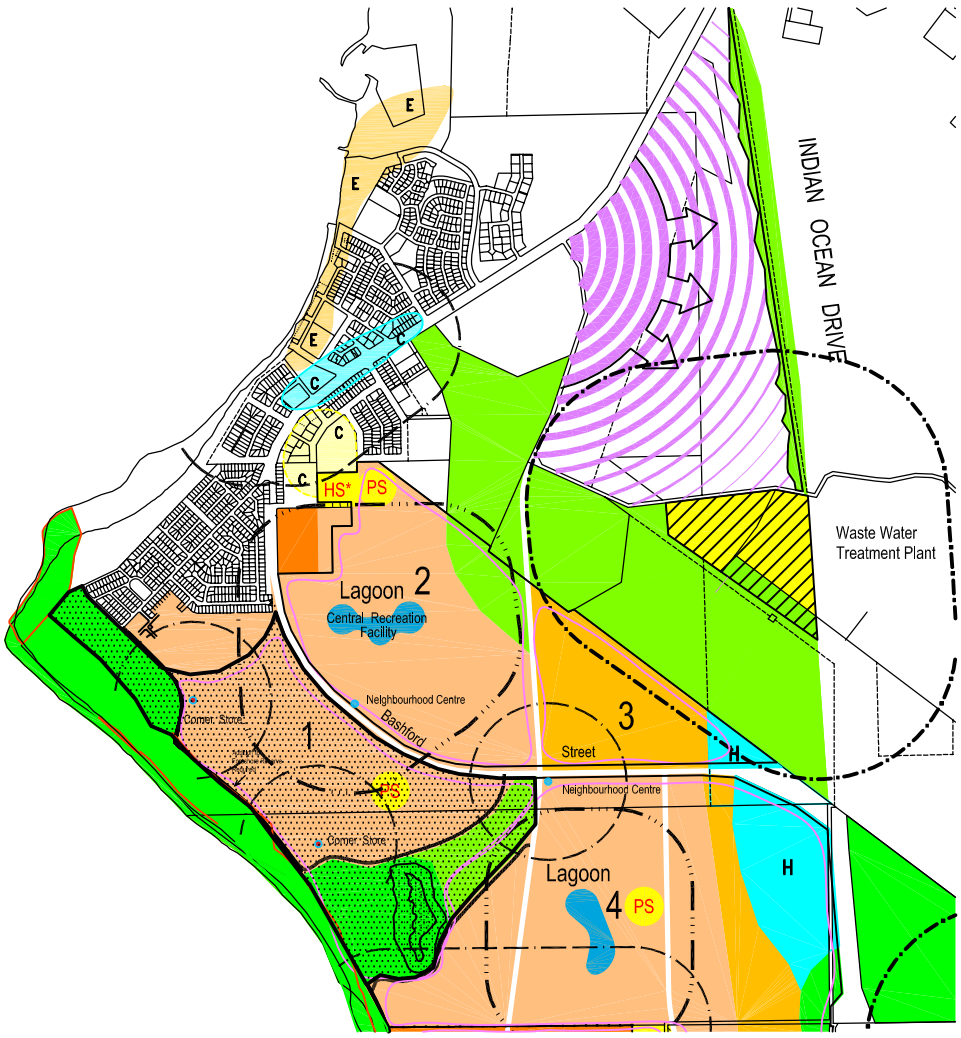
TURQUOISE COAST DEVELOPMENT

JURIEN BAY

Draft Development Plan 1
Draft Coastal Foreshore & Beach Ridge Management Plan
Draft Wetland Management Plan
Draft Detailed Site Plan

for ARDROSS ESTATES PTY LTD

OCTOBER 2004



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DRAFT
DEVELOPMENT PLAN 1

TURQUOISE COAST DEVELOPMENT - JURIEN BAY

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ENDORSEMENT

This structure plan is prepared under the provisions of the Shire of Dandaragan Town Planning Scheme No. 6

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

2004

In accordance with Schedule 2, Part 4, Clause 28 (2) and refer to Part 1, 2. (b) of the *Planning and Development (Local Planning Schemes) Regulations 2015*.

Date of Expiry: **19 OCTOBER 2028**

Table of Contents

1. Introduction 1

2. Background 1

Table 1 3

3. Context Analysis 5

4. Site Analysis 7

Table 2 10

5. Design Proposals 11

6. Community Design 11

7. Movement Network 12

8. Lot Layout 14

9. Public Parkland 14

10. Urban Water Management 15

11. Utilities 16

12. Zoning And Residential Density 18

12.1 Residential 18

12.2 Tourist 20

12.3 Community 20

12.4 Recreation 21

1. INTRODUCTION

This Development Plan and Detailed Site Plan apply to land adjacent to the south-western shore of Island Point at Jurien Bay. The locality is identified as Development Area 1 of the recently approved Turquoise Coast Development, Jurien Bay Structure Plan dated November 2003. **Figure 1** is a copy of the Structure Plan locating the Development Plan area.

The Development Plan and Detailed Site Plan have been prepared in accordance with Appendix 7 of the Shire of Dandaragan Town Planning Scheme No. 6. To this extent, the land is zoned "Special Development" under the Scheme and the Development Plan overlays a more detailed local zoning and density pattern, on the base zoning, providing the context and rationale for the land use proposals. Flexibility is inherent in the Development Plan in accordance with paragraph 5 (17) of Appendix 7.

The Detailed Site Plan is proposed to guide the built form on individual lots created within the Development Plan area. Guidelines contained within the Detailed Site Plan supplement the Residential Design Codes and establish Special Policies in relation to landscaping and sustainability principles, particularly with respect to water use and management.

2. BACKGROUND

Part 5 of Appendix 7 of the Shire's Town Planning Scheme No 6 establishes the statutory background for the preparation and implementation of the Development Plan. In particular, the Development Plan is to deal with the following:

(a) the definition of zones in accordance with the range of zones set out in the Scheme:

(b) proposed residential densities within zones where residential use is permissible;

(c) proposed transportation systems; road layout and vehicular traffic, cycle, and pedestrian networks; underpass locations; and public transport routes;

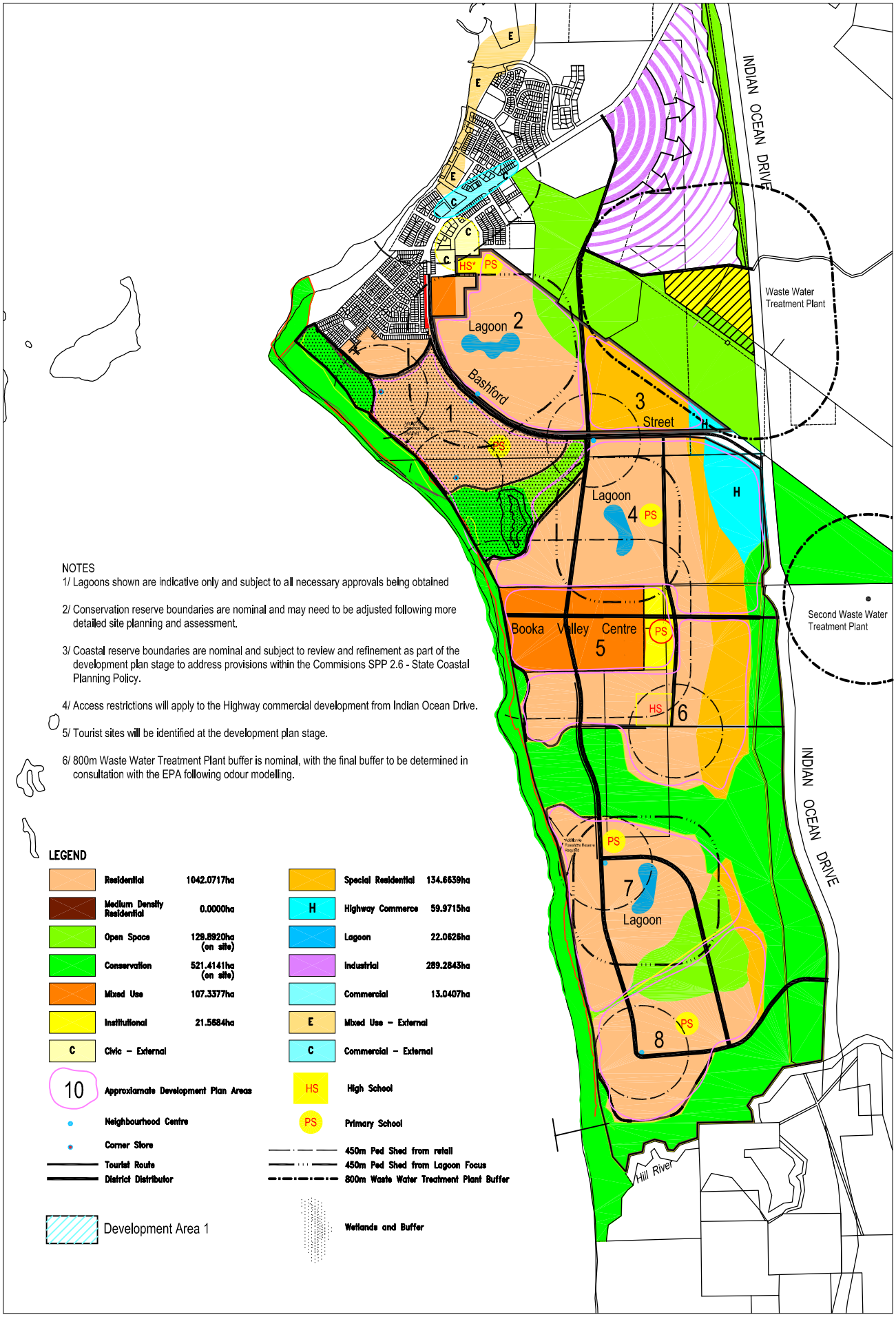

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FIGURE 1

STRUCTURE PLAN SHOWING DEVELOPMENT PLAN AREA

(d) provision for major land uses including residential, shopping, resorts, commercial, office, educational, civic, employment centre, open space, recreational, waterways and community facilities:

(e) indicative lot pattern and general location of any major building, and

(f) the integration of land use and development.

In addition to the scheme provisions, the landowners, Ardross Estates Pty Ltd have entered a Memorandum of Understanding (MOU) with the Council and the Western Australian Planning Commission (WAPC). The MOU is more particularly relevant to the Structure Plan but also has general application to the Development Plan. One aspect of the MOU which does directly affect the proposals of the Development Plan is the requirement for a variety of lot sizes and housing choice.

The Turquoise Coast site at Jurien Bay was referred to the Environmental Protection Authority (EPA) for advice under Section 16(j) of the Environmental Protection Act leading to the publication of a report for public comment. Various supplementary studies were completed resulting in the EPA releasing Bulletin 1031 in October 2001 detailing advice in respect of the project. This advice was summarised and staged in accordance with the planning process to form a Sustainability Chart within the Turquoise Coast, Jurien Bay Structure Plan. That chart is included here as Table 1 with the elements relevant to the Development Plan highlighted.

With particular respect to the Jurien Bay Marine Park, the Water Corporation's Water Management Plan outlines proposals for the disposal of effluent and stormwater, modelling anticipated impacts and setting monitoring programmes.

Table 1 SUSTAINABILITY CHART

Issue	Structure Plan	Development Plan	Subdivision
General Biodiversity & Natural Environment	Identify biodiversity reserves	**Establish reserve boundaries with higher degree of accuracy after carrying out detailed investigations.** **Develop management plans for adjacent reserves.** **Ascertain multi purpose POS which may retain some bushland to serve some biodiversity protection functions.** **Carry out visual impact studies.**	Survey and vest reserves in Crown ownership at appropriate subdivision stage. Implement proposals of management plans. Protect the nearby wetlands during construction and in perpetuity – dust, weeds, fencing, etc
Energy Efficiency & wise use of Natural Resources	Identify routes of efficient distributor road system. Identify trunk cycleway system. Identify public transport routes. Locate district scale destinations to maximise efficiency. Locate neighbourhood centres to take advantage of the "movement economy" and to be within efficient pedestrian/cycle catchments.	**Establish efficient, interconnecting local street systems.** **Plan for pedestrian/cycle systems at the local level including access to public transport routes.** **Detail neighbourhood centres and establish design guidelines.** **Design residential lots so that a high proportion have solar efficiency.**	Construct infrastructure including roads, cycleways and footpaths, with a view to minimising the number and lengths of vehicle trips. Create neighbourhood centre sites. Create residential lots with regard to solar orientation. Implement any sustainability strategies that may have been developed (having regard for government initiatives on sustainability).

Water Use Efficiency and Reuse	Integrate with preparation of Water Management Plan	**Development to comply with the Water Management Plan in provision of infrastructure and total water cycle principles to conserve water.** **Plan to minimise domestic and public water use.** **Plan to recycle waste water.** **Infiltrate stormwater as close to source as possible.** **Continue to develop Water Management Plan and integrate development with Water Management Plan.**	Integrate water efficient landscaping packages. Implement water efficient landscaping packages. Design public spaces to take advantage of wastewater recycling opportunities. Implement drainage strategies minimising piped systems. Lot size, layout and dwelling designs will maximise water efficiency. Extent of vegetation types (eg lawn) should become part of the building approval process. Integrate and implement (as part of sales promotion) residential paving packages, rainwater tank systems, and rebate schemes for installation of water efficient internal domestic appliances such as dual flush toilets, water efficient showerheads, etc. Other water saving innovations are to be adopted as they are developed, guided by the State Water Strategy.
Waste Management	Acknowledge Shire of Dandaragan Waste Management review.	**Design lots and landscaping to limit green waste.** **Consider education programmes to limit waste and improve recycling.**	Implement landscaping proposals and any waste minimisation programmes agreed on.

Relationship to Marine Park	Development planning to be consistent with proposed Marine Park Zonings. Total Water Management Plan to duly regard water quality issues.	**Design for all facilities including parking facilities at regional/district beaches to be sympathetic to the Marine Park.** **Design drainage systems to attenuate nutrient inputs and other potential pollutants.**	Implement Development Plan proposals for parking and facilities. Implement drainage strategies.

3. CONTEXT ANALYSIS:

Figure 2 maps the location of the various features of the existing town of Jurien Bay and relates them to the Development Plan area.

As can be seen, the Development Plan area sits to the south-west of the existing township, on the southern shore of Island Point. Bashford Street is Jurien Bay's main street and it also provides the principal frontage to this Development Plan area. Bashford Street forms part of the Indian Ocean Drive link, a tourist route along the coast from Dongara to Cervantes which is ultimately proposed to extend to Lancelin and the Metropolitan area. Access to the Development Plan area is also available from housing areas directly to the north via residential streets extending from Lesueur Drive.

Jurien Bay's town centre is focused on Bashford Street, principally between Roberts and Murray Streets where retailing is concentrated. Shopping however, is now extending further west along Bashford Street on the opposite side of the Town's caravan park on to land adjacent to the hotel/motel.

Community uses are primarily located on the opposite (southern) side of Bashford Street and include the Shire of Dandaragan offices. Council chamber and library at the Bayliss Street corner, the town's police and fire stations, a new medical centre and the high and primary schools on a combined site south of Hamersley Street.

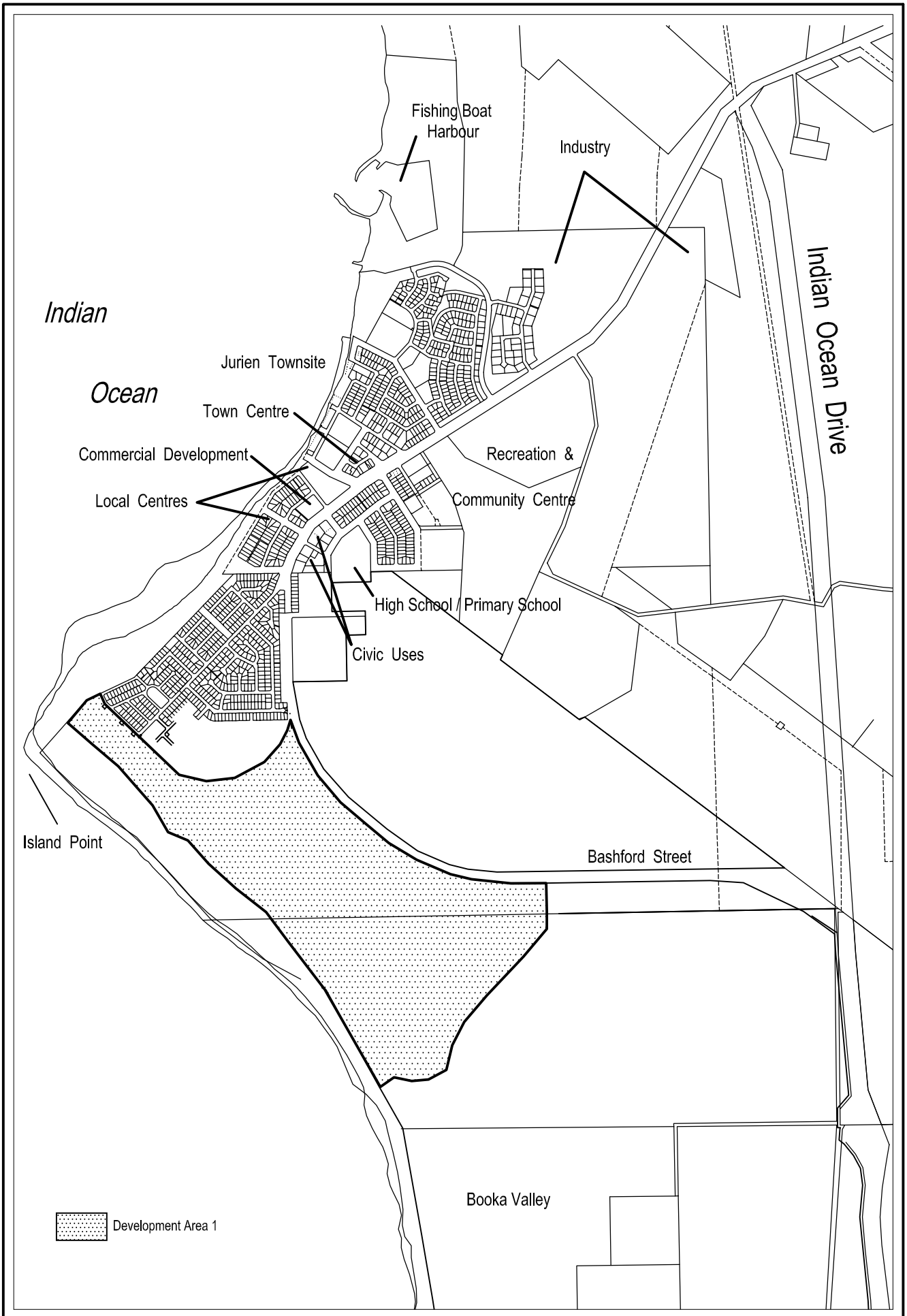

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FIGURE 2

FEATURES OF JURIEN BAY

Local centres include a corner store at Grigson/Cook Streets and a shop associated with the caravan park Heaton/Roberts streets.

In addition to the commercial/community locations described above, other employment centres include a fish processing plant at Roberts and Heaton Streets and the fishing boat harbour to the north of town. Industrial areas exist to the north of Bashford Street off Carmella Street and to the north of Bashford Street, east of the town's main recreation area.

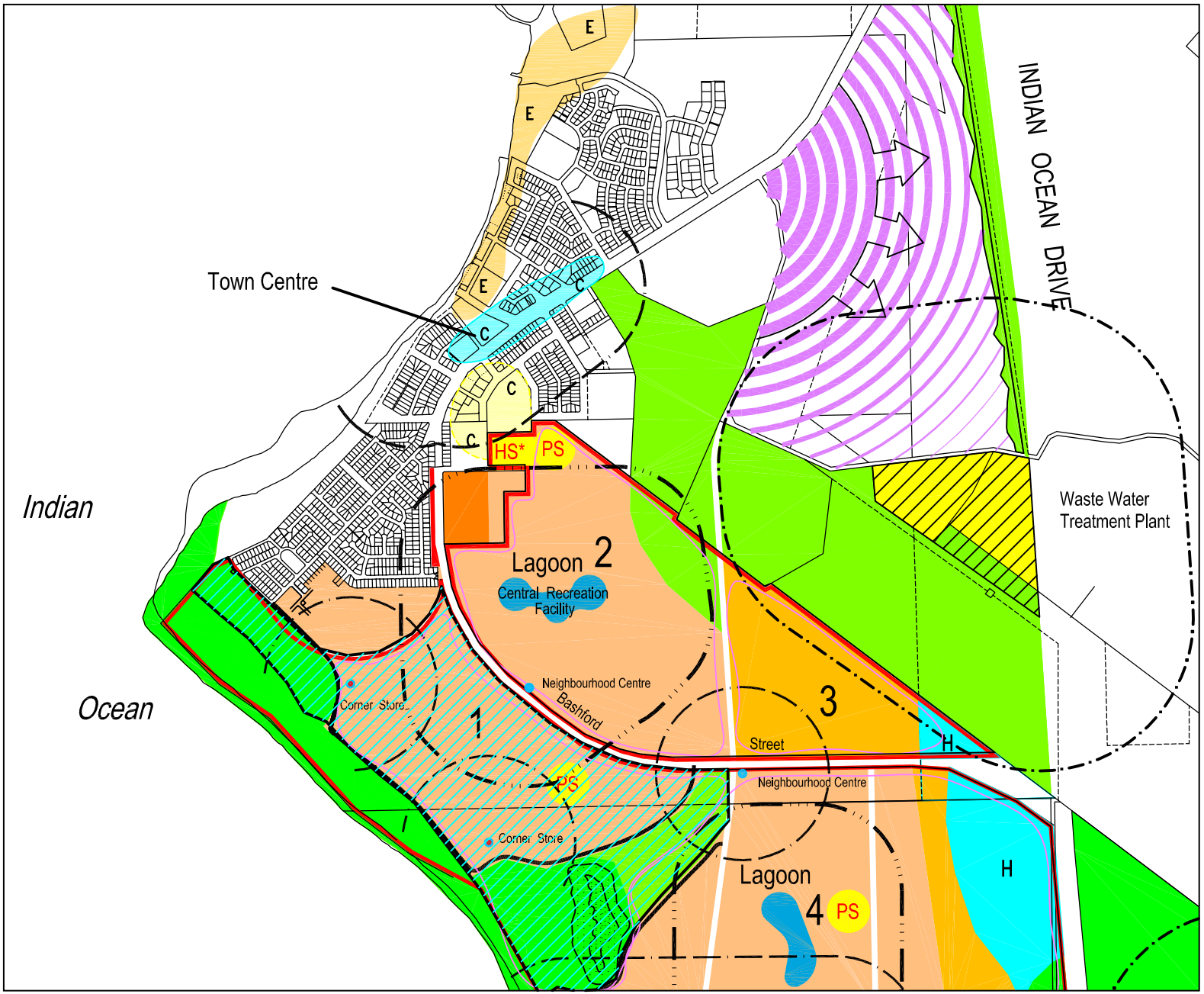
Recreation activity is centred on an area of reserved land on the eastern side of town, south of Bashford Street. Facilities include a golf course, bowling club, tennis courts, an oval and a community centre with indoor meeting areas and basket ball court.

The Turquoise Coast Development, Jurien Bay Structure Plan establishes development principles for the expansion of Jurien Bay. **Figure 3** puts the Development Plan area into context with the approved Structure Plan. Key elements of the Structure Plan include Bashford Streets identification as a District Distributor road and the extension of a Tourist Route along the coast and adjacent to other reserves.

The Jurien Bay Town Centre is shown to consolidate as the main commercial hub in conjunction with the civic area south of Bashford Street. The industrial area east of the Town is also intended to consolidate.

A section of stable coast at Booka Valley towards the centre of the Structure Plan area is identified as a Mixed Use area to accommodate a combination of residential, commercial and tourism uses but only to an extent and intensity secondary to the Town Centre.

Neighbourhood/Local Centres are identified centrally on the Development Plan area's frontage to Bashford Street as well as towards the north-western and south-western parts of the area, linked with future visitation to recreation areas. A Neighbourhood Centre is also shown at the corner of Bashford Street and the main north/south District Distributor road, outside and to the east of the Development Plan area.



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LEGEND

- Residential
- Medium Density Residential
- Open Space
- Conservation
- Mixed Use
- Institutional
- Civic – External
- 10 Approxiamate Development Plan Areas
- Neighbourhood Centre
- Corner Store
- Tourist Route
- District Distributor
- Development Plan Area 1
- Special Residential
- H Highway Commerce
- Lagoon
- Industrial
- Commercial
- E Mixed Use – External
- C Commercial – External
- HS High School
- PS Primary School
- 450m Ped Shed from retail
- 450m Ped Shed from Lagoon Focus
- 800m Waste Water Treatment Plant Buffer

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FIGURE 3

CONTEXT ANALYSIS - STRUCTURE PLAN

DEVELOPMENT PLAN AREA

A central recreation facility in the form of a proposed lagoon is shown in the neighbouring Development Plan area to the east.

A Primary School site is identified in the southern half of the Development Plan area. The existing combined high school/primary school is shown to be split and accommodated on expanded school sites to the north of the adjacent Development Plan area.

4. SITE ANALYSIS

Figure 4 is a portion of aerial photographic coverage of the Jurien Bay area with contours added. The Development Plan area is outlined on the Figure.

A patch of cleared and pastured land can be identified in the centre of the Development Plan area. The balance of the area is generally naturally vegetated with coastal heath. This heath covers the dunes behind the beach as well as land further inland.

A feature apparent from the aerial photography is the narrow strip of sandy beach indicating a receding coastline on the southern shore of Island Point. The beach strip increases in width towards the southern end of the Development Plan area indicating a transition to a more stable coastline. These impressions are confirmed in previous work on coastal processes which led to the identification of minimum setbacks. Minimum setbacks are shown on **Figure 5** however, it should be noted that this depicts an "engineering" line and does not necessarily take into account issues of land form and land requirements associated with the likely future use of the ocean foreshore.

An Indicative Management Plan prepared by the Marine Parks & Reserves Authority/CALM identified proposed use zones for the Jurien Bay Marine Park. These included a Sanctuary Zone off Island Point with a 100m wide Special Purpose (Shore Based Activities) Zone along the southern shore of Island Point as far south as Booka Valley. The zoning pattern is shown on **Figure 6** and **Table 2** details the activities which may occur within each of the zones. It will be noted that activities such as beach fishing are permitted

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Development Area 1

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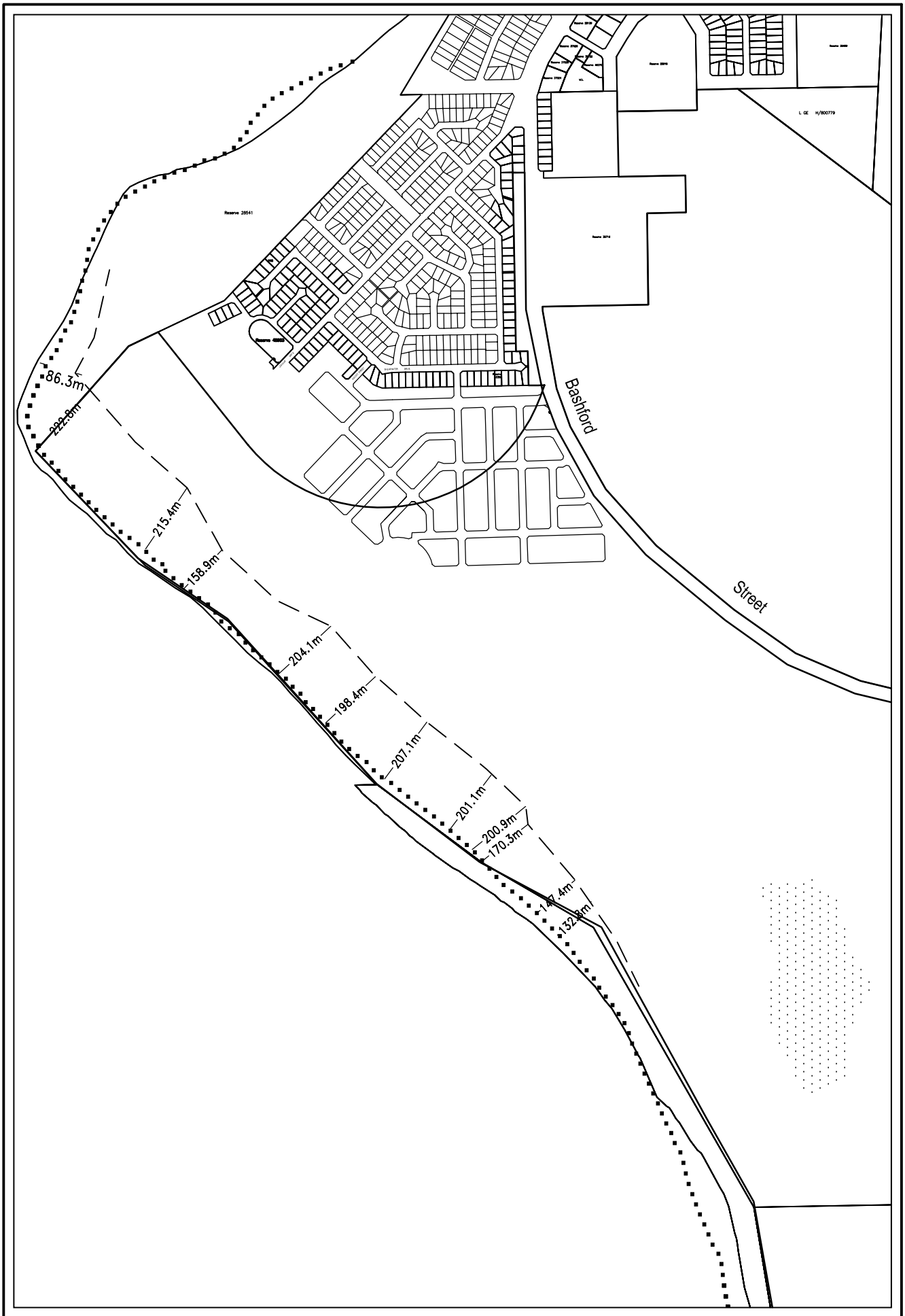
Figure 4

AERIAL PHOTOGRAPHY and CONTOURS WITH DEVELOPMENT PLAN AREA 1



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1998 Vegetation Line

New Foreshore Reserve

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FIGURE 5
FORESHORE SETBACKS
DEVELOPMENT AREA PLAN 1

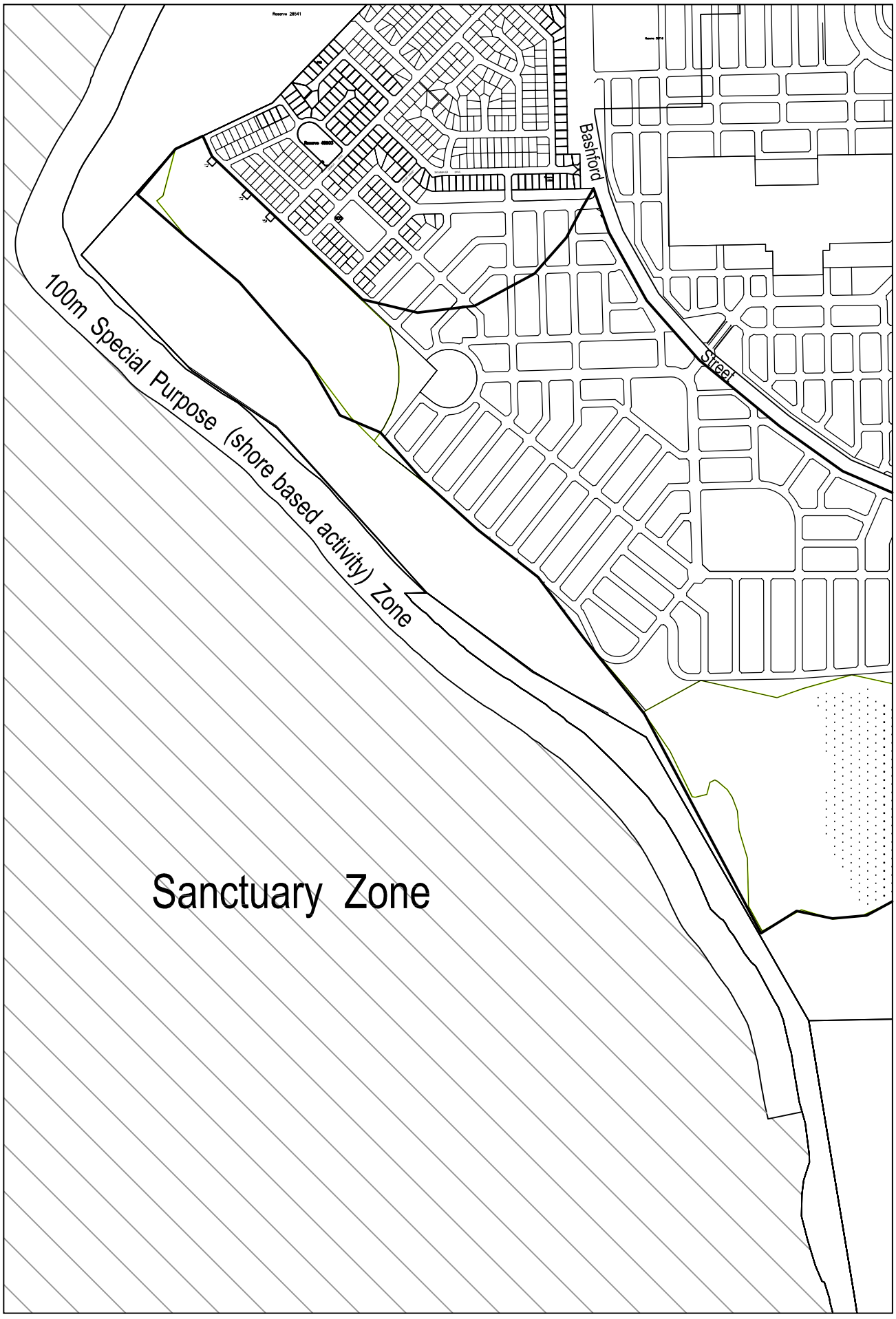

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FIGURE 6

MARINE PARK

along the southern shore of Island Point within the Special Purpose (Shore Based Activities) Zone but not further to the south at Booka Valley. This pattern is consistent with the Structure Plan proposals which identify Booka Valley as a major public bathing beach. Clearly, this stable area of coast is appropriate for this use and beach fishing would conflict with people swimming. Except at the far southern end of the coast in front of this Development Plan area, the narrow beach and pattern of erosion make it unsuitable as a major bathing beach and activities such as beach fishing, dog exercising mixed with "local bathing" are appropriate uses.

These activities are not very intensive and accordingly, parking demand etc. are not high limiting the need for additional land beyond the "engineering" line. Indeed, the degree of erosion resulting in the frontal dune faces being "cut away" creating steep slopes suggests that public access should simply be catered for but not greatly encouraged by the provision of parking etc.

Figure 7 is a Digital Terrain Model providing a 3-D representation of the Development Plan Area and its landform. The Figure also depicts the foreshore reserve boundary defining the minimum setback necessary for the accommodation of coastal processes. It will be noted that this boundary is generally to the east of the coastal dune systems and therefore, landscape issues associated with boundaries across dunes etc. do not arise. As the beach is unsuited to intensive use, there is little reason to set the foreshore reserve boundary beach further in this locality.

The only possible exception arises in the far southern portion of the Development Plan areas frontage to the coast where a modest dune extends further inland. This landform provides one of very few opportunities for a development such as a tourism facility to obtain an ocean view and it is therefore proposed to resolve any conflicts between development and the dunal landform by appropriate development controls in the Detailed Site Plan. This treatment is considered appropriate since the dunes are not high and are relatively gently graded.

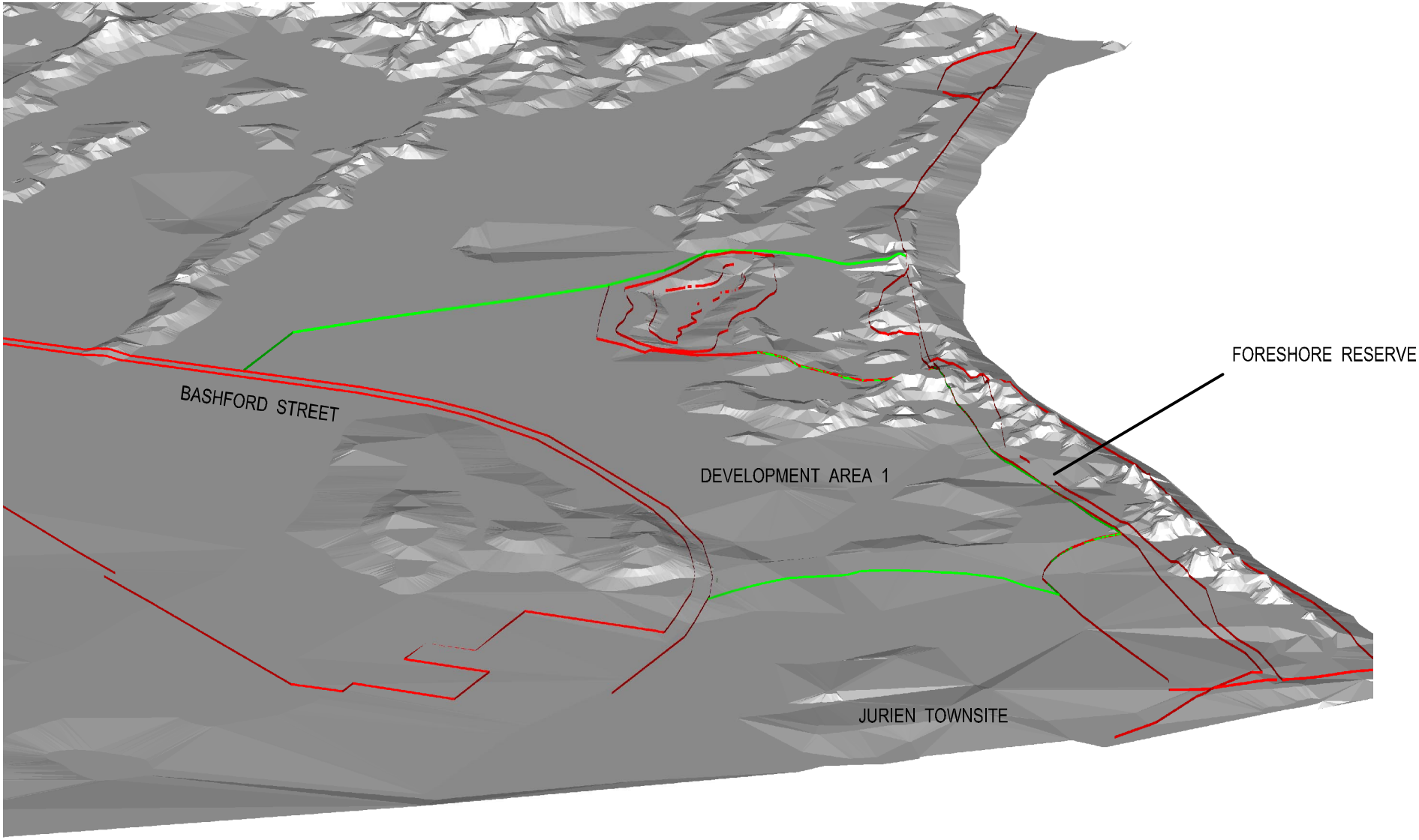

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Figure 7

DIGITAL TERRAIN MODEL

3X VERTICAL EXAGGERATION

Apart from the features discussed above, the site is generally flat comprising an old beach ridge plan. It offers few constraints to development. A representative portion of the beach ridge plan is to be retained in a reserve at Island Point to the north of the Development Plan area in accordance with a Conservation and Bio-diversity Strategy agreed with the EPA.

Similarly, the southern boundary of the Development Plan area is defined by another conservation area identified to protect a wetland area and linkage to the ocean foreshore. The Structure Plan extended this reservation eastwards to include an area of public open space.

Table 2 : Uses permitted in zones of the Jurien Bay Marine Park

Activity	Special Purpose (shore-based activities)	Sanctuary Zone
COMMERCIAL		
Commercial rock lobster fishing	Yes	No
Commercial abalone fishing	Yes	No
Commercial gill netting	Yes	No
Commercial wetlining	No	No
Commercial aquarium collecting	No	No
Commercial specimen collecting	No	No
Aquaculture	Assess	No
Mineral & petroleum exploration (seismic)	Assess	Assess
Petroleum drilling and mineral development	Assess	Assess
Charter vessels - fishing	No	No
Charter vessels – other	Yes	Yes
RECREATIONAL		
Boating (motor & non-motorised)	Yes	Yes
Surface water sports	Yes	Yes
Recreational Abalone	Yes	No
Recreational rock lobster fishing	Yes	No
Recreational line fishing	Beach-Yes Boat - No	No
Recreational netting	Yes	No
Spear fishing	No	No
Recreational crabbing	No	No
Recreational specimen collecting	No	No
Diving	Yes	Yes
Wildlife interaction	Yes	Yes
OTHER ACTIVITIES		
Groynes, Jetties, Mooring, structures	Assess	Assess
Research	Yes	Yes

5. DESIGN PROPOSALS

Figure 8 shows the proposed structure of the Development Plan area. Features of the proposal include :

- walkable neighbourhood catchments of 450 m radius
- proposed commercial uses
- proposed natural features to be retained
- proposed street block layout
- proposed transportation corridors, public transport and cycle/pedestrian networks (see **Figure 11**)
- proposed schools and community facilities
- proposed land uses including distribution of residential densities (see **Figure 13**)
- public open space (see **Figure 12**)

6. COMMUNITY DESIGN

The dominant influence on the Development Plan area is its position in relation to the coastline. The southern shoreline of Island Point is on a south-east to north-west trend. The coast and its associated recreation values are expected to be a primary focus of residents within the Development Plan area. For this reason, the Development Plan layout seeks to maximise accessibility between residential areas and the coast. This objective results in roads leading to the coast being normal to the shoreline. Farther from the coast, the street system adopts a north-south/east-west alignment with a consequent impact on proposed lot orientation.

The form of the Development Plan is also influenced by Bashford Street, a district distributor, generally parallels the alignment of the coast. This factor together with the alignment of the coast result in the Development Plan area generally being on a north-west to south-east alignment. These alignments are influential in defining the form of the Development Plan. In particular, the Structure Plan identifies a neighbourhood centre approximately midway along Bashford Street frontage to the Development Plan area. In addition, commercial sites are shown proposed towards north-west and south-west of the plan area. Strong linkages are therefore proposed between these elements which in turn provide direct connection to major recreation areas including the reserve containing representative portions of the local beach

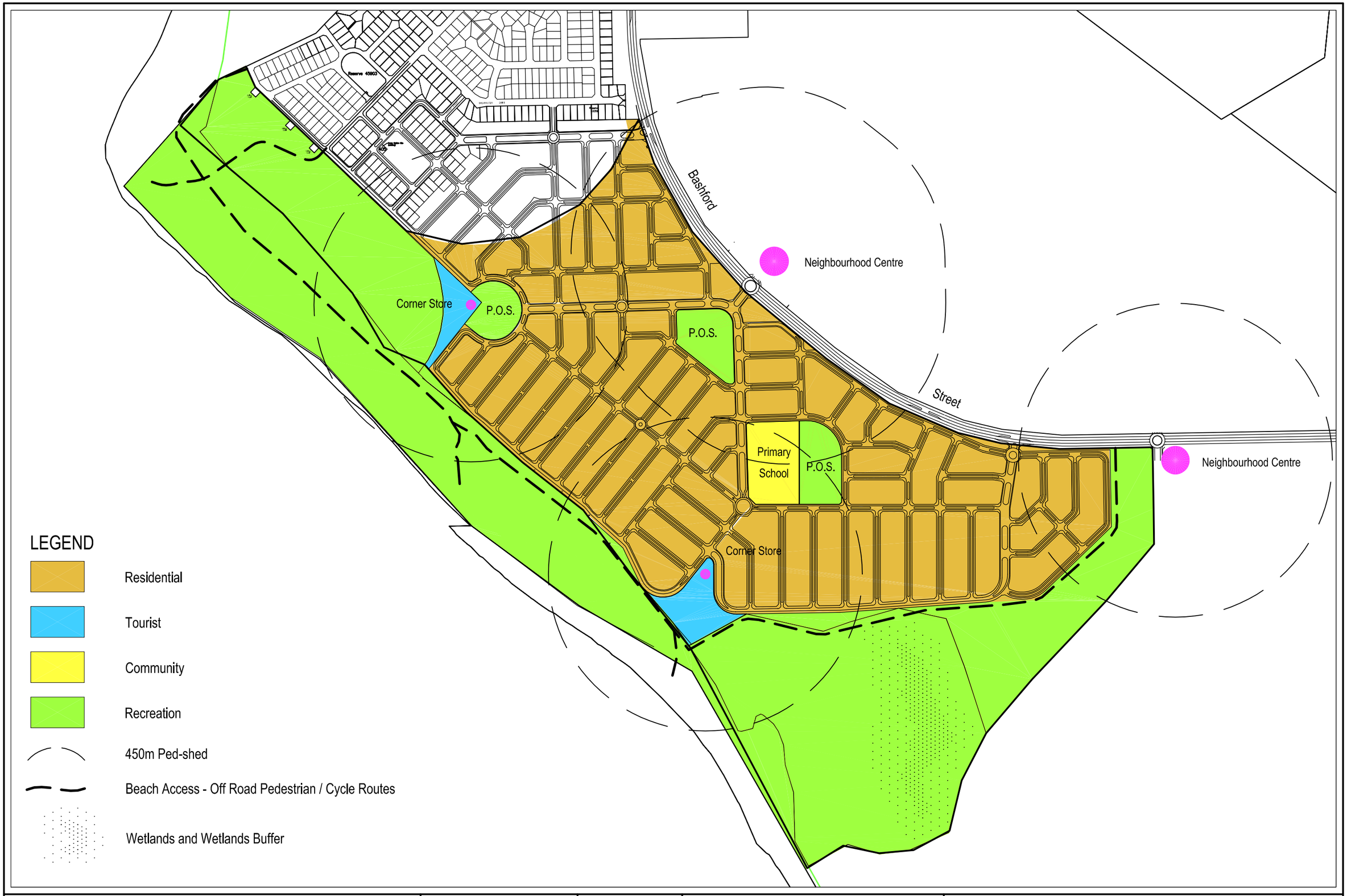

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FIGURE 8
DEVELOPMENT PLAN

ridge system and beyond to Island Point towards the north and in the south, a direct connection towards the future regional beach envisaged at Booka Valley.

In accordance with earlier discussion, the ocean foreshore reserve is shown located on the alignment determined through the application of policy on coastal processes. The anticipated low intensity use of the beach in this locality results in no additional provision being made to accommodate recreational activities and carparking.

Proposed commercial uses are small in scale and will not compete with the town centre of Jurien Bay. In fact, the development will support the town centre functions. Reliance on dispensation of services from the town centre will include access to the existing high school and at least in the early stages of development, access to the primary school as well. In the longer term, the plan envisages a new primary school within the Development Plan area.

Overall, it is anticipated that the Development Plan will provide for approximately 1,300 residential lots and at an average of around 3 persons per household, this yield represents a total population capacity of approximately 3,900 persons. Development is expected to occur in stages of approximately 100 to 150 lots per year from the north.

7. MOVEMENT NETWORK

As indicated, Bashford Street provides a district distributor link and the principal connection between the Development Plan area and the Jurien Bay Town Centre. In addition, Bashford Street forms part of the Indian Ocean Drive connection extending to Cervantes in the south and ultimately beyond to the Metropolitan area.

Neighbourhood connectors provide the next tier in the hierarchy of roads serving the Development Plan area. A requirement of the approved Structure Plan is to provide a tourist link along the coast and around the major conservation reserves. Since the adjacent beach and associated foreshore reserves are anticipated to be areas of low intensity use, there is little need foreseen in creating a foreshore tourist link at a level higher than that

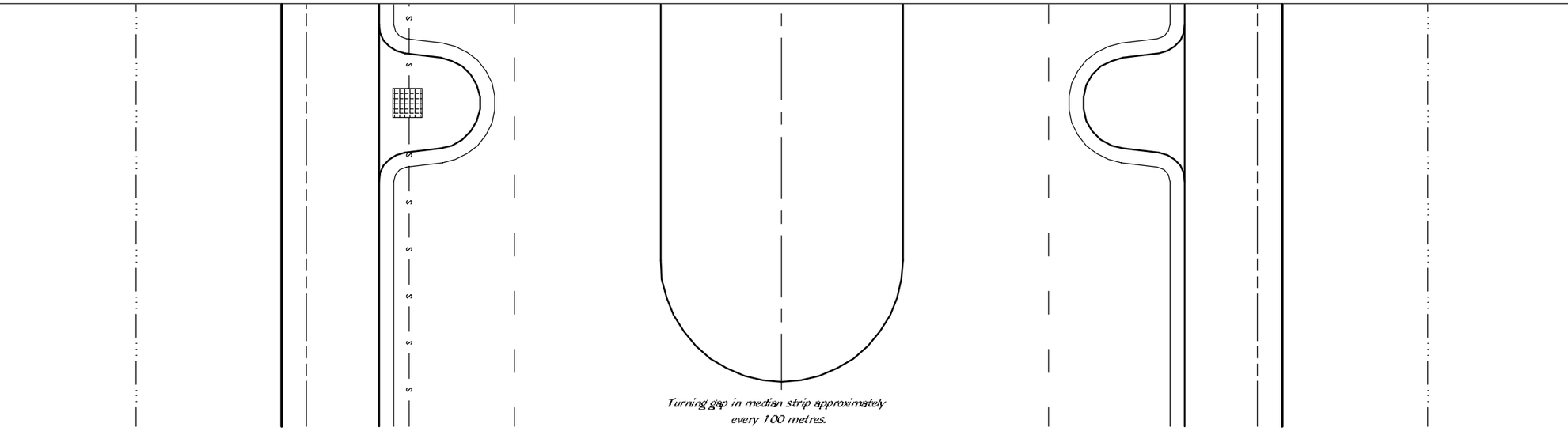
provided by a neighbourhood connector. Two walkable catchment focii are identified on the route of the foreshore tourist road. These are connected via neighbourhood connectors to a more significant neighbourhood centre identified midway along the Bashford Street frontage. None of the neighbourhood connectors within the Development Plan area is expected to carry traffic volumes exceeding 3,000 VPD.

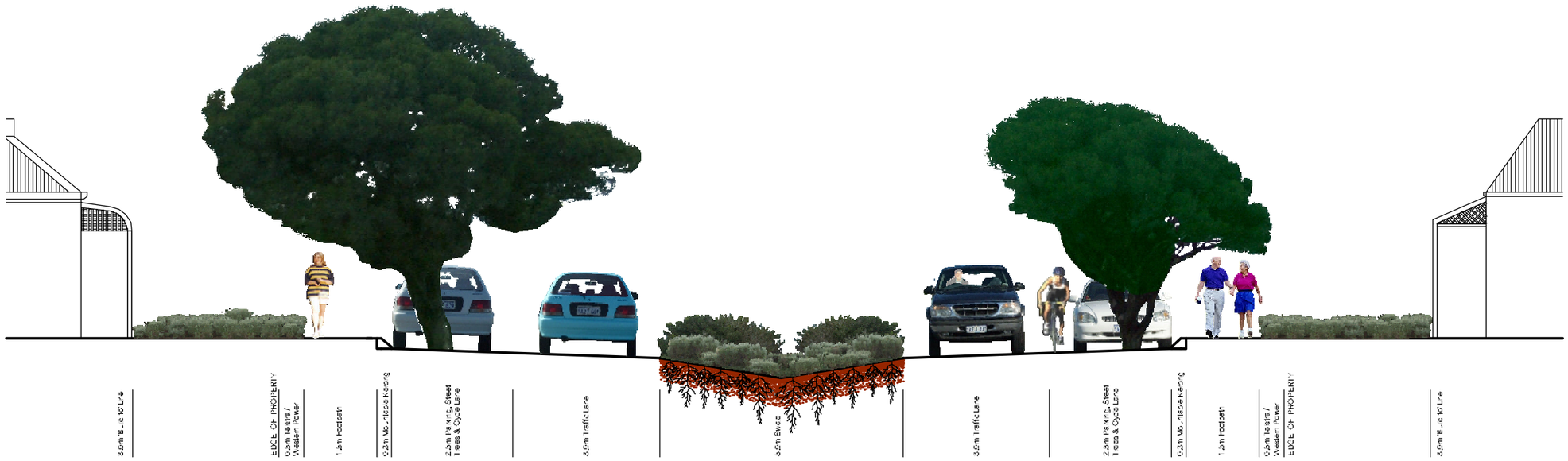
All other streets within the Development Plan are anticipated to be access streets.

In common with subdivision occurring south of Lesueur Drive to the north, the street system proposed within the Development Plan area incorporates a system of dual carriageway roads utilising the median strip as a drainage swale. **Figure 9** shows a standard road profile indicating the dimensions and functions of elements within the proposed street system. The proposed medians obviously impact on access to frontage development. Sketches at **Figure 10** have been produced by Sinclair Knight Merz to illustrate the treatment of intersections and their use to provide access to properties on both sides of the proposed streets. In addition to the use of intersection for this purpose, provision is to be made for median openings around every 100 metres on street lengths between intersections. Another feature of the proposal is to use the intersection treatments to prioritise particular roads. In particular, neighbourhood connectors will have priority over local streets.

One feature of the dual carriageway road systems employed in the Development Plan is the alignment of footpaths on both sides of each road. This results in a high degree of provision for pedestrian movement. The streets also make provision for on street cycling. This provision increases in width according to the status of roads. Provision for cyclist is illustrated on the diagrams at **Figure 10**.

In addition to the on street facilitation of pedestrians and cyclists, systems are proposed in neighbouring reserves including the ocean foreshore reserve. This provision is generally illustrated on **Figure 11** Traffic Management. The figure identifies the road hierarchy, provision for intersection





A 3 metre 'build to' line rather than a minimum set back ensures that front garden width is minimised, reducing incentive to plant lawns and other 'thirsty' vegetation requiring fertiliser application.

Native heath vegetation required in front set back area. This vegetation is water wise and does not need fertiliser (nutrient) inputs. Maintenance is also minimised which is particularly important in the case of holiday homes.

All pavements are graded down towards the median so that stormwater run-off is directed to the swale rather than to gully traps and piped drainage system. Sewer main aligned within the parking lane and manholes designed into street tree nibs.

Median swale comfortably holds 1 in 10 year stormwater event. Infiltration of stormwater commences within about 10 metres of the point at which it falls. Infiltration is therefore spread over the estate rather than at particular points with the result that the natural groundwater regime retained as much as possible. Planting within the swale uses low maintenance, low water use native coastal heath species. Root systems and associated micro-fauna aerate soil maintaining it in a porous condition, enhancing infiltration capacity for efficient drainage. Water main aligned within the median strip.

Paved areas are greater than in a conventional street system but costs are offset by not having to install piped drainage systems. The absence of verges or nature strips means there are no thirsty lawns and no fertiliser applications resulting in low nutrient run-off to swale drainage system.

The use of low maintenance, native heath in the front garden reduces fertiliser inputs into the natural environment. This is particularly important in an area adjacent to a proposed Marine Park because groundwater eventually flows to the ocean.

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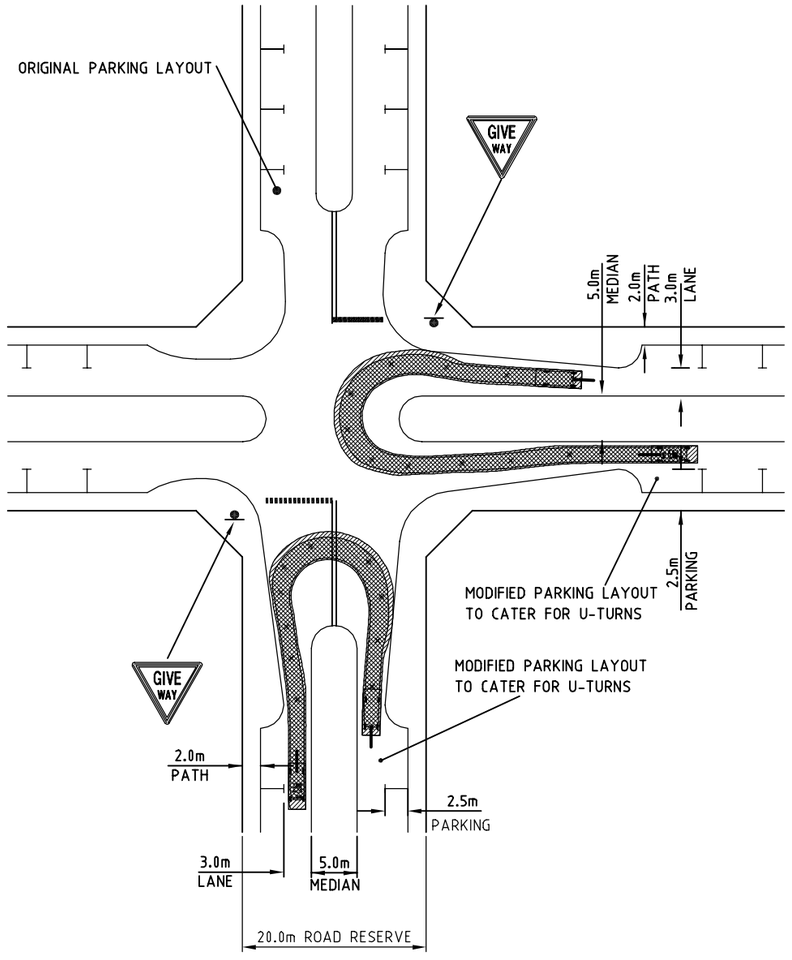
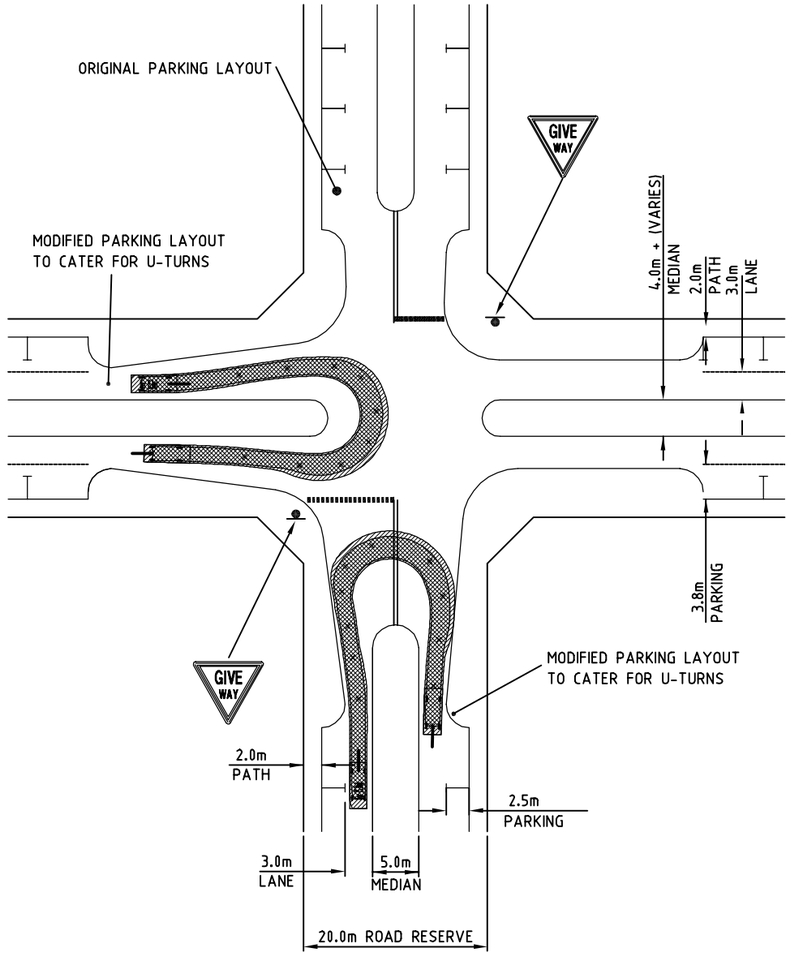
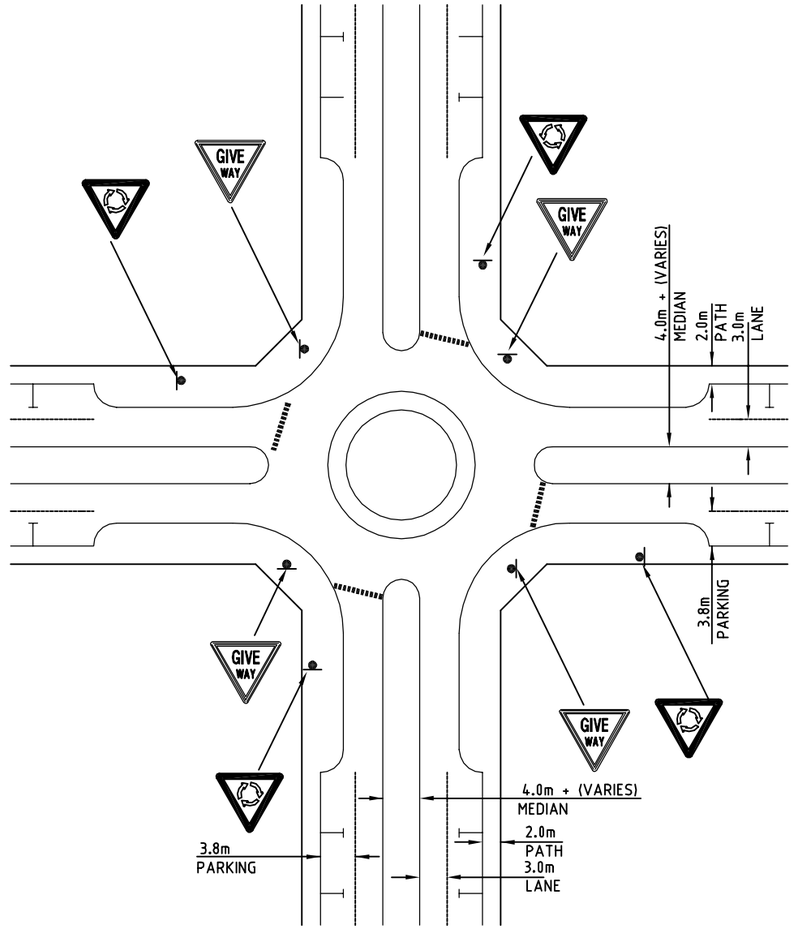
STREET PROFILE
JURIEN BAY
APPROVAL PURPOSES



INTERSECTION TYPE 1
INTERSECTION OF MINOR ACCESS STREETS
LESS THAN 3,000 VPD



INTERSECTION TYPE 2
INTERSECTION OF NEIGHBOURHOOD
CONNECTOR WITH ACCESS STREET



INTERSECTION TYPE 3
INTERSECTION OF NEIGHBOURHOOD CONNECTORS
LESS THAN 3,000 VPD

NOTES:

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N

0 Metres

Scale: Not to Scale

Date: 29 October 2004 Ref. 1919/04/intersections

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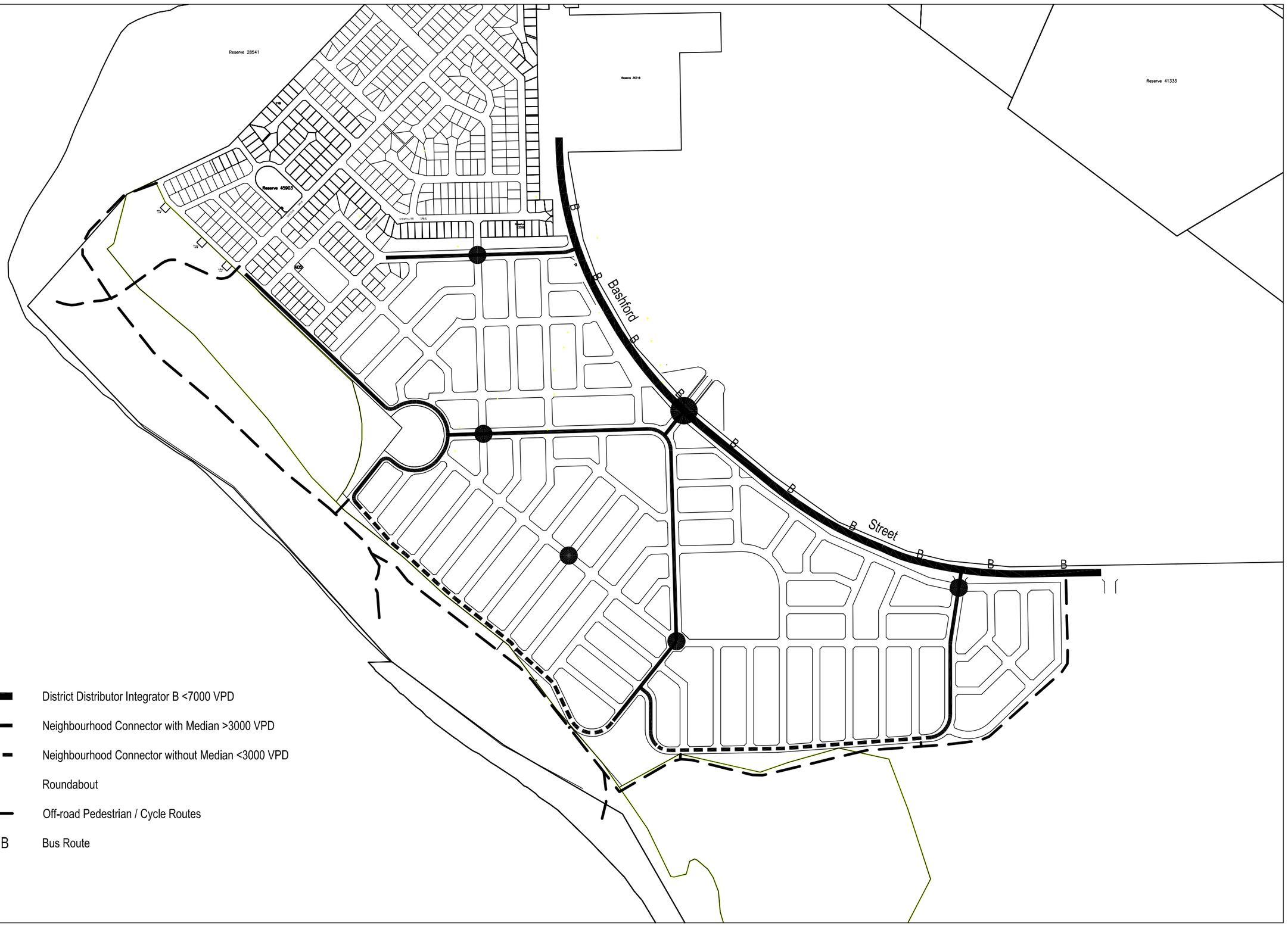
FIGURE 10

ROAD TREATMENTS



NOTES:
Connections between off-road cycle routes and adjacent local road system via kerb ramps and short path connectors as appropriate.

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Scale 1:10000

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All dimensions and areas subject to survey

FIGURE 11
TRAFFIC MANAGEMENT

controls/treatments and the location of major pedestrian/cycle way linkages. Kerb ramps etc will be required to link off-road and on-road routes.

Also illustrated is the proposed use of Bashford Street as a bus route and the area within a walkable catchment of that bus route.

8. LOT LAYOUT

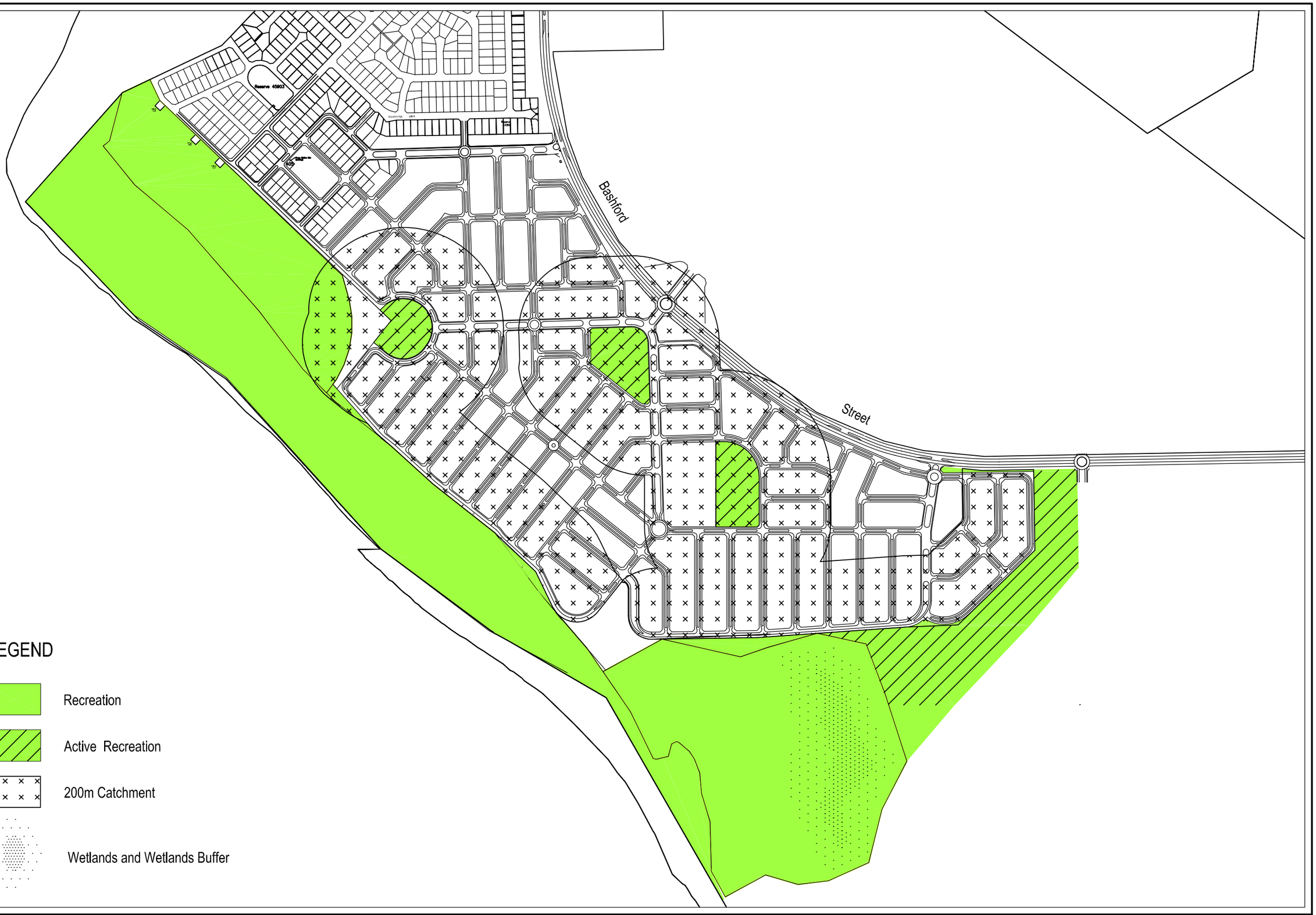
The influences of the coast and Bashford Street resulting in a north-west to south-east trend in the shape of the Development Plan area also have some impact on the orientation of local street systems and proposed housing lots. Notwithstanding this situation, approximately 50% of lots within the Development Plan area enjoy north-south or east-west orientation. Significantly, this Development Plan area is the only locality within the whole Structure Plan where the general grain departs from a north-south/east-west trend.

The more dense development and smaller lot sizes are generally associated with areas close to amenities including commercial functions and open spaces. Localities not enjoying these benefits are shown to be available for larger lot sizes.

9. PUBLIC PARKLAND

Figure 12 identifies the nature of public parklands within and adjacent to the Development Plan area. These parklands include areas primarily set aside for conservation purposes as well as areas identified as areas for the recreational requirements of the resident population. Public use of the conservation areas will primarily be restricted to passive use as well as walking and cycling. Active recreation and kick-around space will be accommodated within the general public open spaces. **Figure 12** shows that approximately 75% of lots within the Development Plan area are within 200 metres of parkland reserves.

The major area of active recreational use is expected to be that reserve adjacent to the proposed primary school site. It is anticipated that there will be joint school/public use of this area and that the recreation function will extend onto the school site. Other open spaces are primarily kick-around



LEGEND

- Recreation
- Active Recreation
- 200m Catchment
- Wetlands and Wetlands Buffer

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FIGURE 12
PUBLIC PARKLAND

areas although, in the south-east, a large area of reserve extending a conservation area surrounding an inter-dunal wetland has potential for active recreational pursuits.

The proposed open spaces are generally divorced of any drainage function except that, in extreme events, the reserves could be utilised for flood mitigation.

It is anticipated that open space reserves beyond the conservation areas will be landscaped by way of grassing as well as enhancement with coastal heath species. Groundwater availability for reticulation of large areas of grass is a concern pointing to a need to balance the use of grass with other plantings. In addition, the use of below ground sensors will be implemented to optimise the efficiency of the lawn irrigation system, the planting of the most suitable lawn species for the soil conditions, the area's climate and expected rainfall.

10. URBAN WATER MANAGEMENT

The Water Corporation has prepared a Water Management Plan which includes principles designed to reduce the rate of infiltration of nutrients into groundwater system and beyond to environmental bodies including the ocean and wetlands as well as maintaining the groundwater regime in a state as consistent as possible with the natural state. This objective involves disposing of stormwater as close as possible to source, in accordance with Water Sensitive Urban Design Principles which involves:

- Protecting and enhancing all natural water systems
- Reducing peak flows by use of local detention measures
- Protecting the quality of water drainage from urban developments
- Incorporating multiple use corridors that maximise the visual and recreational amenity of the development

In achieving these objectives, the Development Plan adopts the system of swale drains within road medians and utilising landscaping which does not require fertiliser inputs nor excessive use of irrigation. The techniques proposed within this Development Plan are being put into effect on land to the north currently zoned for residential development, towards Lesueur Drive.

The principles of the local road system were previously illustrated in **Figure 8.** The system provides for stormwater runoff to be infiltrated as close as possible to source through the median swale drains and calculations have been undertaken to confirm the adequacy of storage and infiltration capacities in the swales. These calculations increased run off coefficients to take account of the expanded area of pavement proposed in the road profile.

A standard 20.6 metre wide road profile is made of 0.5 m of unpaved surface adjacent to the property boundary for telecommunications and power utilities, 1.5 m of footpaths, a parking lane of 2.5 m and a traffic lane of 3 m width. This profile is repeated on the other side of the road leaving a median of 5 m. At 600 m^3 of stormwater storage per hectare of impervious surface, previous work has demonstrated that the provision made for stormwater storage and infiltration within the swale drainage system is adequate to cater for the one in ten years storm event. Flows from more major events would be directed towards open spaces.

11. UTILITIES

The Water Corporation has produced a draft Water Management Plan for the Jurien Bay area as a whole which consequently includes the Turquoise Coast development. This Plan has been prepared in response to the Central Coast Regional Strategy's adoption of Jurien Bay as the dominant centre of the region.

The Water Management Plan proposes strategies for the expansion of water and sewerage services at Jurien Bay to cater for longer term development as well as the drainage strategy discussed at 10. It also sets reduced water consumption targets which are adopted into this Development Plan and Detailed Site Plan by way of proposals to avoid lawned verges, expansive front gardens and by utilising appropriate vegetation minimising reticulation requirements.

Proposals to reduce water consumption and to achieve drainage objectives result in a residential road profile departing from accepted standards. This amended profile has been discussed previously. It impacts on utility provision in that revised water and sewer alignments are proposed and rather than

being beneath a verge, reticulation sewer mains will be below paved areas. These adjustments have been agreed by the Water Corporation with respect to an existing subdivision approval and it is accordingly foreshadowed that the principle will continue into this Development Plan area.

Existing water supply infrastructure includes three shallow production bores 4 km north east of Jurien Bay supplying water to a summit storage tank from where a trunk main gravity supplies the Jurien Bay reticulation system. Both the borefield and the storage tank require upgrading. Ultimately, the Water Management Plan recommends a northern and southern borefield with associated source protection areas. The proposed distribution network compresses gravity reticulation from a central storage to the east of the Turquoise Coast development area.

The Water Corporation has also undertaken a water balance recognising the need for water efficiency and promoting the strategies to reduce consumption adopted in this Plan.

Only 10% of the existing Jurien Bay town site is connected to deep sewerage. Hence, the Waste Water Treatment Plant (WWTP), which is located 2 km east of town receives only small flows via a conventional sewerage system. Treatment is through facultative ponds with disposal via an infiltration pond into the groundwater system since flows are too low to justify reuse. Environmental monitoring indicates that the WWTP is having minimal impact on the surrounding environment. In the short term, the existing system will be expanded to accept flows from new development leading to medium term upgradings including activated sludge treatment. Treated waste water management will include indirect reuse at ovals, schools, golf course, woodlot etc. In the long term, a second WWTP will be established further to the south-east, again comprising activated sludge treatment and reuse of waste water. The major risks associated with the proposal are to be addressed by a monitoring regime with contingency measures identified for implementation should monitoring support potentially adverse impacts.

Stormwater disposal is to be via infiltration with this occurring virtually at source as demonstrated at **Figure 9.**

Planting policies limit the addition of nutrients to the system and hence conveyance to groundwater (see **Detailed Site Plan**).

The Dandaragan Shire Council currently provides a rubbish collection service disposing of waste in a landfill site off Canover Road. The site has capacity to accept waste for a further 10 years.

Green waste is generally minimised by the use of landscaping with low nutrient requirements and less water, limiting seasonal growth and therefore waste. Lawn areas are limited to rear yards with no front or street lawns. Household waste reduction and recycling will need to be encouraged through broad based community programmes.

Council has received a Waste Management Review which recommends that in the longer term there should be a regional landfill facility near Badgingarra along the Brand Highway corridor. This would potentially also serve the Shires of Gingin and Moora.

12. ZONING AND RESIDENTIAL DENSITY

The Shire of Dandaragan Town Planning Scheme requires that the Development Plan define zones and residential densities for the Development Plan area. **Figure 13** is therefore a zoning map for the area with R Code densities overlaid.

The range of zones include:

- Residential
- Tourist
- Community
- Recreation

Residential density codings are proposed over the Residential Zone.

12.1 Residential

Land to the north of the Development Plan area is currently zoned Residential and coded R12.5 providing for an average lot size of 800m² and a front set back of 7.5 metres. It is proposed that this density be generally increased to R15 however, it is anticipated that in light of the present zone boundaries,

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FIGURE 13
ZONING & RESIDENTIAL DENSITY

some lots will straddle the boundary of the Development Plan and consequently be subject to two residential density codings (R12.5 and R15).

To overcome this concern, a split coding of R12.5/R15 is proposed along the boundary of the Development Plan with the existing Residential zoning. Lots that are actually divided by this common boundary can therefore be considered solely in terms of the R12.5 code while lots wholly within the boundary can be considered in terms of the R15 code.

The R15 code is considered an appropriate replacement of the R12.5 because of reduced front setbacks. Traditionally, people at Jurien Bay have required space for boats, caravans and sheds. Consequently the area offered by an R12.5 lot has been appropriate for the locality. A standard R12.5 lot of 800m² would likely have a frontage of 20 metres and a depth of 40 metres. After deducting the front set back area of 7.5 m x 20 m = 150 m², the usable lot space is reduced to 650 m².

In respect of this Development Plan, it is proposed to reduce front set backs to 3 metres resulting in the front set back area of a 20 metre wide lot being reduced from 150 m² to 60 m². Lots created under the R15 code must have an average area of at least 666 m² and therefore a 20 metre wide lot requires a depth of 33.3 metres. The usable space after deducting the front set back area therefore becomes 606 m², just 44 m² less than available in the standard R12.5 lot.

It is probable that rather than R15 lots having a depth of 33.3 metres, this will be rounded to 35 metres in which case the usable lot area becomes 640 m². The proposed density increase therefore retains the lifestyle opportunities traditionally associated with Jurien Bay.

In accordance with previous discussion, the MOU entered with Council and the WAPC requires variety in housing opportunities. To achieve this variety, a central area is proposed to be coded R20 allowing lot sizes ranging upwards from 450 m² with an average of a minimum 500 m².

Sites close to neighbourhood/local centres are shown to be R40 because of the level of service available to them and their ability to support the centre.

12.2 Tourist

Two tourist sites are shown on the Zoning and Density Map at **Figure 13**. One is adjacent to the reserve containing the representative sample of the back ridge plain at Island Point. The second occupies an elevated portion of land to the south overlooking Booka Valley.

The first site is seen to be an opportunity for a low key facility accommodating school camps, corporate and community groups. Its position adjacent to the beach ridge plain reserve and proximity to Island Point and the Jurien Bay Marine Park offers educational opportunities. General public open space is also available to the site allowing kick around activity and more formal events.

The second site overlooks Booka Valley from a more elevated area towards the south. Outlook and proximity to a stable bathing beach create opportunities for more traditional holiday accommodation.

A shop and/or café/restaurant are uses permitted if incidental to the predominant use of land within the Tourist zone. Consequently, these two tourist sites double as neighbourhood centres.

12.3 Community

The Community zone applies to the primary school site which is shown to occupy an area which is well accessed by the local street system and in a central part of the Development Plan area identified for this purpose in the Structure Plan. Road frontage is provided to three sides of the school site and open space abuts on the fourth boundary.

The school site is shown at 3.5ha in anticipation that joint development and use can occur with the adjacent open space. In view of general fresh groundwater resources being limited, joint development and use are encouraged however, should this not be possible, the flexibility inherent in the Development Plan would permit the boundary between the open space and school site to be adjusted to increase the school site to 4ha.

12.4 Recreation

The Recreation Zone is applied to all open spaces irrespective of whether they are intended primarily for conservation purposes and generally passive use or for active pursuits.

In addition, to assist in meeting the Western Australian State Government's objective of achieving at least 20% reuse of treated wastewater on a state wide basis, a commitment is made to increasing the reuse of treated wastewater from the current (and the proposed) wastewater treatment plant. Thus maximum use of treated wastewater is planned through the process of recharging the local superficial aquifer with this water and extracting the required amounts for irrigating all reserves and school lawn areas.