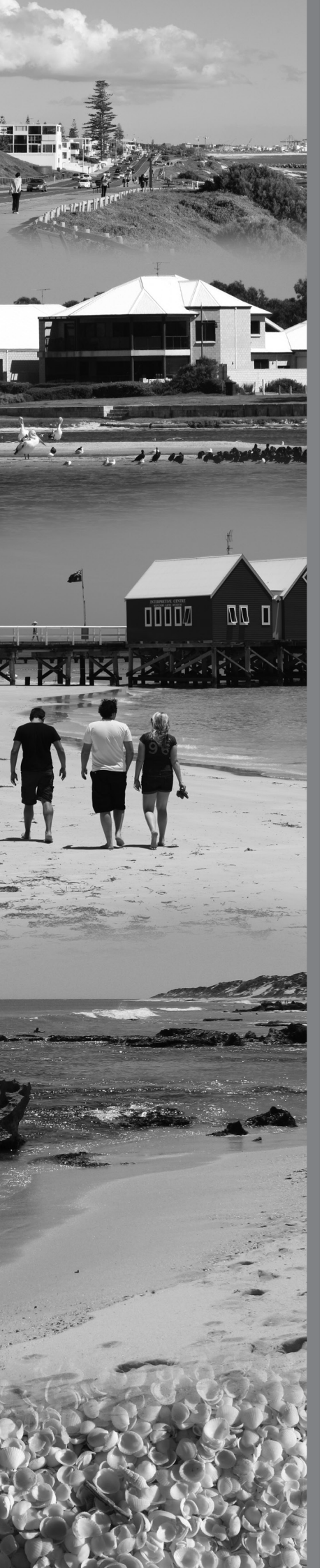

Department of **Planning**

GOVERNMENT OF WESTERN AUSTRALIA

Western Australian Planning Commission

Draft
State Planning Policy 2.6
State Coastal Planning policy

February 2012

Prepared under Part Three of the
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Published by the Department of Planning
140 William Street, Perth WA 6000

Locked Bag 2506
Perth WA 6001

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Website: www.planning.wa.gov.au
Email: corporate@planning.wa.gov.au

tel: 08 655 19000
fax: 08 655 19001
National Relay Service: 13 36 77
infoline: 1800 626 477

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1. Citation

This is a State Planning Policy made under Part 3 of the *Planning and Development Act 2005*. This Policy may be cited as State Planning Policy No. 2.6 State Coastal Planning Policy.

2. Introduction and background

2.1 The Western Australian Coast

The Western Australian coast is a significant asset of the state in terms of its environmental, economic, social and cultural resources.

The Western Australian coast varies in character and patterns of use and includes:

- urban coasts – where the adjacent uses are predominantly residential and commercial and there is a high demand for recreational activity;
- natural coasts – with less intensive hinterland uses and concentrations of tourism and associated recreational and cultural activities; and
- remote coasts – with limited opportunity for low key tourism and associated recreational and cultural activities.

There are pressures on the coast for use by different groups in the community for a variety of purposes including a mix of recreational, residential, industrial and commercial uses. Planning for coastal land is about balancing these often competing needs and desires in a way that takes into account the values of the coast, which include its scenic, aesthetic and ecological qualities; recreational opportunities; and social, indigenous, cultural and economic importance. The overall effect of these values contributes to the psychological wellbeing and health of the Western Australian community. The presence of coastal hazards is also an important consideration.

There is also growing pressure on coastal resources as the state's population increases, coastal-based industries expand and technological changes make remote areas more accessible. Successful coastal planning today will ensure that current and future generations of Western Australians can benefit from the opportunities presented by the values and resources of the Western Australian coast.

2.2 The Policy Context

Section 77 of the *Planning and Development Act 2005* requires local governments, when preparing or amending a local planning scheme, to have due regard to this State Coastal Planning Policy where it affects its district. The local governments may decide to make a new or amended scheme consistent with particular aspects of this State Coastal Planning Policy, or include in a new or amended scheme a provision that this State Coastal Planning Policy is to be read as part of the scheme.

The *State Planning Strategy* provides a strategic basis for coordinating and promoting land use, transport and land development in a sustainable manner throughout Western Australia. The Strategy sets out the guidance for achieving the state goals of generating wealth and prosperity; preserving and enhancing the environment; and building vibrant and safe communities for enjoyment of current and subsequent generations of Western Australians.

State Planning Policy No. 1 State Planning Framework Policy (SPP1) brings together existing state and regional policies and plans that apply to land use and development in Western Australia, into a State Planning Framework. SPP1 identifies the policies, plans, strategies and guidelines as well as regional strategies, regional and sub-regional structure plans, strategic policies and operation policies and guidelines prepared from time to time and used by the Western Australian Planning Commission (WAPC) and the Department of Planning in making decisions.

State Planning Policy No. 2: Environment and Natural Resources Policy (SPP2) sets out the broad environment and resource management policies for sustainable development.

Under SPP2 planning strategies, schemes and decision-making will identify and, where appropriate, include provisions for the sustainable use of the coast.

This State Coastal Planning Policy is consistent with and complementary to the State Planning Strategy, SPP1 and SPP2 and should be read and applied within the context provided by these policies.

2.3 Relationship to other WAPC Policies and Guidelines

SPP2.6 applies state-wide and draws on and is supported by other WAPC state planning policies, development control policies and guidelines relevant to the coast. Application of these other policies and guidelines is to be made in view of this policy, including but not limited to:

State planning policies

- *1 State Planning Framework Policy*
- *2 Environment and Natural Resources Policy*
- *2.9 Water Resources*
- *3 Urban Growth and Settlement*
- *3.4 Natural Hazards and Disasters*
- *3.6 Development Contributions and Infrastructure*
- *6.1 Leeuwin-Naturaliste Ridge Policy*
- *6.3 Ningaloo Coast.*

Development control policies

- *1.1 Subdivision of Land - General Principles,*
- *1.2 Development Control - General Principles,*
- *1.8 Canal Estates and other Artificial Waterway Developments,*
- *2.3 Public Open Space in Residential Areas and*
- *4.2 Planning for Hazards and Safety.*

Coastal planning guidelines

For coastal matters this State Planning Policy No. 2.6 State Coastal Planning Policy is to be viewed as the higher order and prevailing policy.

2.4 The Policy Purpose

The purpose of this Policy is to provide guidance for decision-making within the coastal zone including establishment of foreshore reserves; managing development and land use change; and to protect, conserve and enhance coastal values. This policy recognises and responds to regional diversity in coastal types; ensures coastal hazard risk management and adaptation is appropriately planned for; and encourages innovative approaches to managing coastal hazard risk.

The Policy is to inform and guide decision-making by the WAPC and its Committees, and in integrating and coordinating the activities of state agencies that influence the use and development of land on the coast. The Policy will also guide local governments, state government agencies, the State Administrative Tribunal and the State Government of those aspects of state planning policy concerning the protection of the coast that should be taken into account in planning decision-making.

There are many agencies with statutory responsibilities along the Western Australian coast. While recognising these responsibilities, this Policy provides a framework for coordinating those agency's activities with those of the private sector to ensure an integrated approach for coastal planning. The Policy also provides guidance for private landowners wishing to undertake development on or abutting the coast.

This Policy also provides guidance for situations where planning decisions occur outside the framework of the *Planning & Development Act 2005*, such as for unvested Crown land, pastoral lease, indigenous and conservation estate land.

3. Application of the policy

This Policy applies to the coast throughout Western Australia, including:

- sandy shorelines, rocky shorelines, mixed sandy and rocky shorelines, coastal lowlands, and tidal reaches of inland waters;
- near shore marine waters, state waters;
- all islands within the state lying seawards of the mainland; and
- land use and development abutting the coast.

The application of this Policy should be read in conjunction with policy of other relevant decision-making and management authorities.

4. Objectives

The objectives of this Policy are to:

1. ensure that the location of coastal facilities and development takes into account coastal processes, landform stability, coastal hazards, climate change and biophysical criteria;
2. ensure the identification of appropriate areas for the sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, commercial and other activities;
3. provide for public coastal foreshore reserves and access to them on the coast; and
4. protect, conserve and enhance coastal values, particularly in areas of landscape, nature conservation, indigenous and cultural significance.

5. POLICY MEASURES

5.1 General Measures

(i) Local and regional planning strategies, structure plans, schemes, subdivisions, strata subdivision and development applications, as well as other planning decisions and instruments relating to the coast should comply with the policy measures.

(ii) The policy measures where relevant should be read in conjunction with Schedule One and the Coastal Planning Guidelines prepared and endorsed under this policy.

5.2 Development and Settlement

(i) Encourage urban development to be concentrated in and around existing settlements, particularly those with established infrastructure and services. Continuous linear urban development along the coast should be discouraged or, where it has occurred, carefully controlled. Proposed major urban development outside existing settlements will only be supported where a genuine community need has been demonstrated and the environmental capability has been properly assessed.

(ii) Ensure that when selecting a development location, regard is given to infrastructure capacity and where possible, existing infrastructure be upgraded and improved.

(iii) Ensure that when identifying areas suitable for development, consideration is given to strategic sites for coastal access and commercial development that is demonstrably dependent on a foreshore location including ports, boat harbours and regional boat ramps.

(iv) Ensure that use of the coast, including the marine environment, for recreation, conservation, tourism, commerce, industry, housing, ocean access and other appropriate activities, is sustainable and located in suitable areas.

(v) Ensure that land use and development, including roads, adjacent to the coast is sited and designed to complement and enhance the coastal environment in terms of its visual, amenity, social and ecological values.

(vi) Avoid significant and permanent negative impacts on the environment, either on or off site.

5.3 Water Resources and Management

(i) Coastal development should manage water resources in accordance with the principles of water sensitive urban design and integrated water cycle management. This includes treating all urban water flows as potential resources, and giving consideration to all water users, including the community, industry and the environment.

(ii) Development on or near the coast should maintain or restore pre-existing or desirable environmental flows and hydrological cycles within foreshore reserves. Development on or near the coast should not discharge any waste or stormwater that could significantly degrade the coastal environment, including the coastal foreshore reserve, coastal waters and marine ecosystems.

(iii) Stormwater flows from development areas that comply with the Stormwater Management Manual for Western Australia may be incorporated into foreshore reserves. Permitted stormwater management measures within foreshore reserves are detention/infiltration areas and overland flow paths onto the beach for major flow events, subject to minimal landform modification within the dune system.

(iv) There is a general presumption against the use of coastal foreshore reserves for the management of wastewater or to accommodate any portion of infrastructure or site works used for wastewater management.

5.4 Building Height Limits

(i) Careful consideration should be given to building heights.

(ii) The provisions of this part of the policy apply to all development within 300 metres of the horizontal shoreline datum, but do not apply to industrial or resource development, transport, telecommunications and engineering infrastructure, and Port Works and Facilities (as defined by the *Port Authorities Act 1999*).

(iii) Building heights on the coast should have regard to the following development criteria:

  (a) development is consistent with the overall visual theme identified as part of land use planning for a locality or in an appropriate planning control instrument such as a local planning strategy;

  (b) development takes into account the built form, topography and landscape character of the surrounding area;

  (c) the location is part of an identified activity node;

  (d) the amenity of the coastal foreshore is not detrimentally affected by any significant overshadowing of the foreshore; and

  (e) there is visual permeability of the foreshore and ocean from nearby residential areas, roads and public spaces.

(iv) Maximum height limits may be specified as part of controls outlined in a regional planning scheme or local planning scheme, in order to achieve outcomes which respond to the desired character, built form and amenity of the locality.

5.5 Coastal Hazard Risk Management and Adaptation Planning

(i) Adequate coastal hazard risk management and adaptation planning should be undertaken by the responsible management authority and/or proponent where existing or proposed development is in an area at risk of being affected by coastal hazards over the planning timeframe. Coastal hazard risk management and adaptation planning should include as a minimum, a process that establishes the context, vulnerability assessment, risk identification, analysis, evaluation, adaptation, funding arrangements, maintenance, monitoring and review.

(ii) Where a coastal hazard risk is identified it should be disclosed to those likely to be affected. On consideration of approval for development lot owners should be made aware of the coastal hazard risk by providing the following notification on the certificate on title: **VULNERABLE COASTAL AREA – This lot is located in a area likely to be subject to coastal erosion and/or inundation over the next 100 years**.

(iii) Where risk assessments identify a level of risk that is unacceptable to the affected community or proposed development, adaptation measures need to be prepared to reduce those risks down to acceptable or tolerable levels. Adaptation measures should be sought from the following coastal hazard risk management and adaptation planning hierarchy on a sequential and preferential basis:

(1) **Avoid** the presence of new development within an area identified to be affected by coastal hazards. Determination of the likely consequences of coastal hazards should be done in consideration of local conditions and in accordance with the guidelines provided in Schedule One.

(2) **Planned** or **Managed Retreat** or the relocation or removal of assets within an area identified as likely to be subject to intolerable risk of damage from coastal hazards over the planning time frame.

(3) If sufficient justification can be provided for not avoiding development of land that is at risk from coastal hazards then **Accommodation** adaptation measures should be provided that suitably address the identified risks. Such measures would involve design and/or management strategies that render the risks from the identified coastal hazards acceptable.

(4) Where sufficient justification can be provided for not avoiding the use or development of land that is at risk from coastal hazards and accommodation measures alone cannot adequately address the risks from coastal hazards, then coastal **Protection** works may be proposed for areas where there is a need to preserve the foreshore reserve, public access and public safety, property and infrastructure that is not expendable.

(iv) Where new information or methods become available that significantly modify the understanding of the coastal hazards then all areas within the newly defined risk areas should be reviewed again through the coastal hazard risk management and adaptation planning hierarchy above, as part of the ongoing monitoring and review process.

5.6 Infill Development

(i) Where development is likely to be subject to coastal hazards over the planning timeframe, coastal hazard risk management and adaptation planning measures (Section 5.5) should be implemented to reduce the risk from coastal hazards over the full planning time frame to an acceptable level.

5.7 Coastal Protection Works

(i) There is a general presumption against new coastal protection works, except where such works are considered only after all other options for avoiding and adapting to coastal hazards have been fully explored, as part of a comprehensive coastal hazard risk management process.

(ii) Existing coastal protection works that require significant upgrade or maintenance over the planning timeframe should be considered as new coastal protection works, including consideration of the most appropriate form.

(iii) Coastal protection works should only be supported:

  (a) where it is demonstrated there are no significant negative impacts on the adjacent environment within the sediment cell; and

  (b) in conjunction with appropriate funding arrangements for the construction and ongoing care, control and maintenance being put in place.

(iv) Coastal protection works, where necessary and justified should be:

  (a) adequately considered and planned as part of making decisions about land use, subdivision and development within the coastal zone;

  (b) primarily proposed in the public interest to ensure they maintain a coastal foreshore reserve, public access, public amenity and public safety as well as to protect high value property and infrastructure that is not expendable; and

  (c) evaluated at a sediment cell level and take into consideration the future protection requirements of adjoining development.

5.8 Public Interest

(i) Ensure that adequate opportunity is provided to enable the community to participate in coastal planning and management, including the support and guidance of activities undertaken by voluntary coast care groups.

(ii) Community consultation and engagement strategies should be developed to encourage informed community input into decision-making processes. Communities should have sufficient information to understand the risks to their communities arising from likely influence on coastal processes and coastal hazards. Consultation and participation should raise community awareness, understanding and education of risks and appropriate responses associated with their region(s).

(iii) The provision of public access to the coast that is consistent with the values and management objectives of the area including, the interests of security, safety and protection of coastal resources as well as the recreational opportunities, both on and offshore, of that section of coast.

(vi) Support public ownership of the coast, including where appropriate the provision of a coastal foreshore reserve and accommodation of regional and local recreational needs.

(v) Support the removal of existing unlawful dwellings (squatter shacks) on coastal Crown land as per the State Government Squatter Policy (July 1989 and January 1999).

5.9 Coastal Foreshore Reserve

(i) Coastal foreshore reserves are required to accommodate a range of functions and values. While local and site specific considerations will vary, the delineation of a coastal foreshore reserve will include the consideration of, and protection for, significant natural features such as coastal habitats and, for their biodiversity, archaeological, ethnographic, geological, geo-morphological, visual or wilderness, ecological, heritage, landscape, seascape, and visual landscape values; likely impacts of coastal hazards; and opportunities for public access, public recreation needs and safety to lives and property. Schedule One provides guidance on how to estimate the potential impacts of coastal hazards, however, this is only one input into the determination of a coastal foreshore reserve, which will be required to demonstrate that the values, functions and uses prescribed are available at the end of the planning timeframe.

(ii) The required coastal foreshore reserve will vary according to the circumstances of any particular proposal. Each proposal must be assessed on its merits having regard to this policy, including the principles and guidelines of Schedule One and the Coastal Planning Policy Guidelines.

(iii) Ensure that the identification of land to be set aside for public ownership for management, public access, recreation, and conservation is undertaken during the planning process. Generally this land should be given up free of cost at the time of development, subdivision or strata subdivision, over and above the required provision of public open space.

(iv) Support vesting of the coastal foreshore reserve in the relevant local government for the purposes of coastal foreshore management, public access, recreation and conservation. Where the land has significant conservation value, vesting should generally be with the state body responsible for the conservation estate. Opportunities to improve and protect the conservation values of freehold land should also be pursued.

(v) Ensure that the coastal foreshore reserve is separated from adjacent development in a way that provides a clear demarcation between public and private land.

5.10 Coastal Strategies and Management Plans

(i) Ensure that at rezoning, structure planning, subdivision, strata subdivision or development – whichever arises first and is appropriate in scale, a coastal planning strategy or coastal foreshore management plan is prepared and implemented, by the local government and/or proponent, for the coastal foreshore reserve and any abutting freehold land with conservation values of the subject land.

(ii) Ensure that any structure plan, zoning, subdivision, strata subdivision or development proposal for public purposes, residential, industrial, commercial, tourist, special rural and similar uses on the coast is only approved based upon or in conjunction with a current detailed coastal planning strategy or foreshore management plan (whichever is appropriate for the stage and scale of development).

(iii) Ensure that the coastal planning strategy or foreshore management plan is developed in consultation with the broad community and relevant public authorities, and achieve the approval of the local land manager and the WAPC if appropriate.

(iv) A coastal planning strategy or foreshore management plan should address as a minimum, the matters set out in the Coastal Planning Policy Guidelines.

5.11 Precautionary Principle

(i) Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

(ii) The onus is on any proponent to show that development does not pose any likelihood of serious or irreversible harm to the environment.

(iii) If the proponent cannot demonstrate there is not a likelihood of such harm, the onus is on the development proponent to show that the harm can be managed.

6. Implementation

Implementation of this Policy will be through related state planning policies, regional strategies, local planning strategies and regional and local planning schemes. Implementation will also occur through the day to day process of decision-making on zoning, structure plans, subdivision, strata subdivision and development applications, and the actions of other state agencies in carrying out their responsibilities. New or amended region or local planning schemes should be consistent with the objectives, policy and guidelines contained in this Policy. Local governments and state agencies should take account of this Policy to ensure integrated decision-making.

Given the variation of coastal environments in the state and the range of development and use contexts that can be presented, it is important that this Policy, together with the Schedule One and Coastal Planning Policy Guidelines, be applied to each case under consideration on its merits using the best available information, common sense and a precautionary approach.

The Policy will be monitored on an ongoing basis and reviewed as required or at least within five years of its adoption.

7. Defintions

In this Policy, unless the context otherwise requires:

'accretion' refers to shoreline movement where the shoreline shifts seaward increasing the width of a coastal foreshore reserve and or the distance to a fixed feature on the adjoining land.

'acceptable' means the risks that do not need further treatment at this stage. The expression acceptable level of risk refers to the level at which it is decided that further restricting or otherwise altering the activity is not worthwhile. eg. additional effort will not result in significant reductions in risk levels.

'adaptation' means an adjustment in natural or human systems in response to actual or expected stimuli or their effects, which moderates harm or exploits beneficial opportunities. Adaptation is the primary means for maximising the gains and minimising the losses associated with climate change.

'coastal compartment' means length of shoreline bounded by broad scale changes in geology, geomorphic structures/landforms or changes in the aspect of the shore.

'coastal foreshore reserve' is the area of land on the coast set aside in public ownership to allow for likely impacts of coastal hazards and provide protection of public access, recreation and safety, ecological values, landscape, visual landscape, indigenous and cultural heritage.

'coastal or foreshore management plan' is a local scale plan, designating areas for various purposes such as public access, car parks, toilets and surf life saving club rooms, and providing advice on management needs. Foreshore management plans tend to deal with a smaller area, be more detailed and are prepared as part of a planning approval process or ongoing maintenance or upgrading program.

'coastal hazard' means the consequence of coastal processes that affect the environment and safety of people. Potential coastal hazards include erosion, accretion and inundation.

'coastal planning strategy' is generally a district or subregion scale plan focusing on the coast designating areas suitable for conservation, recreation and development purposes. It should include a strategic land use and access strategy and determination of an appropriate foreshore reserve.

'coastal processes' means any action of natural forces on the coastal environment.

'coastal protection works' means any permanent or periodic work undertaken primarily to alter physical coastal processes and/or manage the effects of coastal hazards. The influence of coastal protection works should be evaluated at the sediment cell level.

'consequence' means the outcome or impact of an event. Consequence is expressed qualitatively or quantitatively – a loss, injury, expressed concern, disadvantage or gain. Consequence can be more than one consequence from one event, range from positive to negative and is generally considered in relation to achievement of objectives.

'cross-shore' means perpendicular to the shoreline.

'development node' is a distinct and discrete built area that may be located within a coastal foreshore reserve. Excluding permanent residential development, it may vary in size from a grouping of recreational facilities to an area of commercial and short stay accommodation within an urban locality.

'environment' means conditions or influences comprising built, physical and social elements, which surround or interact with the community (including the natural conditions, the natural as modified by human activity and the artificial).

'erosion' refers to shoreline movement where the shoreline shifts landward reducing the width of a coastal foreshore reserve and/or the distance to a fixed feature on the adjoining land.

'event' means any occurrence of a particular set of circumstances that can have an adverse impact(s) on the environment. The event can be certain or uncertain, and be a one-off occurrence or a series of occurrences of a particular set of circumstances.

'height' has the same meaning as in the Town Planning Regulations 1967, Appendix B–Model Scheme Text.

'horizontal shoreline datum (HSD)' defines the active limit of the shoreline under storm activity. It is the line from which a physical processes allowance will be applied from.

'infill development' refers to sites between existing developments.

'intolerable' means risk that is unacceptable in any circumstances or at any level.

'inundation' means the flow of water onto previously dry land. It may either be permanent (for example due to sea level rise) or a temporary occurrence during a storm event.

'likelihood' means the probability that something will occur. Likelihood is generally expressed qualitatively or quantitatively.

'longshore' means parallel to the shoreline.

'peak steady water level (PSWL)' means the highest average elevation of the sea surface caused by the combined effect of storm surge, tide and wave setup resulting from the storm events defined in Schedule One section 5.

'precautionary principle' means where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, decisions should be guided by:

(i) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and

(ii) an assessment of the risk-weighted consequences of various options.

'risk' is specified in terms of an event or circumstances and the consequence that may flow from it. Risk is measured in terms of a combination of the likelihood of an event occurring and the consequence of that event occurring.

'risk assessment' means the overall process or method for evaluating risks associated with a specific coastal hazard and includes risk identification, risk analysis and risk evaluation.

'risk management' means the measures taken to reduce, modify, offset or share risks associated with development in areas subject to coastal hazards. These include the coordinated activities to direct and control an organisation with regard to risk; and the culture, processes and structures that are directed towards realising potential opportunities whilst managing adverse effects.

'sediment cell' means a length of shoreline in which interruptions to the movement of sediment along the beaches or near shore sea bed do not significantly affect beaches in the adjacent lengths of coastline. Within a sediment cell the sediments sources, transport pathways and sinks should be clearly definable.

'storm surge' means the increase in water level at the shoreline due to the forcing of winds (wind-setup) and atmospheric pressure.

'tidal reaches of inland waters' has the meaning in Schedule One section 3.5.

'tolerable' means the willingness to live with a risk to secure benefits, on the understanding that it is being properly controlled. 'Tolerability' does not mean 'acceptability'. Tolerating a risk does not mean that it is regarded as negligible, or something we may ignore, but rather as something that needs to be kept under review and reduced further, if and when able to be done so.

'updrift' means the direction to which the predominant longshore movement of shoreline material approaches.

'vulnerability' means the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity. Systems that are highly exposed, sensitive and less able to adapt are vulnerable.

'wave run-up' means the rush of water up a shoreline or structure on the breaking of a wave.

'wave overtopping' means water carried over the top of a structure or landform due to wave run-up or surge action exceeding the crest.

Schedule One
Calculation of coastal processes

1. Introduction

The specific objective of this Schedule is to provide guidance for calculating the component of the coastal foreshore reserve required to allow for coastal processes. **The width calculated from this Schedule does not necessarily delineate a coastal foreshore reserve width**. Factors other than coastal processes will often require additional width and should be considered on a case-by-case basis. These factors include ecological values, landscape, seascape, visual landscape, indigenous and cultural heritage, public access, recreation and safety to lives and property.

The component of the coastal foreshore reserve to allow for coastal processes should be sufficient to mitigate the impacts of coastal hazards (including erosion, accretion and inundation) by allowing for landform stability, natural variability and climate change. Notwithstanding this, where the affects of coastal processes would ordinarily preclude development, but where development is unavoidable, coastal hazard risk management and adaptation planning (Section 5.5) should be undertaken to reduce the risk from coastal hazards over the full planning timeframe, to an acceptable level.

An appropriate coastal foreshore reserve will include a component to allow for coastal processes and be of an appropriate width to ensure a coastal foreshore reserve continues to provide the values, functions and uses prescribed should the coastal processes be realised over the planning timeframe (Section 5.9 [i].

2. Planning time frame

These guidelines are based on a 100-year time frame from when a subject proposal is being assessed. For erosion and accretion, consideration is given to ocean forces and coastal processes, which have a one percent or one-in-one hundred probability of being equalled or exceeded in any given year over the planning timeframe. For storm surge inundation, consideration is given to ocean forces and coastal processes that have a 0.2 percent or one-in-five hundred probability of being equalled or exceeded in any given year over the planning time frame.

3. Coastal classification

Calculation for coastal processes should be determined with regard to the physical and biological features of the coast. The following classification of coastal types shall be used and coasts that cannot be categorised within these types shall be considered on a case-by-case basis.

3.1 Sandy Coasts

Sandy coasts comprise unlithified/unconsolidated sediments, rock is either not present or not dominant. They typically feature gently to moderately sloping shores and are often backed by dunes or beach ridges, which may contain dune blowouts. The shoreline can quickly alternate between accretion and erosion but is likely to retreat as a result of sea level rise.

Examples include Swanbourne to Trigg Beach (Perth), Wylie Beach (Esperance), and 80 Mile Beach (Canning Coast).

3.2 Rocky Coasts

Rocky coasts comprise a continuous rocky substrate which extends to an elevation above the active limit of the shoreline. In most instances this elevation should be defined at least one metre above the HSD. Coasts with discontinuous or low elevation rock shall be classified as mixed sandy and rocky coasts. Rocky coasts shall be classed as one of the following three groups depending on their geomorphic/geological features.

3.2.1 Hard rock coast

These coasts comprise hard, highly durable rock. They typically feature uniform slopes of a relatively low gradient, often with boulders at the base and are relatively free from fractures. Negligible shoreline change is expected over the planning timeframe.

Examples include the igneous/metamorphic headlands of Cape Naturaliste, Esperance, and the Dampier Archipelagos.

3.2.2 Soft sedimentary rock coast

These coasts comprise relatively hard, strongly lithified, durable rock with distinct bedding layers. They typically feature high, steep cliff faces, which may be undercut. Shoreline retreat is generally slow and through rock-falls or slab collapse.

Examples include the Kalbarri cliffs, Zuytdorp Cliffs (near Shark Bay), Broome, and the Great Australia Bight

3.2.3 Weakly lithified sedimentary rock coast

These coasts comprise poorly cemented or semi-lithified, discontinuous, relatively soft or highly weathered, weak rock. They typically feature low steep cliffs which are easily undercut often forming wave cut platforms. Shoreline retreat is comparatively rapid compared to other types of rocky coasts and generally occurs by slumping, rock-falls, or slab collapse.

Examples include the coastal limestone of the Perth Region and the Cape to Cape Region.

3.3 Mixed Sandy and Rocky Coasts

Mixed sandy and rocky coasts shall be classed as one of the following three groups dependent on the location and continuity of the rock. These coasts may be sensitive to small variations in climatic conditions and often contain unstable/dynamic landforms.

3.3.1 Fringing reefs

These shorelines comprise offshore or near shore rock in the form of a reef or island which results in a reduction in the wave energy reaching the shoreline. On sandy shorelines the wave sheltering often results in a bulge (salient) in the shoreline towards an offshore reef or island.

Examples include Shoalwater Bay (Perth), Lancelin, Horrocks, and Port Gregory.

3.3.2 Rocky platforms

These coasts comprise a continuous subtidal or intertidal rock platform overlain by unlithified/unconsolidated sediments. The rock platform is often created as the result of the historic retreat/ erosion of a rocky shoreline. In many locations a sandy beach overlays the platform to form a perched beach. These are commonly backed by a remnant sand dune.

Examples include Robert Point (Mandurah), and Leighton to Mudarup Rocks (Cottesloe, Perth), Greenhead, Leeman.

3.3.3 Discontinuous rocky shorelines

These coasts comprise discontinuous subtidal or intertidal rock on a predominantly sandy shoreline. The subtidal rock may be present as a pavement or discontinuous outcrops of reef close to the shore.

Examples include the bay beaches Trigg Point to Sorrento (Perth), North Head to Sandy Cape (Jurien), and Drummonds Cove (Geraldton).

3.4 Coastal Lowlands

Coastal lowlands typically feature flat to gently sloping shores often containing high percentages of finer sediments. In contrast to sandy coasts the landforms are generally the result of the historic geologic advance of a deltaic or outwash plain. The near shore environment often comprises tidal flats, salt marshes or mangroves. In many locations where there is an availability of sediments, a chenier plain or storm ridge may be present. These shorelines are strongly influenced by inundation and tidal processes.

Examples include the deltaic landforms of the Ashburton River (Onslow), Gascoyne (Carnarvon) and the outwash plains of Wooramel (Shark Bay), and Yannarie (Exmouth Gulf).

3.5 Tidal Reaches of Inland Waters

Tidal reaches of inland waters are inland water bodies which are predominantly controlled by coastal related processes, particularly tides and fluctuations in sea level. They include river mouths and estuaries and generally comprise flat to gently sloping shores often containing high percentages of finer sediments. These shorelines are strongly influenced by inundation and tidal processes.

Examples include the non-deltaic coastal lagoons of the southwest, Princess Royal Harbour (Albany), Oyster Harbour (Albany), Peel-Harvey Estuary and the Swan Estuary.

3.6 Islands

Islands typically comprise a combination of sandy and rocky coasts. Examples include Rottnest Island, Garden Island, the Abrolhos, and the Dampier Archipelago.

4. Calculation of the coastal processes

The site specific coastal foreshore reserve width to allow for coastal processes should be calculated based on the coastal classification, and should consider each of the factors listed for that coastal type.

The study area for the calculation of the coastal processes should be defined based on the coastal geology/geomorphology. The study area should include the entire sediment cell and extend to include adjacent coastal areas as required to define the coastal processes at the development site. Macro-level land use planning such as regional plans and strategies, should be extended to include the entire coastal compartment.

The values given for each factor have been based upon the best available data and are a conservative estimate of that factor and include allowance for uncertainty. As knowledge improves, the WAPC in consultation with and agreement of the Department of Planning will update the values and methods.

More detail and advice on the factors and the models used to calculate the value given for each factor can be obtained from the Department of Transport's Manager, Coastal Management.

4.1 Climate change

Climate change will cause variations in many environmental variables including mean sea level, ocean currents and temperature, wind climate, wave climate, rainfall/run-off and air temperature. The allowance for coastal processes should include the impacts of sea level rise. Consideration of changes in other key environmental variables should be included as knowledge improves.

The allowance for sea level rise should be based on a vertical sea level rise of 0.9 metres over a 100-year planning timeframe to 2110.

4.2 Horizontal shoreline datum

The horizontal shoreline datum should define the active limit of the shoreline under storm activity, and should be determined against the physical and biological features of the coast. In most instances it should be defined as the seaward shoreline contour representing the peak steady water level under storm activity resulting from the storm defined in section 5.

4.3 Coastal protection works

Development that benefits from protection from coastal hazards by formal coastal protection works should be determined on a case by case basis with the allowance for coastal processes taking into account the works in question.

4.4 Allowance for erosion on sandy coasts

On a sandy coast the allowance for erosion should be measured from the HSD and calculated as the sum of the factors: S1 Erosion; S2 Erosion; and S3 Erosion plus 0.2 metres per year allowance for uncertainty.

4.4.1 (S1 Erosion) Allowance for the current risk of storm erosion

The allowance for absorbing the current risk of erosion should be based on the calculation of the maximum cross-shore storm erosion with consideration of the maximum longshore storm erosion. The cross-shore erosion should be determined using a credible sediment transport model appropriate for the subject location. When a model is used it should be run for three successive storm events and the distance should be the recession from the HSD to the land extent of the storm erosion as calculated by the model. In the absence of modelling a minimum value of 40 metres should be used to allow for cross-shore erosion coastal erosion on a typical sandy coast.

Consideration should be given to longshore erosion, especially where there may be a gradient/transition in longshore erosion during a storm. This may be caused by an obstacle (natural or manmade) which reduces updrift longshore sediment transport and is common on the tidal reaches of inland waters, sheltered embayments and gulfs.

Steeply sloping sandy coasts may also be subject to coastal recession as a result of slope failure. This may be the result of undercutting by storm erosion, changes in groundwater conditions or loading at the top of the slope. For steeply sloping sandy coasts the distance for absorbing the current risk of erosion should extend to the crest of the stable post storm shoreline slope. In the absence of a geological assessment the stable slope profile for a typical sandy shoreline should be 30 degrees from the horizontal.

4.4.2 (S2 Erosion) Allowance for historic shoreline movement trends

The allowance for historic shoreline movement trends should be based on the review of available shoreline records. Aerial photography has been collected for the majority of the coast at about five-yearly intervals since around the 1950s and should be used to determine the historic position of the shoreline. In some locations historic beach and bathymetric surveys may exist and should also be used.

Consideration should be given to the cause of shoreline movement trends. Trends should be derived from shoreline movement time series and may include continuous erosion or accretion; erosion followed by accretion or visa-versa; longshore evolution of features; or shoreline rotation.

The allowance for historic shoreline movement trends should generally be calculated as 100 times the historic annual rate of erosion.

Where the historic annual rate of shoreline movement is accretion less than 0.2 metres per year the allowance for historic shoreline movement trends should be zero. Where the historic annual rate of shoreline movement is continuous accretion in excess of 0.2 metres per year and there is compelling evidence that accretion is likely to continue at the same rate for at least the next 50 years the allowance for historic shoreline movement trends should be calculated as minus 50 times the historic longer-term annual rate of accretion.

Where mobile dune systems exist, they should be included in the coastal foreshore reserve width, with a provision for dune migration calculated as 100 times the annual historic movement rate.

The coastal foreshore reserve width shall include the greatest of that calculated as a result of shoreline movement or dune migration.

4.4.3 (S3 Erosion) Allowance for erosion caused by future sea level rise

The allowance for erosion caused by future sea level rise on sandy coast should be calculated as 100 times the adopted sea level rise value of 0.9m over a 100-year timeframe or 90 metres. Consideration should be given to increasing the allowance where the impact of obstacles (natural or manmade) may influence future trends by reducing updrift longshore sediment transport.

4.5 Allowance for erosion on rocky coasts

On the majority of rocky coasts the rate of coastal erosion is relatively slow. The allowance for the current and future risk of erosion should be based on a geotechnical assessment of the shoreline stability. The geotechnical assessment should include consideration of: slope elevation, slope angle, durability of material, consistency of material, angle of bedding layers and thickness of bedding layers.

4.6 Allowance for erosion on mixed sandy and rocky coasts

4.6.1 Allowance for erosion on fringing reefs

The allowance for erosion on coasts with fringing reefs should generally be determined using the methods specified for sandy coasts. Where a dynamic landform is present, such as a salient, the coastal foreshore reserve width should include allowance for the fluctuation or reduction/loss of the landform.

The allowance for erosion caused by future sea level rise should include consideration of the potential reduction in wave attenuation by reef and the resulting impacts on shoreline stability.

4.6.2 Allowance for erosion on rocky platforms

The allowance for erosion on rocky platforms should be determined on a case-by-case basis. The allowance should be evaluated following a geotechnical assessment of the platform which should include consideration of: elevation, width, angle and durability and consistency of material.

4.6.3 Allowance for erosion on discontinuous rocky coasts

The allowance for erosion on discontinuous rocky coasts should generally be determined using the methods specified for sandy coasts. Particular consideration however, should be given to how a rocky outcrop may act as an obstacle to updrift longshore sediment transport.

4.7 Allowance for erosion on coastal lowlands

The allowance for erosion on coastal lowlands should generally be determined using the methods specified for sandy coasts,; rocky coasts; and mixed sandy and rocky coasts. However consideration should be given to potential changes in the landform.

4.8 Allowance for erosion on tidal reaches of inland waters

The allowance for erosion on tidal reaches of inland water should generally be determined using the methods specified for sandy, rocky, and mixed sandy and rocky coasts. It is however, acknowledged that these methods are principally derived for open ocean coast and case-by-case consideration should be given to the variation in underlying coastal processes and driving forces within sheltered inland waters.

4.9 Allowance for erosion on islands

Acknowledging that for most islands the allowance would preclude development, variation should be considered on a case-by-case basis.

4.10 Allowance for storm surge inundation on all coasts

The allowance for inundation should be the maximum extent of inundation calculated as the sum of S4 Inundation plus the predicted extent of sea level rise. Where inundation is limited by a coastal barrier (natural or manmade) consideration should be given to the stability of the barrier over the planning period.

4.10.1 (S4 Inundation) Allowance for the current risk of storm surge inundation

The allowance for the current risk of inundation should be the maximum extent of storm inundation, defined as the peak steady water level plus wave run-up. Where inundation is halted by a coastal barrier (natural or manmade) consideration should be given to whether the barrier may be breached or bypassed during a storm event over the planning period.

Where a continuous barrier dune is present the capacity of the dune to provide protection from inundation should be assessed based on the cross-sectional area of the dune. If the dune reserve, the cross-sectional area of the dune above the peak steady ater level, is less than 100 cubic metres, it should be assumed that the dune will be removed during storm activity and the maximum extent of storm inundation should be calculated without the dune.

On low permeability/impermeable coasts where wave run-up can result in wave overtopping, the coastal foreshore reserve width for this coastal process should be the maximum extent of wave overtopping.

5. Definition of the storm event

The selection of the storm event for determining the allowance for the current risk of erosion and inundation is dependent on the coastal zone (Figure E1).

The allowance for the current risk of erosion should be based on a tropical cyclone storm event for zones one and two and a mid-latitude depression or extra-tropical low storm event for zones three and four.

The allowance for the current risk of inundation should be based on a tropical cyclone storm event for zones one, two and three; and a mid-latitude depression or extra-tropical low storm event for zone four.

Storm events will vary for each location and should be reviewed on a case-by-case basis. The path for the storm event should be determined so as to maximise the associated erosion and inundation. To assist in the determination of tropical cyclonic storm events the relative scales, central pressures and worst-case paths derived from historic records area available for the majority of locations. Non-tropical cyclonic storm events for coastal zones three and four should be based on recorded storm events and are available for the majority of locations.

5.1 Tsunamis

Storm events currently do not include definition of tsunamis. As information becomes available however, the tsunamis should be considered as a storm event when determining the allowance for absorbing the current risk of inundation.

5.2 Sheltered coasts

Some sections of the coast are sheltered from the direct impacts of offshore storm events. This may be as they form part of the tidal reaches of inland waterways or due to the presence of offshore islands/reefs. For these locations the storm event should be defined on a case-by-case basis either by the transformation of the offshore storm event or, for fetch limited locations, the hindcasting of an equivalent storm event based on recorded or modelled winds.

6 Variations

It is recognised that in the circumstances described below development may need to occur within an area identified to be potentially impacted by physical coastal processes within the planning time frame. Such development should always be considered within a coastal hazard risk management and adaptation planning process and should only precede once adequate management and adaptation planning measures have been agreed, and which accord with the Avoid – Planned or Managed Retreat - Accommodate – Protect hierarchy stipulated in the policy General Measures.

6.1 Public Recreation Facilities with Finite Lifespan

Development with an expected useful lifespan of less than 30 years for public recreation purposes on the proviso that the development is to be removed or modified should it be threatened by erosion or creates an erosion threat to other land. Such development may include for example minor car parks for coastal recreational users; recreational amenities such as public ablutions; barbeque/picnic/shade areas; playground and other recreational equipment; infrastructure for public safety; and pedestrian access structures such as ramps, stairs and paths.

6.2 Coastally Dependent and Easily Relocatable Development

Temporary, easily relocatable structures that are demonstrably coastally dependent. Such structures may include for example fencing, for the purposes of protecting dunes and ecologically sensitive areas; sun shades; and facilities for public events.

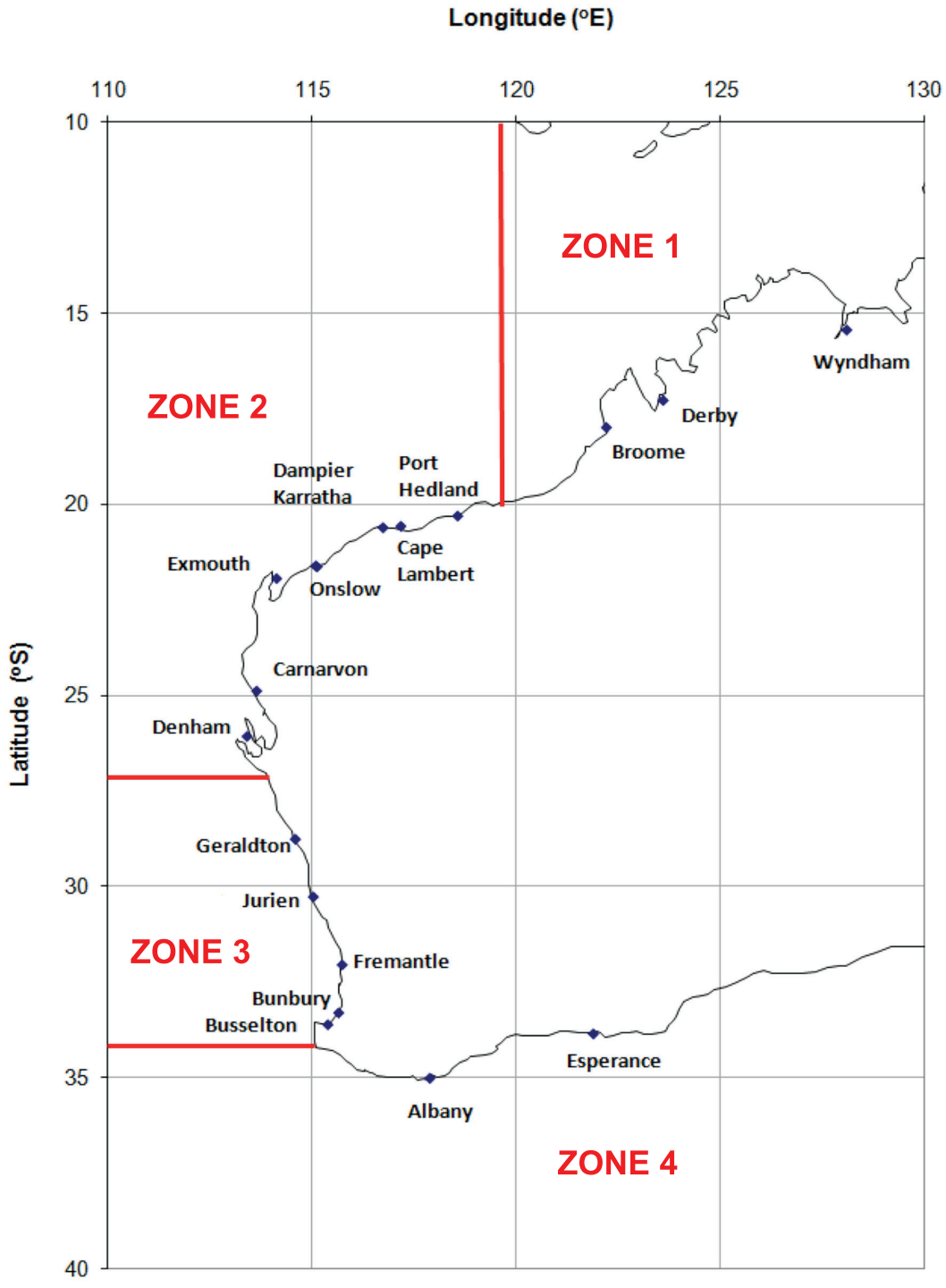

Figure 1. Coastal Zones

6.3 Department of Defence

Department of Defence operational installations that require foreshore location.

6.4 Industrial and Commercial Development

Industrial and commercial development that is demonstrably dependent on a foreshore location. Such development may include, for example, marinas, cage based aquaculture operations, recreational boating facilities and port facilities.

6.5 Development Nodes

The need for the provision of development nodes on the coast is recognised and should provide for a range of facilities to benefit the broader public. Such nodes may be developed within the coastal foreshore reserve but should only be located where identified in a strategic plan. Nodes should be located on stable areas; should have no negative impacts on the adjacent environment; and should avoid areas of high natural landscape or resource value.

6.6 Surf Life Saving Clubs

Where there is a demonstrable need for coastal surf life saving club facilities including surf life saver lookouts in the public interest, preference should be given to clubs that are identified in a strategic plan and co-located with other facilities such as those described in sections 6.1 and 6.5.

Development that falls within the above general possible variations will be assessed on a case-by-case basis against the policy measures in Section 5 and in consultation with other relevant agencies and community as considered appropriate.

Development that is dependent upon location on the coast but which would not require a direct interface with tidal areas or placement in the foreshore – such as resort developments or tank based aquaculture – permanent infrastructure services and facilities such as sewerage pumping stations, drainage, communications, energy and water operation are not included in these possible variations.