term.

2.2 CONSERVATION

A portion of the samphire area had been identified in the System 6 Study as having conservation value, and should be protected.

The Authority concluded that the area was generally degraded, and evaluation of the area indicated limited conservation value. It was concluded that the conservation value did not constitute a reason for not permitting the land for canal development (DCE,1982a:10), and that retention was not practical.

2.3 FLOODS

This low lying land is subject to seasonal inundation. A poorly designed or located development could exacerbate flood events.

The Authority concluded that the canals would compensate for any loss of the floodplain. However, floodways through the estate and along the foreshores of the Inlet Channel should be retained. Buildings within the proposed development would have to be built above the 1.5 metre AHD flood level.

2.4 WATER QUALITY

This was discussed in considerable detail, and related to canal and Inlet Channel water quality, water exchange mechanisms, and associated on-going management costs. Problems were to be subject to on-going research, and would need to reflect the constraints identified in Bulletin 118 (DCE, 1982b). Discussion addressed on-going water quality problems associated with algal blooms in the Peel Inlet and Harvey Estuary, and included reference to several studies currently being undertaken in the area.

2.4.1 CANAL AND INLET CHANNEL WATER QUALITY

Data available at the time of assessment indicated that for most of the year, water quality in the Inlet Channel would be acceptable as source water for a canal estate. However, there would be periods where reduced water quality may have a detrimental impact on canal water quality (between November through to January). Water quality was seen to be related to nutrient input and flushing time. Flushing times should be reduced as much as possible, and nutrient input should be minimal. This could be achieved through appropriate design. Canal width should not be below those suggested in the Report of the Steering Committee on Canal Developments (Waterways Commission: 1981).

2.4.2 WATER EXCHANGE

Mechanisms to aid this were identified as wind, tides and density currents. The area was considered to be windy, and experience significant tidal exchange which would contribute to effective water exchange. Stratification is associated with different salinities in the Inlet Channel, and differing densities in the top and bottom waters could on occasion assist water exchange between the canal and channel waters. This could be aided through appropriate design.

Calculations for water exchange were based on the project as a whole, however no information was available to show whether the individual project stages would operate satisfactorily in isolation. This aspect was considered to be important given the nature of staged construction

of the project. The Authority concluded that the proponent would need to modify subsequent stages of the project in the light of on-going monitoring results.

2.5 GROUNDWATER RESOURCES

Two groundwater formations were identified. An unconfined aquifer is located under Halls Head, which is limited and contains a thin lens of fresh water over brackish, and saline water at depth. This is used by local residents for garden reticulation bores. A confined aquifer has also been located, within the Leederville Formation, and contains brackish sub-potable water in limited quantities. The Authority concluded that they were not significant, and are already subject to overpumping. Problems relating to increased salinity were already being experienced during summer months.

The Authority concluded that the groundwater resources in the area are limited, and the proposed development would not reduce it further. However, construction of the canals would result in a shift landwards of the saltwater interface with the unconfined aquifer. Protective measures, including on-going monitoring should be implemented to minimise this impact. The use of appropriate design techniques would minimise this impact further.

2.6 COMMERCIAL FISHERIES

The Peel - Harvey System supports the largest commercial and amateur estuarine fishing in Western Australia (DCE, 1982b:5), and the estuary has been identified as an important fish nursery area for commercial fish species, including Sea Mullet, Cobbler, and King George Whiting. The Inlet Channel is identified as the only migratory route to the ocean for fish and crabs entering or leaving the Estuary, and is therefore considered to be important. Habitat areas, especially south of the Mandurah Traffic Bridge are recognised as significant. Areas to the north have been modified to a large extent through channel dredging.

The Authority noted that the impact on fisheries through dredging activity should be minimised, and appropriate design, management and monitoring of boating activity should take place to minimise water turbidity. The creation of additional areas for benthic communities within the canals was viewed as a possible advantage, to provide an increased area for overwintering habitats.

2.7 SUITABILITY OF SOILS AS SUBSTRATES

Soils at the site did not appear to present significant engineering problems. Most soils are of a sandy estuarine nature, with a silt fraction. Further surveys would be required prior to construction to determine their suitability.

2.8 1982 CONCLUSIONS

The project as assessed by the Authority in 1982 and described in the ERMP was found to be environmentally acceptable, subject to 33 recommendations (Appendix 1), and provided specific project design was applied to the site to minimise the potential environmental impacts identified. The proponent would be required to adhere to these recommendations, and implement appropriate monitoring, management and if relevant, remedial works.

In summary, the Authority's recommendations related to the following issues:

- . on-going management of the artificial waterways, and project site;
- . on-going management of conservation areas, floodways and foreshore areas;
- . management of adjacent Inlet Channel affected by the development;
- . water quality;
- . on-going monitoring of environmental impacts;
- . environmental engineering aspects;
- . protection and vesting of conservation areas;
- . protection of canal walls;
- . protection and monitoring of fisheries;
- . management of public open space;
- . ownership of canals; and
- . management of environmental impacts during construction, including noise levels, hours of construction, vibration control, dust levels and soil stabilisation.

Planning approval was subsequently granted by the Town Planning Department (TPD). At present, the area encompassed within the proposed project site is zoned for canal development, and was given conditional approval by the TPD in October 1985.

The proposal was also the subject of a legal agreement between Perpetual Trustees WA Ltd., the Shire of Mandurah and the proponent, Esplanade (Mandurah) Pty Ltd in January 1986. This Agreement addressed environmental and planning issues associated with the proposed development, and bank guarantees by the proponent in the event that problems were encountered during the construction phase of the project.

Subsequent to this legal agreement being prepared, the Environmental Protection Act was proclaimed in 1987. This allows for EPA recommendations to be incorporated into Ministerial conditions which are then legally enforceable under the Environmental Protection Act, if the proponent proceeds with the proposal.

The Authority considers that this process allows for environmental concerns associated with the Port Mandurah development to be adequately addressed and enforced, and therefore overcomes many of the reasons that led to the legal agreement being prepared. There may still be a desire for such an agreement under planning requirements.

The Authority also recognises that there may be a legal agreement required to clearly determine mechanisms for on-going monitoring and management of the waterway after construction has been completed. This is likely to be subject to on-going negotiation between the proponent, the Town of Mandurah as Waterways Manager, and the Department of Marine and Harbours, in

consultation with the Peel Inlet Management Authority. Provision must also be made for funding the on-going monitoring and maintenance of the project, and guarantees for remedial works which may be required as a result of failure of the project, to achieve the standards required by the Waterways Manager.

3. DESCRIPTION OF PROJECT

The Rule Group through Esplanade (Mandurah) Pty Ltd proposes to proceed with a modified residential canal development. These modifications have been discussed in the NOI and are outlined below. The site is located between Leighton and Pinjarra Roads, as shown in Figure 1, and encompasses the area included in Stage I of the original Halls Head Waterways proposal.

3.1 HOUSING DENSITY

The current proposal primarily involves development of a residential canal estate comprised principally of single residential lots over all of the area currently zoned 'canal'.

The proponent has submitted three separate subdivision applications to the State Planning Commission, as described in the NOI. These relate to:

1. a superlot for a 'Village Centre' in the south west corner of the site (5.8 ha);
2. a 'Design Precinct Area', in the north west section of the site (3.5 ha)- this is subject to preparation of a concept plan, in preparation by Taylor and Burrell, Planning Consultants; and
3. the canal subdivision, involving single residential development (104.5 ha).

The Authority has been advised since the submission of the NOI that the area described as the 'Village Centre' in the NOI would now be relocated to a different location outside the area subject to the proposed Port Mandurah development. The proponent now proposes to change land use in that area to single residential land use on canal waterways, similar to that suggested for the rest of the site (see Figure 3) and this is the subject of a fourth subdivision application. This change is not considered to constitute a significant environmental change to the overall proposal, or raise additional environmental issues that have not already been addressed for the rest of the proposal. However, the Authority requested further information from the proponent to ensure that water flushing characteristics associated with the additional canals in the area would be adequate.

3.2 CANAL LAYOUT

Changes to canal layout involve a reduction in the number of small islands to be created. A comparison of Figures 1 and 2, show the 1989 and 1981 proposals respectively.

3.3 HYDROLOGICAL MODIFICATIONS

Changes to dewatering concept being used for construction purposes, with the intention of reducing any impact on surrounding domestic bores, are proposed.

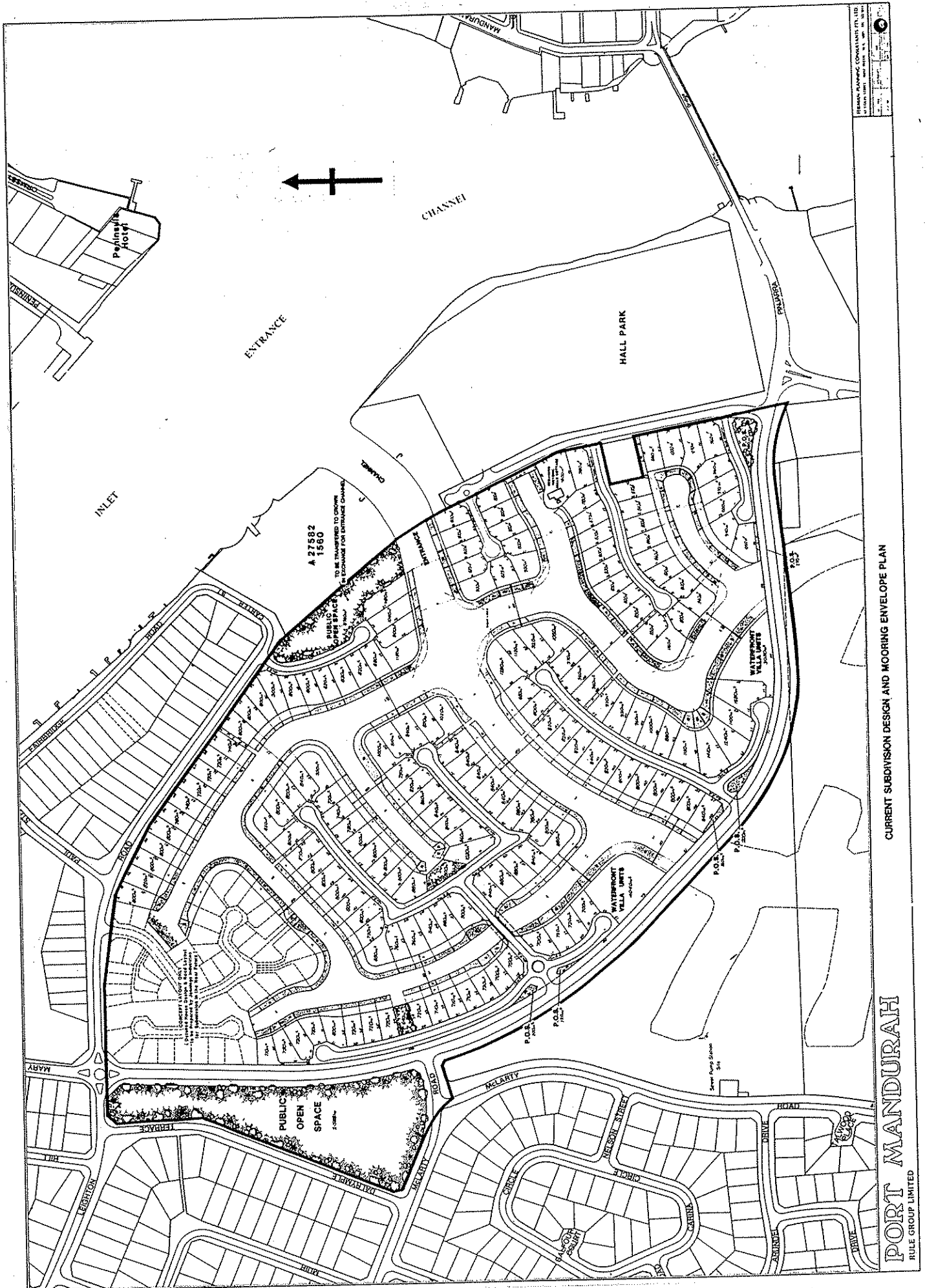


Figure 3 Area and design of Proposed Port Mandurah Waterways Development, as amended in March 1989 (Source: Esplanade (Mandurah) Pty Ltd : 1989)

3.4 FLOOD LEVELS

Changes to minimum block levels as a result of a recent study of the potential Greenhouse Effect have been put forward in the NOI. Blocks would be raised from the original level of 1.9 m AHD as described in the Halls Head Waterways proposal, to 2.2 m AHD. This change allows for 700 mm freeboard in the case of an extreme high water event.

3.5 WATER QUALITY

The revised proposal outlines changes to the profiles of the blocks whereby they would generally slope toward the edge of the canal. A porous walkway pavement would be constructed along the wall frontage of each lot. Stormwater would be channelled to soak wells to facilitate water movement to groundwater rather than direct discharge to the canal waterway.

3.6 CANAL WALLS

Canal edge walling is proposed to be changed, with the bulk of the estate containing walls based at a shallow depth rather than full depth walls.

4. REVIEW OF PUBLIC SUBMISSIONS

During the four week public submission period, nine submissions were received. These comprised submissions from the following:

- . Department of Marine and Harbours;
- . Agriculture Department;
- . Peel Inlet Management Authority;
- . Water Authority of Western Australia;
- . the Town of Mandurah;
- . Conservation Council;
- . Peel Preservation Group; and
- . two members of the public.

Five submissions expressed no preference for or against the development, while four expressed concern and opposition to the proposal.

Two submissions expressed concern that the proposal should have been assessed at a higher level of assessment, rather than as a NOI. It was also suggested that the impact of the proposal could not accurately be predicted until the effect of the Dawesville Cut and the Peel Regional Park are known.

General concern was also expressed in several submissions that Stage I of the new canal proposal was being assessed in isolation of Stage II. It was suggested that more detail of the proponent's plans for Stage II should have been provided for proper assessment of Stage I.

Submissions also indicated that Recommendations 19, 20 and 21 of the Authority's original assessment report in 1982 should be included within the Legal Agreement with the Shire of Mandurah.

Other issues raised in these submissions included :

REVIEW OF SUBMISSIONS (cont'd)

Water Quality

Submissions indicated that:

- . buildings and jetty structures may minimise wind flushing effect;
- . the current proposal does not allow for the flow through system as described for Stage II in the original proposal. All stages of the project should be assessed simultaneously to allow for this, and addressed in a formal ERMP document;
- . the NOI has not adequately addressed the already existing problems experienced in the Peel Harvey Estuary in relation to algal blooms. This may have an impact on canal flushing efficiency, and residents of Mandurah may end up with the costly liability of managing this if the development proceeds;
- . further detail is required regarding the hydraulic link between Paul Street and the canals;
- . too much emphasis is placed on water quality monitoring information from the Waterside Mandurah Development. Flushing characteristics of the Port Mandurah canals may be different; and
- . the question of heavy metals in sediments and water is not adequately addressed, especially given the high number of boats that would use the canals.

Construction Impacts

It was suggested in submissions that:

- . details should be finalised before submission of NOI and assessment. NOI currently refers to possible methods of undertaking works, which suggests a piecemeal and ad hoc approach by the proponent; and
- . hours of operation for construction would need to be determined by Council, before construction commences.

Monitoring and Management Programme

- . The Department of Marine and Harbours (DMH) considers that an extra survey monitoring line would be required in the monitoring programme, due to potential canal bank instability at a canal bend, as indicated in their submission. The proponent should organise this in consultation with DMH.

Foreshore Access

One submission put forward the view that residents of the Town of Mandurah may be denied right of access along the western foreshore, which would be severed by construction of the northern entrance channel. A bridge should be constructed across the entrance channel to allow for public access.

REVIEW OF SUBMISSIONS (cont'd)

Groundwater

The Water Authority of Western Australia (WAWA) has determined that construction of the canals would lower groundwater levels in nearby domestic bores, and affect fresh/salt water interface movement in the short and long term. A monitoring programme should be prepared by the proponent, and provide sufficient information to determine the extent of potential groundwater impacts. The WAWA also considers that:

- . The proponent should make a commitment to institute remedial action to maintain the fresh/salt water interface at an acceptable distance from nearby properties. This needs to be formalised and clearly defined; and
- . A commitment made by the proponent to recompense any other affected groundwater users in the short and long term needs to be formalised and clearly defined.

Another submission expressed the view that problems are already experienced in the Dudley Park area in relation to salt water intrusion of bores due to nearby canal developments. The construction of the Port Mandurah project may exacerbate this already existing problem. Therefore no dewatering should be undertaken.

Planning

Submissions indicated that:

- . NOI does not include plans for the Special Design Precinct section at the north west end of the development site, and the village centre on the south west portion; and
- . There are significant changes to the Public Open Space (POS) areas in the north west corner of the development site. In the original Halls Head Waterways proposal, there was planned to be an area of POS to serve as an alternative area for discharge of water into Mary Street Lagoon in case of flooding. It is unclear what alternative measures have been taken by the proponent to overcome this problem.

Social Impacts

One submission advised that it is irresponsible to attract so many people to low lying areas in view of the Greenhouse Effect. The proponent should be answerable to future problems in relation to this aspect.

A copy of the proponent's response to these issues is included in Appendix 4.

5. ENVIRONMENTAL IMPACTS

The project as described in the current NOI is a variation of Stage I of the original proposal for which conditional environmental acceptability was given by the Authority in 1982. This section addresses changes made to Stage I of the original proposal as described within the original Halls Head Waterways ERMP which have been determined by the Authority to be likely to have a significant environmental impact.

As in the previous Assessment Report (Bulletin 129), the Authority has limited itself to discussion of issues of environmental significance, and has not included discussion of planning issues.

These changes have been identified by the Authority as involving the following issues:

- . canal layout;
- . dewatering operations;
- . flood levels;
- . water quality issues;
- . canal and connecting channel wall design;
- . Public Open Space; and
- . construction impacts.

Following consideration of these issues, the EPA has determined that the development proposal as described in the Notice of Intent is environmentally acceptable subject to the proponent's commitments listed in Annexure 1 of the Port Mandurah NOI, and recommendations contained in the following discussion.

The Authority recognises that the proponent has made a number of commitments to environmental management, specifically as a result of the previous proposal, and the Authority's recommendations on it.

RECOMMENDATION 1

The Environmental Protection Authority concludes that the canal development proposed by Esplanade (Mandurah) Pty Ltd and described in the Notice of Intent is environmentally acceptable and recommends that it could proceed, subject to the proponent's commitments contained in the Port Mandurah proposal as listed in Annexure 1 of the Notice of Intent, and the following recommendations.

The current Port Mandurah Waterways proposal conforms to the existing Canal Guidelines (Waterways Commission, 1981). Section 7 of these guidelines states that the local government authority shall be responsible for the care and maintenance of the canal waterway (Waterways Commission, 1981:33). Accordingly, the Town of Mandurah would become the Waterways Manager for this proposal, and would therefore be responsible for the on-going monitoring and maintenance of the project. The Crown becomes owner of the canal waterways and land parcels designated for public use (Waterways Commission, 1981:32).

As discussed in Section 2.8, a legal agreement currently exists between Perpetual Trustees Pty Ltd, the Shire (now Town) of Mandurah, and the proponent. This agreement includes commitments relating to the on-going environmental monitoring and maintenance and the canal system. While environmental concerns discussed in the legal agreement will be addressed in this assessment report, the Authority recognises that a new legal agreement may be required to clearly determine mechanisms for the on-going monitoring and management of the waterway after construction has been completed. This should be subject to on-going negotiation between the

proponent, the Town of Mandurah as Waterways Manager, and the Department of Marine and Harbours, in consultation with the Peel Inlet Management Authority.

RECOMMENDATION 2

The Environmental Protection Authority recommends that as planning of the proposed development proceeds, the proponent should provide further details on engineering structures, canals, canal profiles, roads, culverts, connecting channels and beaches to the satisfaction of the Water Authority of Western Australia, Town of Mandurah, the Department of Marine and Harbours and/or the Peel Inlet Management Authority as appropriate. The design of these facilities should comply with the recommendations of the Government's Canal Guidelines (1981).

5.1 CANAL LAYOUT

Canal layout has been considerably simplified in the Port Mandurah proposal in comparison to the original Halls Head proposal. The basic difference is a reduction in the number of small islands created through canal design. As discussed in Section 3.2, these differences are highlighted in Figures 1 and 2. The revised canal layout for the south east corner of the development area, previously referred to as the 'Village Centre' is indicated in Figure 3.

The NOI states that canals would be excavated to a depth of 2.7 metres below sea level. The average overall water depth is planned to be 2.4 metres. Canal walls are proposed to be constructed of either masonry or reinforced concrete. The minimum block levels are proposed to be 2.2 metres AHD, and the top of the canal walls at RL 0.9 AHD.

The simplified form of canal layout has significant implications on water quality within the canal system. This is further discussed in Section 5.4.1.

5.2 DEWATERING

The NOI states that all dewatering operations would include provision for settling of fine particulate matter prior to discharge into the Inlet Channel. This ponding would, where possible, be in a completed cell resulting from previous earthwork operations. The proponent has also addressed the possibility of lining the western slope of the canal floor during construction to reduce the possibility of saltwater intrusion during dewatering operations (Port Mandurah commitment 9.1.1).

The Authority acknowledges that dewatering would be necessary for the establishment of essential services such as sewerage pipes below the canals. However, it has concerns regarding the possible impact of dewatering operations on local bores, in particular at those located adjacent to Fairbridge Road and McLarty Street. The Authority considers that only localised dewatering operations should be carried out, and only occur during winter months to minimise impact on the Inlet Channel. If dewatering is undertaken during summer months, water should only be discharged into the Inlet Channel during outgoing tides. This relates to the proponent's Port Mandurah commitments 2.3, 2.6, 9.1.1 and 9.1.3.

Dewatering operations would require a license from the Peel Inlet Management Authority.

Accordingly, the proponent should:

- . ensure that an adequate groundwater and water bore monitoring programme is carried out, to determine the extent of groundwater impact. These monitoring programmes should be undertaken to the satisfaction of the Water Authority of Western Australia;
- . institute remedial action to reduce potential impact on groundwater. The proponent has agreed to undertake this action. (Port Mandurah commitment 2.3 and 5.3); and
- . include a commitment to recompense any groundwater users in the event of groundwater being affected by dewatering operations. The proponent states that he will compensate residents during the construction phase, (Port Mandurah commitment 2.3). However, this should be extended to include compensation at a later stage post construction if monitoring results indicate that dewatering operations have had an adverse effect on the groundwater. (Port Mandurah commitment 5.5).

The proponent has further discussed the control of the fresh/salt water interface through the construction of a subsurface barrier within a deep sewer trench in Appendix 1 of the 'Response to Public Submissions' (see Appendix 4).

RECOMMENDATION 3

The Environmental Protection Authority recommends that localised dewatering associated with the construction of the canals is environmentally acceptable. Generalised dewatering is not, however, acceptable. Dewatering operations should be undertaken to the satisfaction of the Environmental Protection Authority following advice from the Water Authority of Western Australia. The proponent should prepare and implement an on-going monitoring programme for a period of five years to the satisfaction of the Environmental Protection Authority prior to construction commencing. The proponent should be required to institute immediate remedial action in the event that monitoring results indicate that, in the opinion of the Environmental Protection Authority, an adverse effect on the environment is occurring.

5.3 FLOOD LEVELS

The Authority is concerned about the environmental impact of the Greenhouse Effect on sea and flood levels along the Western Australian coastline. While the extent of the effect has yet to be accurately quantified, forecasts predict general sea level rises. In view of this, the Authority is of the opinion that projects that are located on the coast or estuaries should incorporate a conservative allowance for such rises.

As discussed in Section 3.4, the current Port Mandurah Waterways proposal would incorporate changes to the minimum block levels as a result of the recent study of the Greenhouse Effect. Blocks would be raised from 0.9 m to 2.2 m, allowing 700 mm freeboard in the case of an extreme flood event. (Port Mandurah commitment 6.5). This initiative by the proponent is supported by the Authority.

5.4 WATER QUALITY

5.4.1 WATER QUALITY WITHIN ARTIFICIAL WATERWAY (CANALS)

As discussed in Section 2 of this assessment report, the Authority previously concluded that the water circulation and exchange for the original Halls Head Waterways proposal was acceptable. Since this assessment, monitoring work undertaken at the nearby Waterside Mandurah development has indicated that water exchange is occurring in less than seven days. This could be expected for the Port Mandurah proposal.

The main documentation within the NOI relates to monitoring work already undertaken at the Waterside Mandurah development. This has been monitored for the last two years and has shown satisfactory performance, given the quality of source water, and that by comparison, the Port Mandurah development should flush at least as well and have at least as good water quality. Reasons presented in the NOI for this are:

- . the proposed Port Mandurah Development is closer to clean oceanic water, and further from Peel Inlet water;
- . the canal designs are oriented for exposure to the main summer wind directions, and are of comparable lengths to the Waterside Mandurah canals, but with a layout which favours internal (wind driven) circulation; and
- . water level fluctuations associated with astronomical and barometric tidal exchange allows Peel Inlet entrance channel waters to penetrate directly far enough into the canal development so that this newly entered water can be further distributed throughout the canals by wind and density driven circulation.

Water quality information associated with the additional residential canal development, previously referred to as the 'Village Centre' in the NOI has indicated that water flushing characteristics would be adequate.

Discussions with officers of the Waterways Commission indicate that the results of the two years monitoring of the Waterside Mandurah development reveal no serious water quality issues to date. Water quality within the canals is also expected to be improved as a result of dredging within the Inlet Channel, which has taken place since the original assessment of the Halls Head project. This is further discussed in Section 5.4.2 of this assessment report.

Conditions of approval for the original Halls Head Waterways proposal by the Authority included a recommendation that details regarding a public boat wastewater pumpout facility, connected to reticulated sewerage, be provided by the proponent before construction. The proponent has agreed to provide a waste water pumpout facility within the development in a location approved by the Town of Mandurah, and in accordance with the requirements of the Water Authority of Western Australia. (Halls Head Waterways commitment 4.2.1, 4.3.4).

RECOMMENDATION 4

The Environmental Protection Authority recommends that, prior to commencement of development, details regarding connection of the proposed public boat wastewater facility to the reticulated sewage system be prepared by the proponent to the satisfaction of the Water Authority of Western Australia.

The Authority concludes that because of the canal system, adequate contingency plants must be prepared to prevent pollution of the canals with sewage in the event of a mechanical failure. As mentioned in Section 2, the proposal will be deep sewered. The proponent has recognised the need for this in the NOI.

RECOMMENDATION 5

The Environmental Protection Authority recommends that, prior to construction commencing, the proponent provide contingency plans for the prevention of pollution of the canals, in the event of a failure of the sewage disposal system, to the satisfaction of the Peel Inlet Management Authority and Water Authority of Western Australia.

The original assessment of the project also included discussion of a hydraulic link between the north west end of the canal system with the Mary Street Lagoon, should flushing prove inadequate. However, this option is now considered inappropriate by the Peel Inlet Management Authority (PIMA) because the water quality within Mary Street Lagoon could be adversely affected as a consequence.

A more efficient solution is considered by PIMA to be a hydraulic link directly to the Peel Inlet entrance Channel via Paul Street. This is considered to be a more favourable option because the distance to the Inlet Channel is shorter, and therefore increases the effectiveness of the link. Water quality within the Inlet Channel is also considered to be of better quality than that contained within Mary Street Lagoon.

Until flushing and water quality levels have been verified by monitoring, provision should be made for such a link to the Inlet Channel via Paul Street. The Authority considers that the proponent should retain a vacant lot near the Paul Street end of the development in the event that the canal flushing mechanism proves to be inadequate. The proponent has agreed to provide this link in the event that monitoring exercises indicate that flushing and water circulation are insufficient for the maintenance of acceptable water quality within the canal system. The proponent has made a commitment to use a dye tracer to quantify water circulation and flushing within the canal development in the proposed Monitoring and Management Programme (Appendix A, NOI). This is supported by the Authority.

RECOMMENDATION 6

The Environmental Protection Authority recommends that prior to construction, the proponent should prepare to the satisfaction of the Waterways Manager contingency plans for the construction of a hydraulic link to the Inlet Channel via Paul Street. The proponent should retain a vacant block in this corner of the development to allow for the installation of the link. If, in the opinion of the Waterways Manager (Town of Mandurah), water quality monitoring results indicate unacceptable water quality in the north section of the canal development, the proponent should implement the plans for the hydraulic link.

Assessment of the original Halls Head Waterways proposal also addressed the requirement of a second channel to be constructed south of the proposed Stage I area. In relation to the current assessment of the Port Mandurah proposal, the Authority also requires a commitment from the proponent that a second entrance channel be constructed south of the proposed development, as required in the original assessment. This should not be dependent on Stage II proceeding.

RECOMMENDATION 7

The Environmental Protection Authority recommends that if in the opinion of the Waterways Manager there is inadequate flushing of the canals, and unacceptable water quality, thereby indicating a need for greater rate of flushing, the proponent should construct a second entrance channel to increase flushing rates in the south east of the canal estate.

Stormwater Disposal

Management of runoff into the canal system should be such as to minimise movement of silt, nutrients and rubbish directly into the waterways.

The NOI proposes to dispose of stormwater through three methods :

- . roof water be directed to standard soak wells and/or leach drains and an overflow connection to street drainage (Port Mandurah commitment 2.5);
- . the front portion of each block would drain directly to the road reserve and thence directed via normal street gullies to the waterway; and
- . remainder of the block would drain onto a porous walkway adjacent to the wall of each lot. Water would be collected in spoon drains and infiltrate through the soil. Solids would be removed via trapping. Traps would be regularly cleaned through normal council maintenance.

The Town of Mandurah has advised the Authority that the front portion of each lot boundary from the front building boundary/set back line to the curb of the road should be graded to direct excess water to the road drainage system.

Both PIMA and the Authority agree that this method of controlling stormwater runoff would significantly reduce the direct discharge of stormwater into the canal system. The proponent's commitment to direct stormwater runoff into soakwells via a porous walkway pavement along the wall frontage of each lot to facilitate water movement to groundwater rather than direct discharge into the canal system is supported.

RECOMMENDATION 8

The Environmental Protection Authority recommends that planning and operation designs for location of refuelling facilities, stormwater drainage and runoff containment be forwarded to the Peel Inlet Management Authority for approval when these are finalised by the proponent and before construction commences.

5.4.2 WATER QUALITY WITHIN THE INLET CHANNEL

In 1985, the Department of Marine and Harbours (DMH) proposed the dredging of the Mandurah Channel. The aim of the proposed works was to improve the navigability of the Mandurah Channel, and to assist in improving the marine flushing in Peel Inlet. Improvement in the flushing of the Peel Inlet was predicted to occur following completion of the dredging of both the Fairbridge Bank/Ocean Entrance and the Sticks Channel sections, from increased flows through the Channel of 24% to 30% (summer) and 10% to 40% (winter). In the long term these dredging works could contribute to a reduction in the growth of the large floating weed in Peel Inlet.

This dredging proposal was undertaken, and a total of 1 180 000 cubic metres of material was dredged from the Channel, using a floating cutter suction type dredge. This work was undertaken between late 1985 to early 1988.

Monitoring undertaken by the DMH since dredging has indicated that water flows through the Inlet Channel have increased more than was originally predicted. This work has improved the quality of water within the Channel, and consequently could be expected to improve the quality of water passing into the proposed canal development.

5.4.3 WATER QUALITY MONITORING

Water quality monitoring programme is similar to that proposed in the original Halls Head Waterways proposal and is detailed in Appendix A of the NOI. This proposes to monitor four sites for a range of water quality parameters including chlorophyll 'a', nutrients including ammonium nitrate, nitrate/nitrite nitrogen, total nitrogen, dissolved orthophosphate and total phosphorus, suspended solids, pH, dissolved oxygen, BOD, temperature, turbidity, faecal coliforms, and suspended solids. Four sites are proposed to be monitored, both upstream and downstream of the canal development in the Inlet Channel, and two sites within the development. A further six sites would also be monitored for a smaller range of parameters.

Sediment sampling in the monitoring programme would include analysis of total phosphorus (P), total nitrogen (N), organic carbon and heavy metals (including tributyl tin). The PIMA has suggested that sediment analysis should also include apatite and non-apatite P, to allow for assessment of the potential release rate of P from sediments. PIMA considers that samples should also be collected from Mandurah Ocean Marina for comparative purposes, which would help to gauge sediment accumulation within the canal development.

The proposed fish monitoring programme would include monthly fish collections at eight sites, two each within the canal system and Inlet Channel and four in Sticks Channel. The Authority considers that this should be undertaken for one year, and be subject to review at the end of that year. Previous fish monitoring studies at the Waterside Mandurah Development on the opposite side of the Inlet indicate that sufficient information would be collected in that time.

RECOMMENDATION 9

The Environmental Protection Authority recommends that the proponent prepare and implement a detailed water quality and sediment monitoring programme to the satisfaction of the Peel Inlet Management Authority before construction commences.

In addition to parameters listed by the proponent in the Notice of Intent, the programme should provide for :

- . monitoring of heavy metal concentrations in the sediments at sites both within and at a control site outside the canal waterways, as described in the Notice of Intent, commencing before the canals are constructed, and continuing for the first five years of the project;
- . monitoring to be carried out for a period of five years initially, then reviewed, with reports on monitoring and management submitted to the Peel Inlet Management Authority on an annual basis; and

reporting after five years on the operation of the canal development, with reference to the monitoring results obtained during the full five year period, including interpretation of the results, recommendations relating to future requirements and with a commitment to amend management in accordance with the monitoring results.

Sediment analysis should include apatite and non-apatite phosphorous and allow for assessment of potential release rate of phosphorous from sediments.

The Environmental Protection Authority further recommends that the monitoring programme also incorporate regular observation of fish movements within the canal waterways. This should be undertaken for one year, and be subject to review at the end of that year.

5.5 CANAL AND CONNECTING CHANNEL WALL DESIGN

As discussed in Section 3.6, the Port Mandurah Waterways proposal will incorporate changes to the canal edge walling, with the bulk of the canal estate containing walls based at a shallow depth rather than full depth walls. The Authority accepts this change, provided that it complies with the Canal Guidelines. (Halls Head Waterways commitment 4.3.2, and Port Mandurah commitment 2.2, 4.2.1, and 4.2.3)

RECOMMENDATION 10

The Environmental Protection Authority recommends that canal wall structures be constructed to the satisfaction of the Waterways Manager, and to achieve at least a 30 year design life, as stated in the Canal Guidelines.

RECOMMENDATION 11

The Environmental Protection Authority recommends that prior to construction the proponent satisfy the Peel Inlet Management Authority that protective structures along the connecting channel between the canal waterways and the Inlet Channel would be expected to have a design life of 100 years.

5.6 PUBLIC OPEN SPACE

The area proposed reserved for public open space (POS) within the canal development, excluding public access ways and the land exchanged for the entrance channel, represents 11% of the development site.

The canal guidelines require 10% of the development to be reserved for POS, excluding major roads, schools, major drainage, canal waterways and foreshore reserves. The POS therefore meets the Canal Guidelines, and is considered satisfactory by PIMA and the Authority.

Public open space should be vested with the Town of Mandurah, and landscaped to the Council's satisfaction.

5.7 CONSTRUCTION IMPACTS

5.7.1 NOISE

Following discussion with officers of the Pollution Control Division of the Environmental Protection Authority, the proponent commissioned a study of constructional noise impacts expected as a result of the proposed development taking place.

This report concluded that noise associated with construction activity is expected to vary between 59 to 67 dB(A). These levels exceed the maximum noise level recommendations contained within the 'Procedure for Assessing the Noise Effect of Proposed New Developments on Existing or Proposed Noise Sensitive Developments', as prepared for the Noise and Vibration Control Council. This document specifies a 45 dB maximum. The Authority's former Recommendation 23 in relation to noise levels therefore no longer applies to the current Port Mandurah proposal.

The Authority recognises that construction work on site associated with this proposal would be very likely to result in noise emissions that are unacceptable to some nearby residents. There are limited steps which can be taken to reduce these noise levels, given the nature of the proposed development area. However, every possible effort should be made by the proponent to reduce construction noise levels. In particular, hours of operation should be confined to between 7.00 am and 7.00 pm.

RECOMMENDATION 12

The Environmental Protection Authority recommends that prior to construction commencing, the proponent prepare a programme to minimise noise emissions as a result of construction activities to the satisfaction of the Environmental Protection Authority, following advice from the Town of Mandurah.

5.7.2 DUST

The Authority has noted the proponent's commitment to control dust associated with development and construction at the project site. (Port Mandurah commitment 2.6, 9.1.2).

The Authority considers that consideration should also be given to rehabilitation and stabilisation of areas designated as public open space, conservation, recreation, and street verges following completion of earthworks associated with the proposal.

RECOMMENDATION 13

The Environmental Protection Authority recommends that the proponent implement appropriate methods to minimise dust levels and stabilise soils during and after earth moving operations associated with the proposed development to the satisfaction of the Environmental Protection Authority.

The Environmental Protection Authority also recommends that the proponent undertake rehabilitation and stabilisation of areas designated as public open space, public recreation and street verges following completion of earthworks to the satisfaction of the Town of Mandurah.

5.8 OTHER ISSUES

As identified in the previous assessment report, the soil sampling reported for soils in the project area, documented in the Halls Head Waterways ERMP, was based on a very large grid and would not have identified or quantified local variation or the soils in the old river meander and the samphire marsh area (EPA 1982:24). These two areas may contain soils with characteristics which are unsuitable for fill. The Authority considers that before construction approvals are issued, the proponent carry out more detailed field testing of soil conditions to identify soil types and engineering suitability for fill purposes. This has been acknowledged by the proponent in the NOI.

The EPA recommends that the proponent document options for disposal of soil unsuitable for residential land fill.

RECOMMENDATION 14

The Environmental Protection Authority recommends that the proponent be required to document options for disposal of spoil unsuitable for residential landfill, to the satisfaction of the Waterways Manager and the Town of Mandurah prior to construction commencing.

It would be necessary for the proponent to gain approvals and, in some instances, licences for the following works associated with the Port Mandurah proposal, prior to construction.

- . Boat launching areas. The proponent has informed the Authority that there will be no public boat launching facilities. If this situation changes, approval must be sought from PIMA and the Town of Mandurah.
- . Disturbance to the bed, banks and foreshore of the Inlet. Approval must be sought from PIMA and the Town of Mandurah.
- . Any dredging and digging of the bed of the Inlet Channel below high water mark. Approval must be sought from PIMA and the Town of Mandurah.
- . Any drain discharge directly or indirectly into the waterway. Approval must be sought from PIMA, the Town of Mandurah, and the Water Authority of Western Australia (WAWA).
- . Any digging or excavation with the intention of causing any of the waters to be diverted. Approval must be sought from PIMA and WAWA.
- . Construction of groynes, breakwaters or structures which would impede or alter the flow of water. Approval must be sought from PIMA and the Department of Marine and Harbours (DMH).
- . Construction of private boat ramps, retaining walls, dredging, and associated spoil disposal. Approval must be sought from PIMA and DMH.
- . Jetties. These would require the approval of DMH and PIMA. If any portion of the land currently included in Stage 1 of the proposal as described in the NOI is intended to be developed by anyone else other than Esplanade (Mandurah) Pty Ltd, then appropriate recommendations contained within this assessment report should apply.

6. MANAGEMENT

6.1 MANAGEMENT OF THE PROJECT AREA

The Authority considers that an appropriate management area should be determined and agreed upon by all agencies involved as part of the overall management programme. This is considered important to ensure that floodways and foreshore areas are adequately protected during the construction phase of both the canals, and buildings. The management plan should include discussion of aspects such as spoil management and vehicle areas to the site. The proponent has acknowledged the need for this in the NOI and has included a draft management plan within the NOI (Appendix A).

RECOMMENDATION 15

The Environmental Protection Authority recommends that, prior to commencement of the project the proponent develop a management plan which protects the floodways and foreshore areas from any adverse effects during the development of the project to the satisfaction of the Waterways Manager, the Peel Inlet Management Authority, and the Department of Marine and Harbours.

The Authority considers an important part of the management programme is agreement between the proponent and the Waterway Manager on the transfer of responsibility of the estate from the proponent to the Waterway Manager. At the time of the hand over, the estate should be shown to be functioning well and capable of meeting management costs. The proponent has also acknowledged the need for this agreement in the NOI.

RECOMMENDATION 16

The Environmental Protection Authority recommends that the proponent reach an agreement with the Waterways Manager (Town of Mandurah) as to the time, or performance level at which responsibility for all or parts of the project are handed over to it.

6.2 MANAGEMENT OF THE CANALS AND CONNECTING CHANNEL

In the original assessment of the Halls Head Waterways Project, the Authority was advised of the need for a survey of the canals and connecting channel on completion of the connecting channel construction to provide baseline data against which results from future monitoring could be compared.

The proponent has acknowledged the need for on-going monitoring of canal and connecting channel depth, and canal wall stability in the proposed Monitoring and Management Programme in Appendix A of the NOI.

The Authority recommends that an additional survey line be added to the monitoring programme, to monitor canal bank stability (with technical advice from the Department of Marine and Harbours) to the satisfaction of the Town of Mandurah.

A hydrographic survey of the canals and connecting channel should be completed within one month of the canal construction, and continue annually for five years. This survey should include in situ profiles. A commitment to maintenance dredging should also be included, to ensure profiles are kept to within 500 mm in height of design profiles, and are maintained at a navigatable depth. Results of these surveys and maintenance dredging works should be incorporated in the annual monitoring report to PIMA, the Waterways Manager, and the Environmental Protection Authority, as referred to in Recommendation 8.

RECOMMENDATION 17

The Environmental Protection Authority recommends that the proponent conduct a survey of the depth of the canals and connecting channel, and the associated natural waterway to the satisfaction of the Peel Inlet Management Authority within one month of the canal construction, and continuing annually for five years.

The proponent should also provide for maintenance dredging of the canals and connecting channel from the Inlet Channel to the canal waterways to the satisfaction of the Peel Inlet Management Authority and the Waterways Manager. Results of the surveys and maintenance dredging works should be incorporated in the annual monitoring report to the Peel Inlet Management Authority, the Waterways Manager, and the Environmental Protection Authority, as referred to in Recommendation 8.

6.3 MANAGEMENT OF THE ADJACENT INLET CHANNEL

The management and maintenance of the project area should include sections of the adjacent Inlet Channel which the project will have an impact on, in particular in terms of maintenance dredging. This has been acknowledged by the proponent in the proposed Monitoring and Management Programme (also Halls Head Waterways commitment 2.6 and Port Mandurah commitment 6.3.2 and 6.3.5).

RECOMMENDATION 18

The Environmental Protection Authority recommends that the management area for the project should include sections of the adjacent Inlet channel that in the opinion of the Department of Marine and Harbours and the Peel Inlet Management Authority may be affected by the existence of the project.

7. CONCLUSION

The Authority is of the view that this proposal is essentially consistent with the original proposal, and considers that changes are improvements in comparison to the 1981 proposal. As with the Halls Head Waterways proposal, the Authority concludes that the project as described in the NOI to be environmentally acceptable, subject to commitments made in Annexure 1 the Port Mandurah NOI, plus recommendations contained within this assessment report.

In assessing the proposal the Authority was cognizant of the Minister for Environment's Conditions set as a consequence of the Peel Harvey Stage II environmental assessment. In this regard, the Authority has concluded that this proposal is consistent with those Ministerial conditions.

RECOMMENDATION 19

The Environmental Protection Authority recommends that if any portion of the land included in Stage 1 of the Port Mandurah Development is intended to be developed by anyone else other than Esplanade (Mandurah) Pty Ltd, appropriate recommendations made by the Environmental Protection Authority in this Assessment Report should apply.

Development of future stages of the site should be referred to the Authority for comment prior to commencement of development.

8. REFERENCES

Department of Conservation and Environment (1982 a), Report and Recommendations of the Environmental Protection Authority - Halls Head Waterways Project, Parrys (Esplanade) Pty Ltd. Bulletin 129.

Department of Conservation and Environment (1982 b), The Peel - Harvey Estuary Study. Bulletin 118.

Esplanade (Mandurah) Pty. Ltd. (February 1989), Port Mandurah Development - Notice of Intent.

Fielman Planning Consultants (December 1981), Halls Head Waterways - Environmental Review and Management Programme Vols. I and II, for Parrys (Esplanade) Pty. Ltd.

Waterways Commission (1981), Steering Committee on Canal Developments. Recommendations for the development of canal estates (prepared for the State Government).

ORIGINAL ENVIRONMENTAL PROTECTION AUTHORITY RECOMMENDATIONS FOR
FORMER HALLS HEAD WATERWAYS ASSESSMENT (1982)

1. Prior to the land being zoned for canal development the Peel Inlet Management Authority should be appointed as the manager for the artificial waterways.
2. Approval to the development concept proposed in the ERMP should be granted. Development should be on a stage by stage basis with comprehensive environmental monitoring being undertaken to adequately assess the operation and impact of each stage. Approval to develop the next stage or stages should only be granted on the basis that the earlier stage is operating satisfactorily and that data is available to show that the next stage will be acceptable in environmental terms.
3. Prior to subdivision approval being granted, the proponent should provide an undertaking that if in the opinion of the Waterway Manager (PIMA) there is inadequate flushing of the estate and unacceptable water quality and there is demonstrated need to bring forward the construction time of the through canal, he will do so.
4. Prior to subdivision approval being granted, the proponent should provide a firm undertaking that modifications to the proposal or staging will be carried out in the light of monitoring results from the preceding stage or stages and the predictions made on the operation of the next stage.
5. The proponent should provide additional information to PIMA and PWD on the proposal to hydraulically link the project with the Mary Street Lagoon including the likely impact of such action. This aspect should be resolved prior to approval being granted for the north western stage of the project. Should approval for the connection not be forthcoming, then some other form of improved flushing for this stage should be found.
6. As planning proceeds, the proponent should provide further details on engineering structures, canals, connecting channels, and beaches to PWD, Shire of Mandurah and the Waterway Manager (PIMA). The design of these facilities should have due regard to the recommendations of the Steering Committee on Canal Developments.
7. Wall structures should be constructed so as to achieve at least a 30 year design life, as advocated by the Steering Committee on Canal Developments.
8. As part of the detailed engineering design associated with the connecting channels, their width and orientation to the Inlet Channel should be reviewed to ensure that maximum and most efficient exchange of water occurs. This matter can be resolved between the proponent, PWD and the Waterway Manager (PIMA) as planning proceeds.
9. The proponent should provide information to the PWD to indicate that a design life of 100 years would be reasonable expectation for the protective structures along connecting channels.

10. On completion of dredging of a connecting channel, a survey of the channel and the associated natural waterway should be carried out at the proponent's expense and in accordance with PWD and PIMA requirements.
11. The proponent should provide a firm proposal for the maintenance dredging of the northern connecting channel, to the satisfaction of the Waterway Manager (PIMA).
12. As planning proceeds, the proponent should provide contingency plans for the prevention of pollution of the canals, in the event of a failure of the sewage disposal system. These plans should be to the satisfaction of the Peel Inlet Management Authority.
13. As planning proceeds the proponent should provide further engineering and management details of the proposed stormwater disposal systems to satisfy the requirements of Shire of Mandurah, and the Peel Inlet Management Authority.
14. The proponent should be required to document options for disposal of spoil unsuitable for residential landfill.
15. The conservation areas proposed should not be included within any canal zone and should be transferred to the Crown prior to or as a condition of subdivision for the creation of the first stage of the project.
16. The areas for 'Conservation of Flora and Fauna' should be vested in the WA Wildlife Authority. Management of these areas should accept the need for possible future channel widening options as may be required to increase water exchange between Peel-Harvey Estuary and the Ocean. Some limited public access to the conservation areas should be considered as part of their management.
17. The proponent should provide additional information to show that the 'soft edges' proposed as foreshores of the conservation areas will be stable and not require excessive management. This information should be provided to the Waterway Manager (PIMA).
18. A programme of monitoring should include regular observation of fish movements. Redesign of the canal waterway to complete a through canal should be considered as a means of minimising disturbance to fish movements.
19. The proposed foreshore area along the Inlet Channel south of the traffic bridge should be increased to compensate for the loss of foreshore area brought about by the construction of the northern and southern connecting channels.
20. Additional foreshore areas should be provided between the existing bridge and the northern shore of the southern connecting channel to allow for adequate public access, recreation and floodway. Vesting of these areas should include the purpose of River Management.
21. The foreshore areas, as ultimately agreed upon, should not be zoned for canal development when zoning occurs and their transfer to the Crown should take place prior to, or as a condition of final approval to the first stage of the project. Prior to subdivisional approval being

- issued, the proponent should prepare a management programme for the foreshore areas acceptable to the Waterway Manager (PIMA). These plans should be implemented as a condition of approval.
22. The Authority endorses the recommendation of the Steering Committee on Canal Developments that appropriate amendment should be made to the Town Planning and Development Act to allow for transfer, free of cost, of canal waterways to the Crown.
 23. Before construction commences, the proponent should discuss with the Shire of Mandurah the question of noise levels and hours of operation, and he should follow the 'Procedure for Assessing the Noise Effect of Proposed New Developments on Existing or Proposed Noise Sensitive Developments' as prepared for the 'Noise and Vibration Control Council'.
 24. The proponent should liaise with the Commissioner for Soil Conservation on appropriate methods to minimise dust levels and stabilise soils during and after earthmoving operations.
 25. The proponent include in the management programme, suitable provisions to protect the conservation areas, floodways and foreshore areas from any adverse effects during the development of the estate. Agreement to this aspect of the plant should be obtained from the Waterway Manager (PIMA).
 26. Detailed planning for Stage 1 of the project should include provision for a boat waste water pump - out facility connected directly to the reticulated sewage system.
 27. Prior to subdivision or construction approvals being granted to the project, the boundary of the Management Area of the Peel Inlet Management Authority should be extended to include the whole of the project site.
 28. The appointment of the Waterway Manager would need to consider the manner by which funds for management will be raised and the adequacy of resources available to the manager to carry out its responsibilities.
 29. The proponent should develop a management plan which satisfies the Peel Inlet Management Authority.
 30. The management area for the project should include sections of the adjacent Inlet Channel that in the opinion of PWD and PIMA may be affected by the existence of the project. The management area will need to be defined as the management plan is defined.
 31. The proponent should reach an agreement with the Waterway Manager (PIMA) as to a time, or performance level at which the responsibility for all or parts of the project are handed over to the Waterway Manager. This agreement should be reached prior to subdivisional approval being issued.
 32. The proponent should develop a monitoring plan which satisfies the Peel Inlet Management Authority.

33. The proponent should provide guarantees in a form acceptable to Government for remedial works which may be required as a result of failure of the project to achieve the standards required by the Waterway Manager (PIMA).

AGREEMENT BETWEEN SHIRE OF MANDURAH AND ESPLANADE
(MANDURAH) PTY LTD - FOR ORIGINAL HALLS HEAD
WATERWAYS PROJECT

PERPETUAL TRUSTEES W.A. LIMITED

and

ESPLANADE (MANDURAH) PTY LTD

("the Developer")

and

SHIRE OF MANDURAH

("the Shire")

D E E D

REF: SS

SHIRE OF MANDURAH	
Acknowledge	File <u>A/</u>
Answered	
Copies To:	
RECEIVED -7 JAN 1986	
Council Meeting	_____
Committee Meeting	_____
Officer Action	_____
Report to Dept	_____

EXEMPT

(SECTION 119 STAMP ACT.)

For COMMISSIONER OF STATE TAXATION

WESTERN AUSTRALIA STAMP DUTY

16 JAN 86 2024 1383 NDP \$0.00

THIS DEED is made the 16th day of January 1986.

BETWEEN:-

PERPETUAL TRUSTEES W.A. LIMITED in its capacity as trustee of the S.B. Investment Trust of 89 St Georges Terrace, Perth in the State of Western Australia, and ESPLANADE (MANDURAH) PTY LTD of 155 Havelock Street, West Perth, in the State of Western Australia ("the Developer"); and

SHIRE OF MANDURAH of Mandurah Terrace, Mandurah, in the State of Western Australia, ("the Shire") of the second part.

RECITALS:

A. The Developer is registered as the proprietor of the Land which is situated in the area subject to the Scheme.

B. The Developer has made application to the Shire and the Town Planning Board for approval to "the Project".

C. The Shire has effected certain amendments to the Scheme as appeared in Western Australian Government Gazette on the 17th day of May 1985 enabling the Project to proceed to the subdivision and development stage

D. It is a requirement of the Minister that this Deed be entered into and the Town Planning Board has requested the parties hereto to enter into this Deed.

OPERATIVE PART:

1. Interpretation

1.1. In this Deed unless inconsistent with the context or subject matter the following terms have the following meanings respectively:

"Bank Guarantee" - any bank guarantee which the Developer is required by virtue of the provisions of this Deed to secure in favour of the Shire;

"Bank Guarantee Review Date" - each consecutive date of review referred to in Clause 7 while a Bank Guarantee remains in effect;

"Canals" - the canals more particularly delineated and shown on the Concept Development Plan;

"Commission" - the Waterways Commission a body corporate constituted by the Waterways Conservation Act 1976 and includes its successors;

"Concept Development Plan" - the concept Development Plan relating to the Amendment No. 3 of the Scheme, a copy of which is annexed to this Deed;

"Consumer Prices Index" - the Consumer Prices Index (All Groups) for the City of Perth as calculated and published by the Australian Bureau of Statistics or, if that Index is discontinued means the nearest equivalent statistics compiled by that Bureau or other government department;

"Culverts" - the structures permitting water flow beneath the roads connecting to each of the islands more particularly delineated and shown on the Concept Development Plan;

"Date of Handover" - the date referred to in Clause 10;

"Date of Practical Completion of the Canals" - the date upon which the Canals, Canal walls, the Culverts and the Entrance Channel to Stage 1 of the Project are complete in accordance with the Specification and Drawings, as verified by the Shire and the Canals are permanently connected to the Mandurah Estuary and flooded;

"days", "months", "years" - calendar days, months and years respectively;

"Entrance Channel" - the channel connecting the Canals with the Mandurah Estuary more particularly delineated and shown on the Concept Development Plan;

"EPA" - the Environmental Protection Authority of Western Australia;

"EPA Bulletin 129" - the report and recommendations by the EPA in respect of the Project dated December 1982;

"Land" - the land described in the Schedule;

"Mandurah Estuary" - the Main Channel connecting the Peel Inlet to the Indian Ocean more particularly delineated and shown on the Concept Development Plan;

"Periods of Undertaking" - the various periods between the Date of Practical Completion and the Date of Handover of any part of Stage 1 of the Project;

"Project" - the subdivision and development of the Land as a residential canal estate known as "Port Mandurah";

"Scheme" - the Shire of Mandurah Town Planning Scheme No.1A and all amendments to that Scheme made before and after the date of this Deed;

"Single Allotment" - a residential subdivided lot;

"Specifications and Drawings" - those specifications and drawings relating to the Project approved by the Shire.

"Stage 1 of the Project" - the area of the Land shown on the Plan annexed hereto and marked Annexure "B". Port Mandurah Project Boundary of Stage 1.

"Subdivided Lots" - the residential allotments more particularly delineated and shown on the Concept Development Plan or detailed drawings submitted to the Town Planning Board for approval to subdivide;

"Town Planning Board" - the Town Planning Board of Western Australia;

"Water Quality Test" - the test procedures laid down in Annexure "A" attached hereto.

1.2. Subject to Clause 13, the terms "the Developer" and "the Shire" include their respective successors in title, transferees and assigns.

1.3. Reference to a statute includes all amendments for the time being in force and any other statute enacted in substitution for and the regulations, by-laws or other orders for the time being made under that statute.

1.4. Headings shall not affect the interpretation of this Deed.

1.5. A power, authority, right of discretion conferred by this Deed may be exercised from time to time as occasion requires.

2. Planning Consent

2.1. The Developer shall submit to the Shire an application for the Shire's planning consent under the Scheme in respect of Stage 1 of the Project together with detailed plans and specifications showing all works to be carried out in that stage including, without limiting the generality of the foregoing, all canals, culverts, wall structures, road, drainage, and profiles of canals and culverts and shall not carry out or commence to carry out the Project or any part thereof until the planning consent of the Shire under the Scheme has been granted and the Shire has approved the plans and specifications.

2.2. In carrying out the Project and each stage thereof and all works in connection therewith respectively the Developer shall comply with and observe -

- (a) the provisions and requirements of the Scheme, the Local Government Act 1960, the Health Act 1911, the Waterways Conservation Act 1976 and all other relevant statutes, regulations, by-laws and orders;
- (b) all conditions imposed by the Shire in granting its planning consent prior to the Date of Practical Completion except to the extent that any condition imposes continuing obligations.

3. Canal Water Quality

- 3.1. If at any time before the Date of Handover the Water Quality Test indicates that a deterioration in the quality of water in the Canals has occurred or is likely to occur so that the quality of water in the Canals is or is likely to be significantly less than that existing in the Mandurah Estuary in the vicinity of the Canals, but at points beyond the significant influence of the Canals selected by the Shire, and in the opinion of the Shire, remedial action is or may be necessary, then within seven (7) days of the receipt of written notice from the Shire of that opinion the Developer will initiate a study to determine the cause of the deterioration in water quality and within thirty (30) days of receipt of the written notice submit a written report to the Shire outlining the cause or causes of deterioration in water quality and a recommended course of action to improve the quality of water in the Canals. If following consideration of this report the Shire considers action is needed to improve the water quality in the Canals then within seven (7) days of receiving written notice from the Shire specifying the works required the Developer shall commence to carry out the works specified in the notice and shall complete these works within a reasonable period of time specified in the notice.

- 3.2. If the works or other action referred to in Clause 3.1 do not improve the water quality in the Canals to the levels specified in the Management and Monitoring Programme the Shire may by a further notice in writing to the Developer require the Developer within the period stipulated in that notice (not being less than thirty (30) days after the receipt by the Developer of that notice) commence to construct a through canal beneath the Bypass Road shown on the Concept Development Plan connection with the Mandurah Estuary at the location specified in the notice and the Developer shall comply with and observe the requirements of the notice within the period stipulated in it.
- 3.3. The Developer shall prior to seeking clearances of survey documents for Stage 1 of the Project lodge with the Shire a Bank Guarantee in favour of the Shire to secure the due and punctual performance and observances by the Developer of the obligations contained in Clauses 3.1 and 3.2 and the Bank Guarantee shall be for an amount of TWO HUNDRED THOUSAND DOLLARS (\$200,000.00) subject to the provisions of Clause 7 hereof.
4. Canals Entrance Channel and Mandurah Estuary Remedial Works
- 4.1. The Developer shall carry out any remedial works which are required as a result of the works varying from the Specifications and Drawings. Without limiting the generality of the foregoing the remedial works include the works referred to in Clauses 4.2 to 4.4.
- 4.2. The Developer shall within one (1) month of the Date of Practical Completion of the Canals and thereafter annually until the Date of Handover cause the Canals and Entrance Channel to be hydrographically surveyed to obtain the in situ profiles and shall

carry out such maintenance and dredging within the Canals and Entrance channel during that period as is necessary to ensure that profiles are kept to within five hundred (500) millimetres in height of the design profiles as shown on the Specifications and Drawings.

- 4.3. If at any time before the Date of Handover the Shire is of the opinion that the Project has caused an undesirable impact on sediment transport within the Mandurah Estuary which can be reasonably considered to have been caused by or to be attributable to the Project or any stage of it or the construction of the Project or any stage of it the Developer shall within seven (7) days of the date of receipt of written notice from the Shire of its opinion in that behalf initiate a study to determine the cause of the undesirable impact on sediment transport within the Mandurah Estuary and within thirty (30) days of receipt of the written notice submit a written report to the Shire outlining the cause or causes of any undesirable impact on sediment transport within the Mandurah Estuary caused in the manner mentioned above and a recommended course of action to improve the quality of the same. If following consideration of the report mentioned in this clause the Shire considers action is needed to improve the sediment transport within the Mandurah Estuary where it has been considered to have been affected by or attributable to the Project or any stage of it or the construction of the Project or any stage of it then within seven (7) days of receiving written notice from the Shire the Developer shall commence to carry out the works specified in the notice and shall complete the same within a reasonable period of time specified in the notice.

4.4. The Developer shall repair or cause to be repaired all Canal wall structures and Culverts to a standard commensurate with the Specifications and Drawings until the Date of Handover but nothing contained in this sub-clause obliges the Developer to undertake any repairs to Canal wall structures or Culverts which are directly attributable to Lot owners, boat owners, vandals or any other person or corporation not being an employee, agent, contractor or sub-contractor of the Developer and which cannot be directly attributed to any fault in workmanship or design of the walls or culverts.

4.5. The Developer shall prior to seeking clearances of survey documents for Stage 1 of the Project lodge with the Shire a Bank Guarantee in favour of the Shire to secure the due and punctual performance and observance by the developer of the obligations contained in Clauses 4.2, 4.3 and 4.4 and the Bank Guarantee shall be for an amount of FOUR HUNDRED THOUSAND DOLLARS (\$400,000.00) subject to the provisions of Clause 7 hereof.

5. Monitoring and Management Programme

The Developer shall prepare and implement a monitoring and management programme approved by and to the satisfaction of the Shire until the Date of Handover.

6. Public Open Space and Foreshore Reserve

The Developer hereby covenants and agrees with the Shire that it shall at such time or times as required by the Town Planning Board give up free of cost to the Crown those public open space, and foreshore reserve areas as are specified on the Concept Development Plan or areas of similar size in substitution therefor as may be agreed between the parties and the Town Planning Board but otherwise in accordance with the

conditions of subdivision approval by the Town Planning Board but the Developer shall have unhindered access to public open space and foreshore reserve areas during all phases of construction.

7. Escalation of Bank Guarantees

7.1. The amount of each Bank Guarantee referred to in this Deed shall be reviewed as at each consecutive date on which the Consumer Prices Index is published after the date of this Deed and shall be increased or decreased, annually, by a percentage equal to the percentage increase or decrease of those Indices.

7.2. The Developer shall within fourteen (14) days after the date of increase or decrease cause the amount of each Bank Guarantee to be increased or decreased in accordance with the provisions of Clause 7.1

8. Recommendations of the Environmental Protection Authority

The parties hereto mutually acknowledge and agree that they have fully acquainted themselves with the provisions of EPA Bulletin 129 and the recommendations numbered 1 to 33 inclusive therein and therefore mutually agree and declare as follows:

8.1. Recommendations 1, 2, 3, 4, 8, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 31, 32, and 33 of EPA Bulletin 129 are hereby excluded from the provisions of this Deed on the basis that those recommendations are now no longer of any further use or capable of implementation or alternatively are already provided for in the provisions of this Deed and the undertakings of the Developer herein contained.

8.2. Recommendations 5, 6, 7, 9, 12, 13, 14, 18, 23, 24, 25, 26, 29 and 30 of EPA Bulletin 129 are acceptable to the parties hereto and each of them shall as required or implied by such recommendations implement the same with the following modifications:-

- (a) All reference to "the Waterways Manager (PIMA)" shall be read and construed as a reference to the Shire;
- (b) All references to "PWD" shall be read and construed as a reference to the Department of Marine and Harbours.

9. Observance by the Developer of the Recommendations Contained in EPA Bulletin 129

The Developer hereby covenants and agrees with the Shire that insofar as any of the recommendations of EPA Bulletin 129 hereinbefore acknowledged and agreed to by the Developer require the Developer to carry out and perform various obligations and duties the Developer shall carry out those recommendations in a prompt and efficient manner but in no case later than the Date of Handover.

10. The Date of Handover

10.1. The Date of Handover is the date being five (5) years after Date of Practical Completion of the Canals.

10.2. On and after the Date of Handover the Developer is under no further liability under this Deed in respect of Stage 1 of the Project.

10.3. Nothing in Clause 10.2 relieves the Developer from any liability for or in respect of any default under this Deed committed by it before the Date of Handover.

11. Default

11.1. Subject to Clause 11.4 if the Developer makes default in the performance or observance of any of its obligations or duties under this Deed and the default is not remedied within thirty (30) days after the service on the Developer of written notice given by the Shire specifying the default complained of and requiring the same to be rectified, the Shire may (without prejudice to its

other remedies in respect of the default) enter on the Land or any part thereof by its employees, agents or contractors with or without motor vehicles, engines, machinery and plant and carry out, execute or do any works, matters or things which in the opinion of the Shire are necessary to remedy the default without being liable for or in respect of minor damage.

11.2. The amount payable under the Bank Guarantee applicable to the obligation or duty in respect of which default has been made or so much thereof as is necessary for the purpose shall be paid to the Shire to reimburse it all costs and expenses paid or incurred by it in the exercise or attempted exercise of the powers conferred by Clause 11.1.

11.3. If the Shire exercises its powers under Clause 11.1 the Shire shall if required by the Developer by notice in writing provide written details of the amounts expended by the Shire in doing so.

11.4. Notwithstanding the provisions of Clause 11.1 hereof the Developer shall be given a reasonable extension of time to remedy any default where the Developer is unable to remedy any default due to a delay or delays caused by strikes, lockouts, civil commotion, shortage of materials, an Act of God or any other matter beyond the reasonable and practicable control of the Developer and the Shire shall not be entitled to exercise any of its rights or remedies set forth in Clause 11.1 until the expiration of such time.

12. Arbitration

12.1. If any dispute or difference concerning the provisions of this Deed or the obligations of a party hereunder arises between any of the parties hereto, one or more parties may give to the other or

others of them (as the case may be) notice in writing thereof and at the expiration of twenty eight (28) days from the date of service of the notice, unless it has been otherwise settled, the dispute or difference shall be submitted to the Minister for Planning as arbitrator.

12.2. Any award made in an arbitration proceeding is final and binding on the parties to this Deed and none of the parties is entitled to commence or maintain an action on a dispute or difference until it has been referred or determined as hereinbefore provided and then only for the amount of relief to which the arbitrator, by his award finds that party entitled.

12.3. The costs of the submission reference and award shall be in the discretion of the arbitrator.

13. Assignment of the Developer's Interest in the Land

13.1. The Developer hereby covenants and agrees with the Shire that until the Date of Handover the Developer will not sell, transfer, demise, mortgage, or part with possession of that part of the Land comprised in Stage 1 of the Project and the Land required for the through canal referred to in Clause 3.2 or any part thereof or interest therein respectively unless the Developer first procures from the purchaser, transferee, lessee, mortgagee or other person entitled to the possession thereof (but in the case of a mortgagee to become effective only in the event of his entering into possession under his mortgage or exercising his other powers and remedies thereunder) a Deed of Covenant with the Shire (in a form approved by it or its solicitors) to observe and perform the terms and conditions of this Deed (including this Clause) as if named as a party herein and the Deed of Covenant shall contain a further