Department of
Transport

Coastal Sediment Cells for the Vlamingh Coast

Between Cape Naturaliste and Moore River, Western Australia

Report Number: M2012 (60001)
Version: 1
Date: September 2015

Recommended citation

Stul T, Gozzard JR, Eliot IG and Eliot MJ (2015) ***Coastal Sediment Cells for the Vlamingh Region between Cape Naturaliste and Moore River, Western Australia***. Report prepared by Seashore Engineering Pty Ltd and Geological Survey of Western Australia for the Western Australian Department of Transport, Fremantle.

The custodian of the digital dataset is the Department of Transport.

Photographs used are from WACoast[34].

The Department of Transport acknowledges Bob Gozzard from Geological Survey of Western Australia for providing the images.

Geological Survey of Western Australia

Seashore Engineering

Executive summary

The aim of this report is to identify a hierarchy of sediment cells to assist planning, management, engineering, science and governance of the Vlamingh coast.

Sediment cells are spatially discrete areas of the coast within which marine and terrestrial landforms are likely to be connected through processes of sediment exchange, often described using *sediment budgets.* They include areas of sediment supply (sources), sediment loss (sinks), and the sediment transport processes linking them (pathways). Sediment transport pathways include both alongshore and cross-shore processes, and therefore cells are best represented in two-dimensions. They are natural management units with a physical basis and commonly cross jurisdictional boundaries.

Sediment cells provide a summary of coastal data in a simple format and can be used to:

1. Identify the spatial context for coastal evaluations;
2. Provide a visual framework for communicating about the coast with people of any background;
3. Support coastal management decision-making;
4. Support a range of technical uses largely relating to coastal stability assessment, such as interpreting historic trends, understanding contemporary processes and basis for projection of potential future coastal change; and
5. Reduce problems caused by selection of arbitrary or jurisdictional boundaries.

Boundaries of sediment cells have been identified for the Vlamingh coast between Cape Naturaliste and Moore River (Guilderton) in Western Australia. The region also extends along the Garden Island Ridge, including Garden Island and Rottnest Island. Nine primary cells, 40 secondary cells and 81 tertiary cells were identified between Cape Naturaliste and Moore River. Ten of the secondary cells and 21 of the tertiary cells are located on the Garden Island Ridge. The cell hierarchy for the Vlamingh coast is presented as maps and tables in this report, and in electronic datasets available from the Department of Transport. They were defined in three steps through selection of:

1. Points along the shoreline (beachface);
2. Offshore and onshore boundaries; and
3. Alongshore boundaries connecting the beachface points to the offshore and onshore boundaries.

This focuses on boundary definition at the beachface where the highest rates of sediment transport are likely to occur.

The cells have been mapped as a hierarchy of primary, secondary and tertiary levels to incorporate three space and time (spatio-temporal) scales. This hierarchical representation of cells gives a basis for implementation of integrated planning and management at a number of scales, from small-scale engineering works, through to large-scale natural resource management.

- Primary cells are related to large landforms, and are most relevant to potential change in large landform assemblages or land systems over longer coastal management timescales of more than 50 years.
- Secondary cells incorporate contemporary sediment movement on the shoreface and potential landform responses to inter-decadal changes in coastal processes.
- Tertiary cells are defined by the reworking and movement of sediment in the nearshore and are most relevant for seasonal to inter-annual changes to the beachface.

Common use of cells is intended to facilitate better integration of coastal management decision-making between governance, science and engineering at a regional and local level.

Contents

Introduction

This report presents a hierarchy of sediment cells along the Vlamingh Coast for application in engineering, science, planning, management and governance of the region.

Sediment cell boundaries were mapped and identified at three spatio-temporal scales, along approximately 350km of the Western Australian coast between Cape Naturaliste and the Moore River. The area includes the inner continental shelf and coastal lands of the Vlamingh Region in the southern Swan Coastal Plain, including Garden Island and Rottnest Island (Figure 1; Figure 2; Figure 3; Appendix A). The three scales range from small, local landforms and the day-to-day processes affecting them to large coastal systems changing over millennia in response to global processes. At each scale the cells identify boundaries within which to consider the potential implications of proposed coastal engineering works as well as for assessment of coastal planning and management practices.

The hierarchy of cells facilitates understanding of contemporary sediment movement, encourages projection of future coastal change at a conceptual level, and establishes a context for qualitative investigations. Additionally, the hierarchy is intended to assist identification of differences in the processes driving coastal change at each scale.

Cells within this report are labelled according to a system described in *Cell labels.*

What are sediment cells?

Sediment cells are spatially discrete areas of the coast within which marine and terrestrial landforms are likely to be connected through processes of sediment exchange, often described using sediment budgets. Each includes areas of sediment supply (sources), loss (sinks), and areas through which sediment is moved between sources and sinks (pathways)[1]. These components are illustrated in Figure 4 for all levels in the hierarchy. Cells are natural management units with a physical basis and commonly cross jurisdictional boundaries.

Box 1: Literature on sediment cells

Sediment cells are spatially discrete areas of the coast within which marine and terrestrial landforms are likely to be connected through processes of sediment exchange, often described using sediment budgets. Extensive global literature related to sediment cells and sediment budgets is available and has previously been reviewed[2,3,4,5,6,7,8]. The literature includes a number of terms similar in meaning to coastal sediment cell, with slight disparities in their use, although the broad concepts underpinning cell identification and sediment budget estimation are well established[6].

Alternative terms for coastal sediment cell at varied spatial scales are littoral cell[1,9], coastal compartment[10], coastal sector[11], beach compartment or coastal segment[12], sediment cell with smaller coastal process units or sub-cells[13], coastal cell[14], process defined management unit or coastal management unit[15,4], coastal tract[5] and three nested systems of coastal behaviour systems , shoreline behaviour units and geomorphic units[16]. The term sediment cell is used in this report for the Vlamingh Region.

Sediment cells are commonly identified as self-contained where little or no sediment movement occurs across cell boundaries[16,8]. This concept is most applicable at a broad scale, such as when defining the scale and limits of coastal investigations[5]. Restriction of sediment movement is not a fundamental characteristic of cells at a fine scale or those not markedly compartmentalised by extensive rocky headlands. The cell approach retains meaning for these coasts, although their cells may have substantial sediment exchange across their boundaries[2,17].

Constraints to sediment transport vary over time for different spatial scales and types of cell boundaries. For example, some rocky headlands are bypassed under infrequent high-energy conditions, but are a major constraint to sediment transport on a seasonal basis. Similarly, on sandy coasts cell boundaries may correspond to ephemeral areas of sediment transport convergence which indicate zones of reduced transport[18,19]. This variability in sediment bypassing at boundaries prompts the incorporation of time-dependence between levels within a cell hierarchy[10], with the boundaries of the larger (primary) cells being related to longer-term processes.

Cell boundaries defined in this document extend landward from points on the shoreline to include terrestrial landforms, and seaward to encompass the nearshore marine environment in which waves and currents are most active. The offshore and onshore boundaries of cells should be determined by the scale of sediment transport processes operating within a cell, as well as by topographic features.

Why use sediment cells?

Sediment cells define natural units with each cell encompassing adjoining marine and terrestrial environments. The cells thereby provide a base for integrated coastal management in which the components of each cell is considered holistically as an interactive system. In this context sediment cells aid interpretation of historic trends, add to an understanding of contemporary processes and provide an important basis for projection of future coastal change. The objectives of determining a three-scale hierarchy of cells were to:

- Identify sediment cells which are recognisable as natural management units for regional, sub-regional and local scale coastal studies;
- Establish a framework for linking marine and terrestrial projects that is founded on the connectivity of subaqueous and submarine coastal landforms, and which supports integrated coastal planning and management;
- Identify areas of coast where sediment budget estimates may provide a useful tool for coastal planning and management based on landforms at varying time and space scales[20,21,22]; and
- Avoid clashes of policy and practice where coastal management is required by neighbouring coastal agencies, particularly local government authorities, within single or adjacent cells.

Characteristics of the sediment cell approach which make it a fundamental tool for assessment of hazards to land use caused by coastal change are that[23]:

- There is a plausible connectivity of geology, landform and hydrodynamics for coastal evolution and change that can be established and used in identification of the cells[24];
- It focuses on the integration of coastal and marine processes with landform responses to them rather than more static, quasi-equilibrium approaches such as those forming the basis for numerical models of beach profile change; and
- The consistent methodology applied to identifying the cell hierarchy facilitates up-scaling and down-scaling in assessments of coastal change, a capability recommended in the assessment of coastal vulnerability to meteorologic and oceanographic change[25].

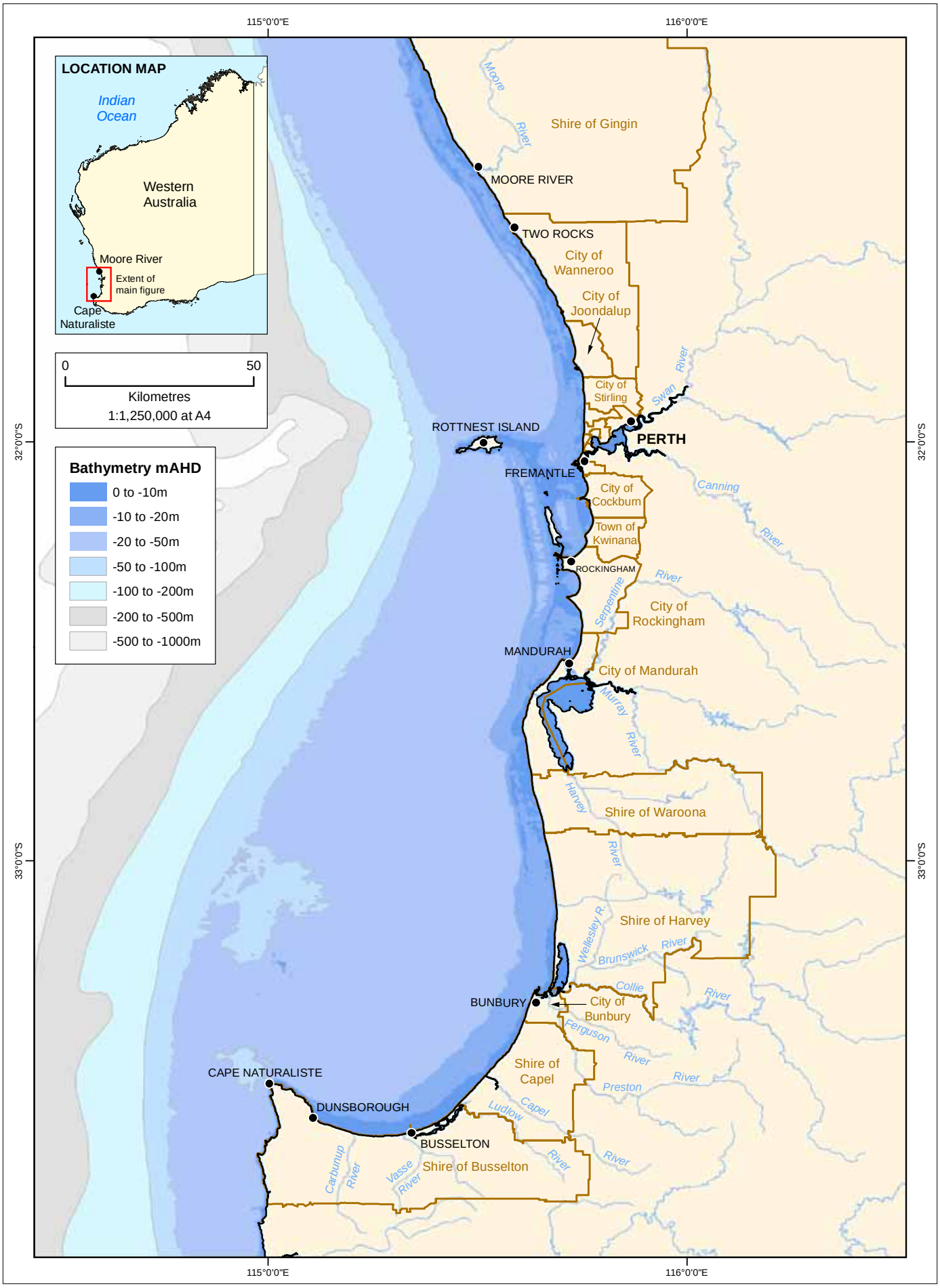


Figure 1: Vlamingh Region coast from Cape Naturaliste to Moore River

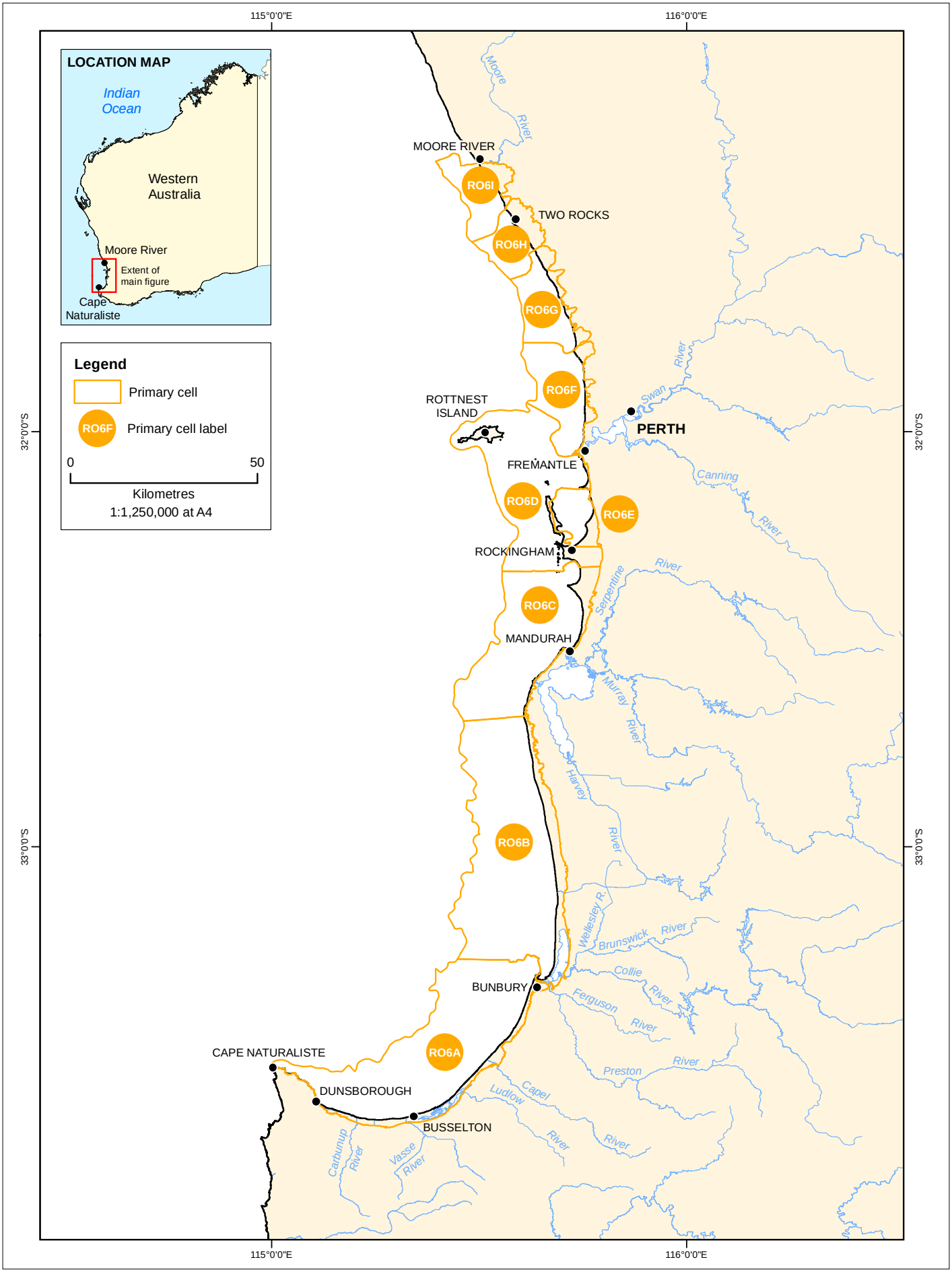


Figure 2: Primary cells of the Vlamingh Region

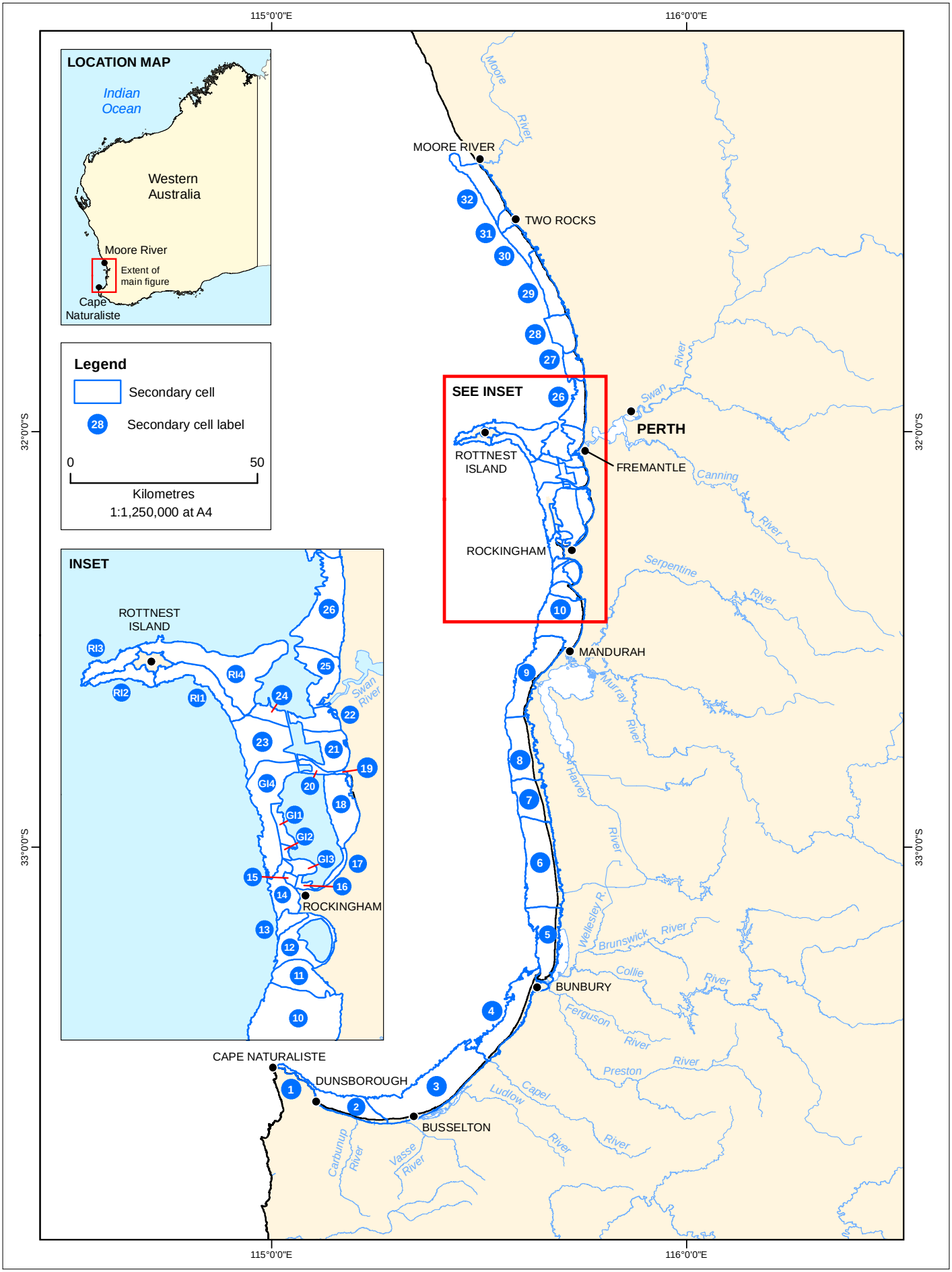


Figure 3: Secondary cells of the Vlamingh Region

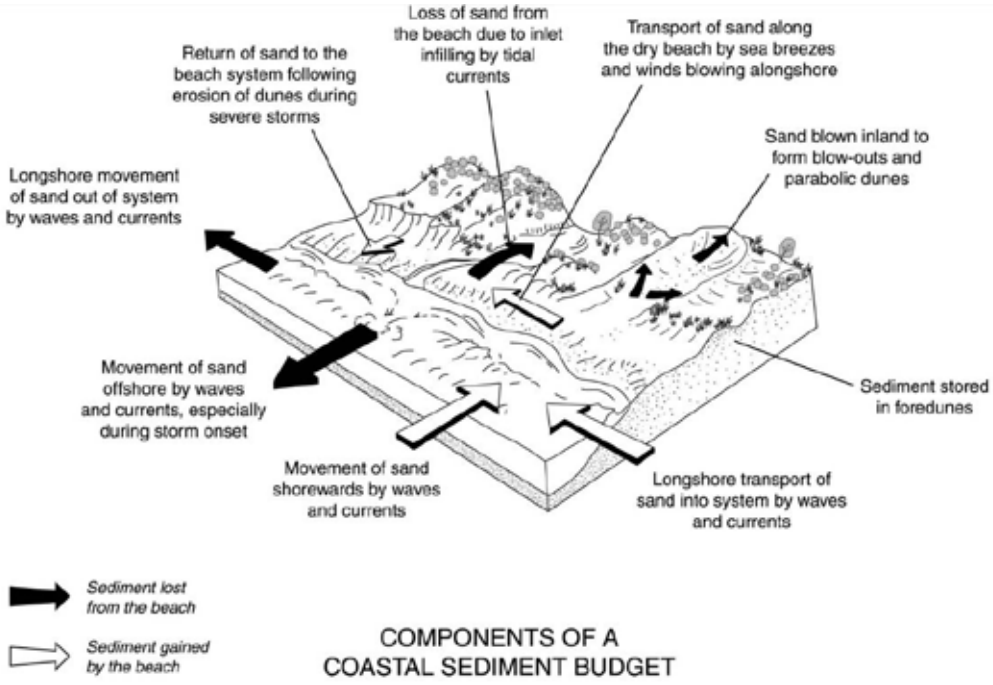


Figure 4A: Components of a coastal sediment cell (WAPC 2003)

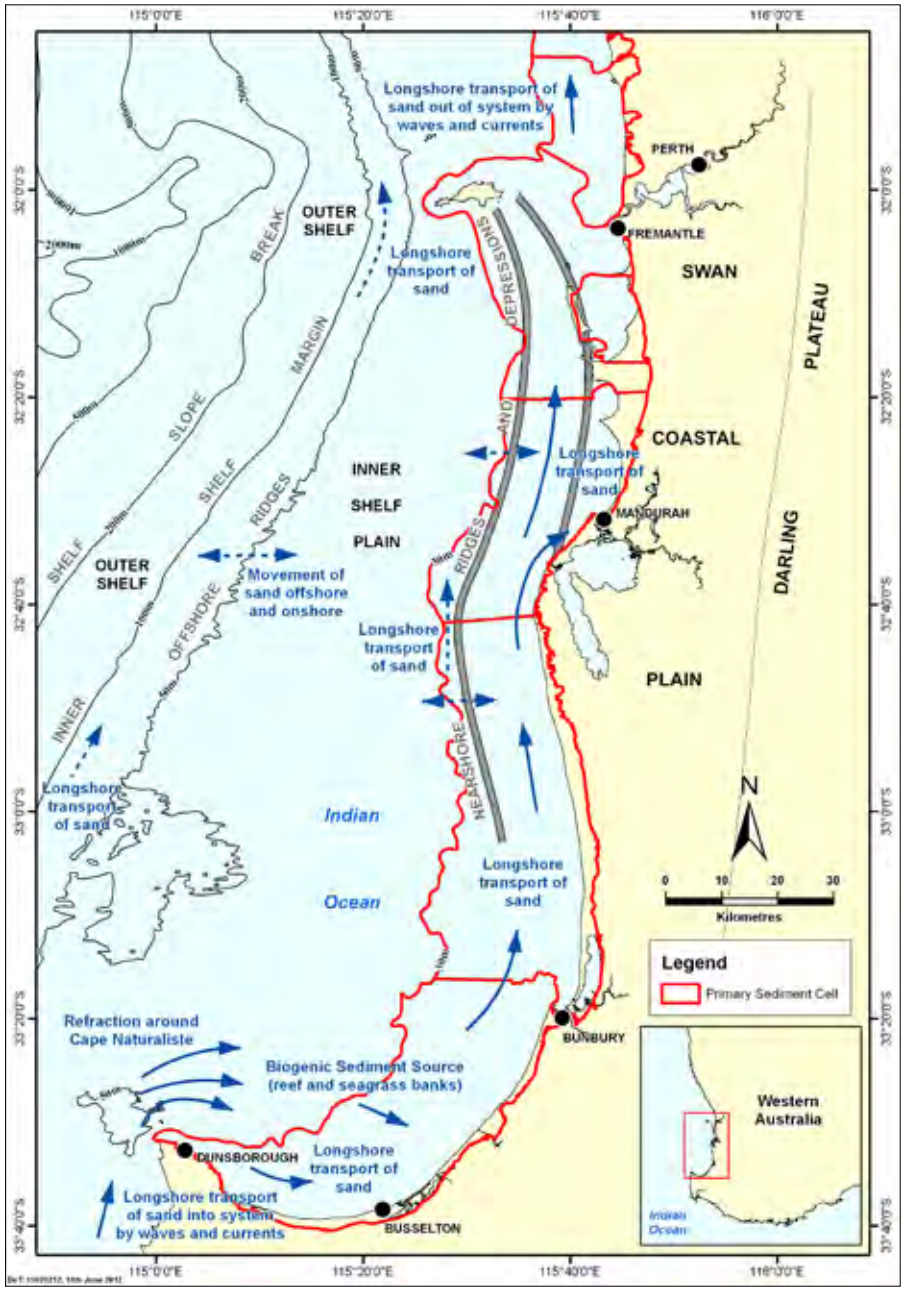


Figure 4B: Example primary cells (R06A to R06F) (after Collins 1988)

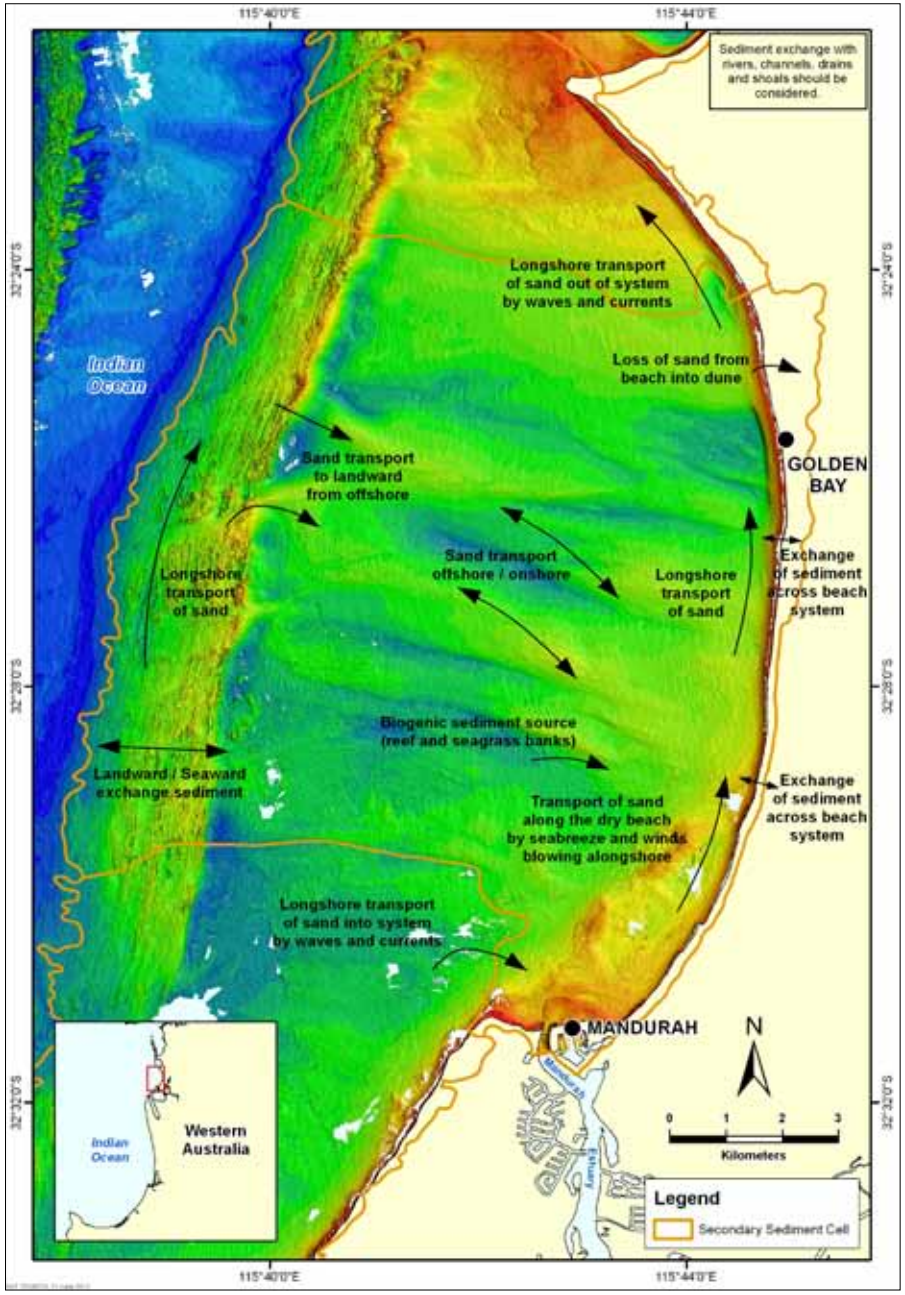


Figure 4C: Example secondary cell (R06C10)

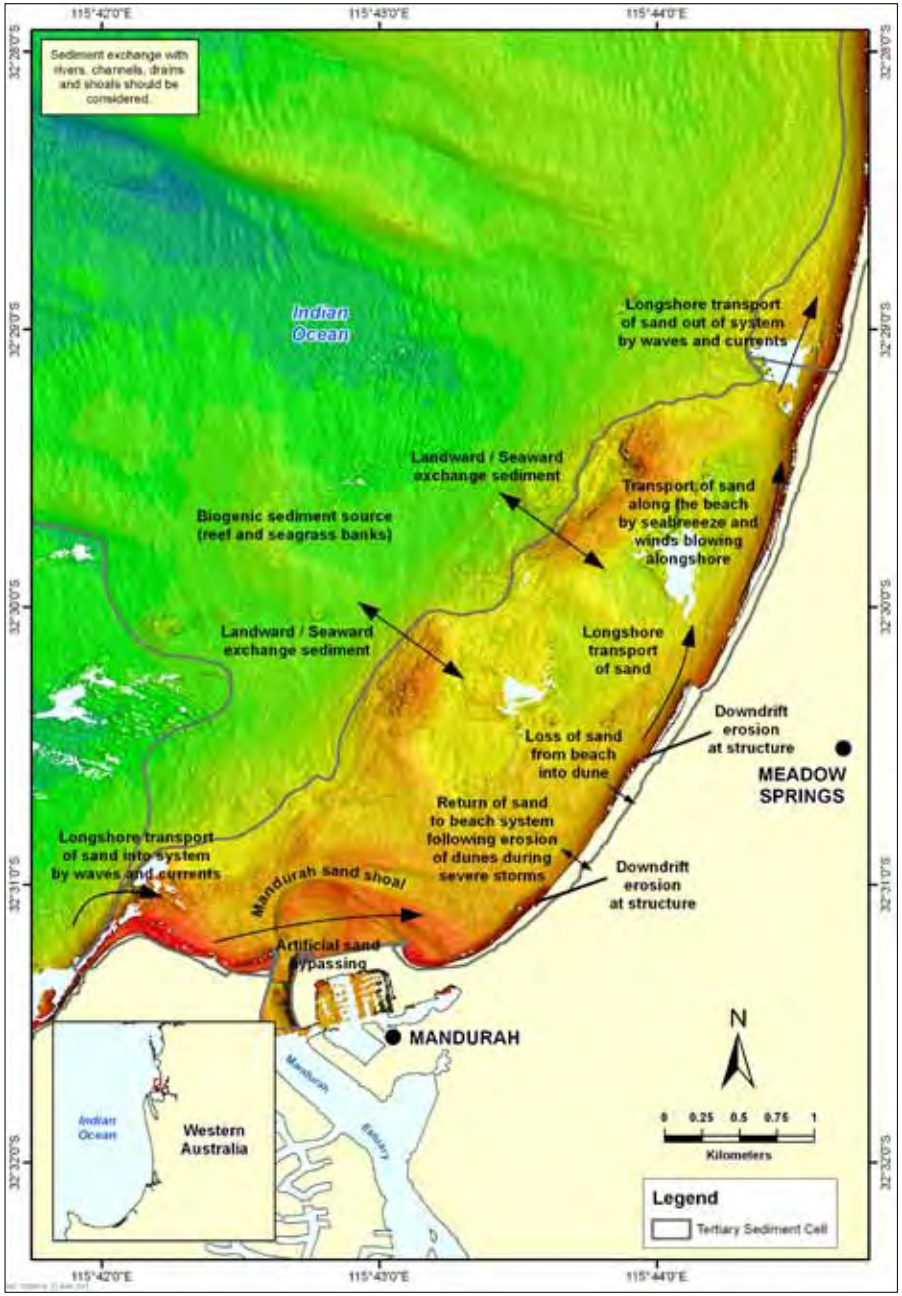


Figure 4D: Example tertiary cell (R06C10a)

The Vlamingh coast

Coastal landform development on the microtidal Vlamingh coast, with low present-day supply of sediment, is subject to substantial control by the geologic framework. Control occurs through interaction of the fixed rocky topography, comprising the framework, with coastal processes and available sediments. The framework for the Vlamingh coast has been described at a variety of scales as part of a series of large-scale coastal compartments identified for the whole Western Australian coast[26].

Modern Holocene sediments and inherited, remnant landforms abut and overlay the geologic framework. Both are reworked by present-day processes, although typically less for remnant landforms. The partly repetitive patterns of reworking define sediment transport behaviour at all scales.
Landforms of the Vlamingh region include:

1. Sand flats, sediment lobes, sand banks and shoals between reef gaps;
2. Flats, subtidal terraces and sand banks spilling into nearshore basins in the inshore waters; and
3. Tombolos, spits, cuspate forelands and coastal dune barriers along the coast[34,35].

These landforms provide an indication of the source areas, transport pathways and sinks; although they need to be established in relation to the processes driving coastal change.

The spatial distribution of alongshore sediment supply is affected by the degree of bypassing at rocky coastal features and engineering works. This varies with shoreline aspect and may therefore be subject to decadal-scale fluctuations. Further offshore, discontinuous reef ridges and inshore reef chains provide a leaky constraint to onshore and offshore sediment movement. Shoreward exchange of sediment typically occurs through gaps in the reef chains and may result in pulses of sediment transport to landward. More commonly, material is moved offshore through reef gaps and is lost from the nearshore system. At the shore, the geologic framework in the form of cliffs and bluffs may constrain sediment transport to landward.

The geologic framework provides a context for identification and description of sediment cells. However, transition from the fixed-structural, broad-scale geologic framework of the compartments to the functionally highly-variable, fine-scale sediment cells commonly includes a change in the balance of processes affecting the shore. For example, offshore currents driven by tides or winds may be significant to coastal evolution at a broad scale but not at a local scale where waves are likely to be dominant. This implies there is potential for process-landform interactions to generate errors at a broader or finer scale than a specific scale under investigation. The broader scale interactions commonly are apparent as trends whereas finer scale interactions contribute to the variability of the system being investigated.

Further information on geology, geomorphology, landforms, meteorological and oceanographic processes for the Vlamingh Region is included in previous work undertaken in the area[e.g.11,27,28,29,30,31,32,33]. Additional geology and geomorphology information is included in the WACoast[34,35] database, the Sea to Scarp resources study[36] and from a country-scale study of Australian beaches[37]. Information on terminology used in this report is contained in previous reports[26,38,39] and global publications[40].

Methods for the definition of sediment cells

Coastal sediment compartments, cells and sectors have previously been investigated along large sections of the Vlamingh Region[11,41,42,43,44]. A hierarchy of large-scale compartments was defined for the whole Western Australian coast[26] to provide a geological context for coastal processes within each compartment, hence supporting identification and description of sediment cells.

In the present analysis, techniques originally established for the Vlamingh Region[45], with some modification of terminology, have been applied to map sediment cell boundaries. This is a revision of the original Cape Naturaliste to Moore River report, made available in 2012, to ensure a consistent format that was adaptable for the whole Western Australian coast. Notably, the technique used to identify and map sediment cells in the Vlamingh Region is modified for the Mid-West, Northampton and Pilbara Regions[46,47,48]. It is expected that further revision of the criteria used (Figure 5; Table 1; Table 2; Appendix C) will be required for application to other parts of the Western Australian coast or elsewhere.

A threefold hierarchy of cells was defined by the type and shape of landforms present as well as the frequency of coastal processes and potential landform responses relevant to each scale. The primary cells are larger and the tertiary cells are smaller. Each primary cell is related to a functional coastal land system, whereas the secondary and tertiary cells identify specific coastal landforms and landform components at increasingly detailed scales. Further offshore, primary cells may extend to a continental shelf feature well offshore, whereas a tertiary cell may capture seasonal to decadal nearshore processes. At each scale, cells are likely to vary in area based on the dimensions of the geologic framework containing the coastal landforms or landform elements being considered, together with meteorologic and oceanographic processes driving coastal change.

Tasks undertaken were based on available data, and involved:

1. Review of available literature to determine prevailing regional and local processes driving geomorphic change, including their temporal and spatial attributes;
2. Identification of the geologic framework and environmental context in which processes operate;
3. Establishment of criteria to identify cell boundaries at each level in the hierarchy of spatial scales indicated in Task 1;
4. Application of the criteria along the Vlamingh coast between Cape Naturaliste and Moore River to identify sediment cells;
5. Preparation of digital datasets and maps showing the cells at each of the three levels in the hierarchy; and
6. Comparison of potential differences in the morphodynamic processes active at each level in the cell hierarchy.

Information used to define the cells

Points along the shoreline that separate sediment cells were derived using the existing knowledge base of the coast, remotely sensed datasets and landform digital datasets (Table B.1 in Appendix B). Datasets used were:

1. Landgate Mean High Water Mark (MHWM) shoreline compiled to 2006;
2. Department of Transport nearshore and inshore LiDAR, Department of Transport nautical charts and isobaths; along with Australian Navy hydrographic charts and isobaths;
3. Onshore geology and geomorphology (including landforms) from Geological Survey of Western Australia[34,35];
4. Digitised foredunes, frontal dunes or the foreshore reserve prepared for this project by Geological Survey of Western Australia.
5. A shaded relief model from the Geological Survey of Western Australia;
6. Aerial orthophotography from Landgate; and
7. High-angle oblique aerial photography from Geological Survey of Western Australia[34,35].

These datasets cover most of the Vlamingh Region but vary with respect to time, spatial scale of capture and level of resolution. These factors limit use of the project datasets which may be reviewed as more detailed information becomes available. For example, the original mapping of coastal landforms was completed in 1985 to 1987 from unrectified stereoscopic aerial photography at a scale of 1:20,000. This scale is adequate for the identification of onshore cell boundaries at a primary and perhaps secondary cell scale but is inadequate at a tertiary cell scale. The information from which the secondary and tertiary cell onshore boundaries were determined also included recent oblique aerial photography, the shaded relief model, 2011 field surveys and landform mapping at 1:2,000-scale using 2006-2008 aerial orthophotomosaics[34,35]. LiDAR imagery, nautical charts, nautical isobaths and 2006-2008 aerial orthophotomosaics were used for delineation of the offshore boundaries and marine sections of the alongshore boundaries at all cell levels.

Additional information, particularly at a local scale, may facilitate refinement of the cell boundaries. In no particular order the extra information could include:

1. Local seismic surveys to determine rock coverage and depth of sediments;
2. Sediment distributions;
3. Long-term analysis of aerial photographs for dune activity;
4. Benthic habitat information;
5. Extension of LiDAR bathymetry north of Two Rocks; and
6. Contemporary and projected local variations in water levels, waves, currents and winds.

For example, detailed assessment of sediment characteristics and processes contributing to their distribution is useful for boundary verification[49] (see *Detailed evaluation of coastal behaviour*). An ongoing review process, say every 10 years, may allow the implications of observed coastal change to be incorporated.

Cell boundaries

A threefold hierarchy of cells is considered for the Vlamingh coast with each cell represented as two-dimensions because sediment transport pathways include both alongshore and cross-shore processes. Each cell may be thought of holistically as a collection of marine and terrestrial landforms, inter-related by sediment exchange between the landforms.

In this study, points along the shoreline separating the cells have first been identified (Table 1), followed by offshore and onshore boundaries (Figure 5; Table 2). Offshore and onshore boundaries are connected by mapping through the beachface points at the shoreline (Table 1). This sequence provides a focus on the alongshore boundary definition at the shoreline, and therefore on beachface processes, while being aware that significantly higher rates of sediment transport occur in this zone.

Alongshore cell boundaries (beachface points) are principally determined by one or several geologic, geomorphic or engineered features at the shoreline (Table 1). Each alongshore boundary has marine and terrestrial sections that connect the offshore and onshore cell boundaries through the beachface point (Figure 5). Distinctions between morphology and processes at each sediment cell scale are incorporated in criteria used to identify the beachface points and cell boundaries. Separate criteria are described for each level in the hierarchy (see *Primary cells, Secondary cells and Tertiary cells*). Sediment cells with cliffed or engineered coasts may have alongshore boundaries with no terrestrial section where the beachface point is coincident with the Landgate MHWM to 2006.

A list of features used to determine the alongshore boundary lines for marine and terrestrial sections is included in Table 1. Those identifying the marine section of the alongshore boundaries provide some restriction to sediment transport at varying timescales: from greater than 100 years for primary cells to inter-decadal and higher frequency timescales for tertiary cells. The terrestrial section of alongshore boundaries is the limit of, or discontinuities in, the relative coastal land system or coastal landform between adjacent cells at the scale of interest. Relevant Holocene coastal land systems are used at a primary cell scale, with foredune plains and parabolic dunes at a secondary scale and frontal dunes or foredunes at a tertiary scale. Exceptions occur on islands, engineered coasts and cliffed coasts where there is no terrestrial section of the alongshore boundary. In places where there is no variation in the land system or landform landward of the beachface point, a *notional* boundary is mapped as a landward extension of the marine boundary line through the beachface point to the onshore boundary along a similar trajectory or orthogonal to the coast (e.g. Warnbro in Figure A.9 in Appendix A).

Points along the shore separating the cells are characterised according to the restriction of sediment transport (open or closed); the extent of the restriction (point or zone) and the potential for migration (fixed or ambulatory). For example the apex of a rocky headland is defined as a fixed point whereas a salient sustained by wave convergence behind a large area of reef is recognised as a fuzzy boundary or zone, although it is geographically fixed. Ambulatory features may be points (e.g. large spits) or zones (e.g. deltas). By definition, an alongshore boundary cannot be ambulatory and closed.

Primary cells evolve over centuries and millennia. They are linked to coastal land systems[50,51,52,53,54,55,56,57,58] and broad marine systems[11,33]. Secondary cells are based on large coastal landforms[34,35,36] subject to inter-decadal change. Tertiary cells are based on coastal landforms subject to change on an inter-annual scale, as well as beachface features restricting sediment transport at a seasonal scale.

Method overview

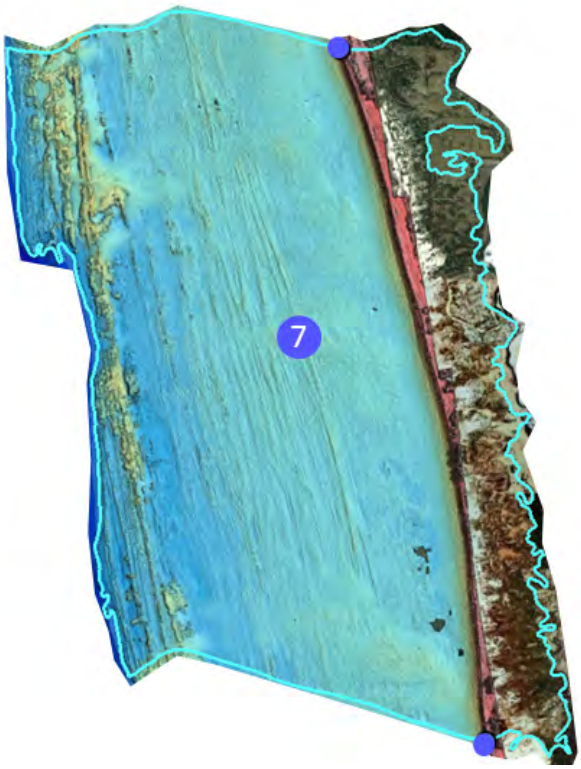
1) Identify points at the beachface.

2) Identify offshore and onshore boundaries.

3) Map alongshore boundaries that connect onshore and offshore boundaries through the beachface point.

Each alongshore boundary has a marine and a terrestrial section.

4) Process is iterative and is checked between cell scales.



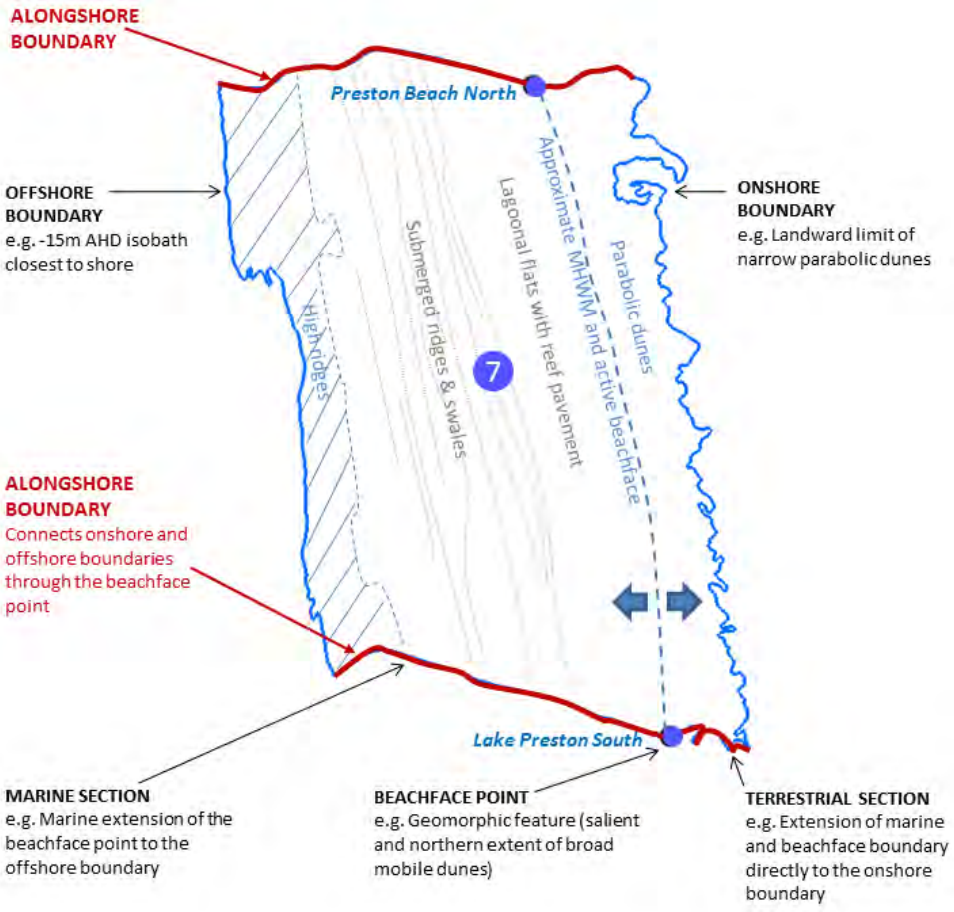


Figure 5: Cell boundaries - example for R06B7
Data Source: LiDAR by Department of Transport and Department of Planning.

Table 1: Criteria for mapping alongshore boundaries in the Vlamingh Region
Variation of criteria will be required when applied to other coastal regions

	Primary cell	Secondary cell	Tertiary cell
Alongshore Boundary	**Marine Section** ((i) -30m AHD isobath (ii) Toe of Holocene sediment banks (iii) Deepest point of depression or contour reentrant (if depth <-30m AHD)[1] (iv) Broad area of sediment transport convergence (e.g. reefs, banks, change in aspect)	**Marine Section** (i) -15m AHD isobath (ii) Fixed by submerged rock outcrops or islands (iii) Area of sediment transport convergence on banks or reefs (iv) Centreline of an engineered structure or edge of a dredged channel (v) A marine extension of the beachface point to the offshore boundary (perpendicular to bathymetric contours where possible) (vi) Deepest point of depression or contour reentrant (if depth <-15m AHD) [1] (vii) Toe of Holocene sediment banks	**Marine Section** (i) Focal point of sediment transport convergence on banks or reefs (ii) Sediment transport divergence (iii) Centreline of an engineered structure or edge of a dredged area (iv) A marine extension of the beachface point to the offshore boundary (perpendicular to bathymetric contours where possible) (v) Deepest point of depression or contour reentrant (vi) Fixed by rock outcrops or islands (vii) Toe of Holocene sediment bank (viii) No marine section
	Beachface Point (May be multiple reasons for selection of position) (i) Rock structures restricting sediment transport at a decadal scale (ii) Geomorphic feature (land system or landform) (iii) Adjacent cells have a different shoreline aspect restricting sediment transport at a decadal scale (iv) Engineered structure (e.g. port) or shipping channel	**Beachface Point** (May be multiple reasons for selection of position) (i) Rock structures restricting sediment transport at an annual scale (ii) Geomorphic feature (landform) (iii) Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale (iv) Engineered structure (e.g. large marina) or dredged channel	**Beachface Point** (May be multiple reasons for selection of position) (i) Rock structures restricting sediment transport at a seasonal scale (ii) Geomorphic feature (landform or landform element) (iii) Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale (iv) Engineered structure (e.g. small harbour) or dredged channel
	Terrestrial Section (i) Boundary of, or discontinuity in, a Holocene land system (ii) An extension of marine section and beachface point directly to the onshore boundary if there is no change in land system between adjacent cells (iii) Central ridge line for an island (iv) Centre line of engineered structure or feature	**Terrestrial Section** (i) Boundary of, or discontinuity in a, foredune plain, parabolic dune or frontal dune (ii) An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (iii) Centreline of engineered structure or feature (iv) No terrestrial section (e.g. cliffs)	**Terrestrial Section** (i) Boundary of, or discontinuity in, the foredune (ii) Boundary of frontal dune if the foredune is eroded or absent (iii) An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (iv) Centreline of engineered structure or feature (v) No terrestrial section (e.g. cliffs)

Note: 1. Isobaths were mapped to the vertical datum of Australian Height Datum (AHD).

Table 2: Criteria for mapping onshore and offshore boundaries in the Vlamingh Region
Variation of criteria will be required when applied to other coastal regions.

	Primary cell	Secondary cell	Tertiary cell
Offshore Boundary	(i) -30m AHD[1] isobath farthest from shore	(i) Continuous -15m AHD[1] isobath closest to shore (ii) Toe of sediment bank (e.g. Cockburn Sound) (iii) Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges (e.g. Comet Bay and Burns Beach to Two Rocks)	(i) -5m AHD isobath[1] closest to shore for sheltered coasts dominated by locally generated wind waves (ii) -7m AHD isobath[1] closest to shore for partially sheltered, swell-restricted coasts (iii) -15m AHD isobath[1] closest to shore for exposed, swell-dominated coasts (iv) Subtidal seaward margin of rock platform (e.g. South of Wreck Point) (v) Toe of terrace or sediment bank (e.g. Cockburn Sound)
Onshore Boundary	(i) Landward extent of Holocene land systems (ii) Seaward extent of rock unit on moderately to high cliffed coasts without dunes. If this extends to the beachface the Landgate MHWM to 2006 has been used (iii) Landgate MHWM to 2006 on engineered coasts with extensive shore parallel structures without dunes to landward (iv) Central ridge line for an island comprised of Holocene land systems	(i) Landward extent of foredune plain (ii) Landward extent of narrow parabolic dunes (iii) Landward extent of frontal dunes (iv) Landward extent of foreshore reserve in built areas (v) Seaward extent of rock unit on low to moderately high cliffed coasts without dunes. If this extends to the beachface the Landgate MHWM to 2006 has been used (vi) Landgate MHWM to 2006 on engineered coasts with extensive shore parallel structures without dunes to landward (vii) Landward extent of estuarine landforms or made ground for flood-prone land with installed mitigation works (e.g. Bunbury and Mandurah) (viii) Central line, watershed or ridge line on promontories or islands	(i) Landward extent of foredunes (ii) Landward extent of the frontal dune if the foredune is eroded or absent (e.g. North of Two Rocks) (iii) Seaward extent of rock unit on bluffed to cliffed coasts, without dunes. If this extends to the beachface the Landgate MHWM to 2006 has been used (iv) Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (v) Central line, watershed or ridge line on promontories or islands

Note: 1. Isobaths were mapped to the vertical datum of Australian Height Datum (AHD).

Primary cells: geologic framework and long-term change in morphology

Primary cells (Figure 2) encompass the geologic framework controlling long-term evolution of the coastal land systems, such as coastal barriers, cuspate forelands and large sediment banks. Although substantial changes to these large land systems occur at time scales longer than 100 years, the changes are general trends when considered over coastal management time scales.

At the shoreline, boundaries of primary cells are defined by one, or a combination of, rocky structures, large accretionary landforms, changes in coastal aspect and large engineered structures that restrict sediment transport at a decadal scale. In the Vlamingh Region, five of 13 alongshore cell boundaries of primary cells are defined by a rock structure. This includes rocky headlands at Cape Naturaliste (R06A), Second Head (R06E) and Point Casuarina (now Bunbury Harbour, R06B); and rocky salients at Mallee Reef salient (R06I) and Moore River (northern extent of Cell R06I). A rocky salient is also present at Cape Bouvard (R06C) reflected in the geomorphic feature criterion. Point Casuarina and the Swan River mouth were rocky salient, now extended by Bunbury Harbour (R06B) and the South Mole Fremantle (R06F) engineered structures respectively.

Accretionary landforms include the toe of banks, such as South Sands at Becher Point (Cell R06C12), Southern Flats at Palm Beach Rockingham and Parmelia Bank at Woodman Point groyne (Cells R06D and R06E);

salients, such as Yanchep (Cell R06H) and Mallee Reef (Cell R06I); and cuspate forelands, such as Pinnaroo Point (Cell R06G). The large basin within Cockburn Sound (Cell R06E) is a primary cell nested within cell R06D due to the protection provided by Garden Island, Southern Flats and Parmelia Bank. Additional basins included within broader primary cells are Warnbro Sound (R06C), Owen Anchorage and Gage Roads (R06D).

The offshore boundary of primary cells is the -30m AHD isobath or depth contour (Table 2). It is located on the inner continental shelf and seaward of offshore reef ridges impounding inshore lagoons and basins. Selecting this depth includes the outer margin of the shore-parallel ridge of limestone reefs within the cell and provides separation between large-scale ocean currents and the complex inshore circulation patterns. LiDAR imagery and aerial photography reveal migratory bedforms across sand banks and reefs and suggest a considerable volume of sediment transport presently occurs along the outer margin of the ridge and spills landward. This may be primarily related to the Holocene rise in sea level[33,59,60] but it also currently occurs as pulsational migration of sand waves and shoals[61,62].

The onshore boundary of primary cells is the landward extent of Holocene accretionary land systems, including the foredune plains, transgressive dune systems and the landward shores of barred estuaries and wetlands[58,34]. Exceptions to this are moderate to high cliffed coasts without dunes to landward, engineered coasts with extensive shore parallel structures without dunes to landward and for Garden Island, which consists of only Holocene Land systems, the central ridge line of the island was used (Table 2). The Landgate MHWM to 2006 has been used for cliffed and engineered coasts (Appendix B). All sections of coast with Landgate MHWM to 2006 as the onshore boundaries require further investigation at a more detailed scale. For example, there may be small pocket beaches or sections with lower elevation rock or engineered structures that have sediment exchange to landward.

The exceptions of cliffed coasts, engineered coasts and central ridge lines of islands also apply at the more detailed, secondary and tertiary cell scales. The mapped representation of the onshore boundary on mixed rock and sand coasts at a secondary and tertiary scale may be located landward of the primary cell onshore boundary as the smaller sections of sandy coast were mapped at the 1:2,000 scale, rather than the 1:20,000 scale for the primary cells.

Secondary cells: regional-scale processes and morphology

Secondary cells contain the broad patterns of contemporary (inter-annual to decadal) sediment movement on the inner continental shelf (Figure 2).

The beachface points on the alongshore boundaries may be fixed or ambulatory (Table 1; Table 7). Fixed boundaries include rocky outcrops restricting sediment transport at an annual scale such as at Point Piquet (R06A2), as well as large engineered structures, such as Garden Island causeway (R06D16) and Woodman Point (R06D21). Ambulatory boundaries are associated with areas of convergence of sediment transport which occur on many of the accretionary landforms such as forelands and salients; for example North Becher Point north of Mandurah (R06C12). At the secondary cell scale, many ambulatory boundaries have been stabilised using engineering structures such as Norman Road near Busselton (R06A3) and Catherine Point south of Fremantle (R06D22).

The offshore boundary of secondary cells follows the -15m AHD isobath closest to shore (Table 2). This depth is near the seaward margin of shore-parallel limestone ridges close to shore or the toe of large sediment banks. Selecting this depth encompasses contemporary sediment transport by nearshore wave[63] and current processes within the cell, including dispersal of locally derived biogenic material[64,61,65,66]. Basins and dredged shipping channels function as sediment sinks and are included in secondary cells only to the toe of sediment banks spilling into them (e.g. Jervoise Bay Bank in Cockburn Sound, R06E18). Warnbro Basin is a remnant basin that is largely inactive at the inter-decadal scale. It has been excluded for depths deeper than -15m AHD (R06C12, Figure A.10 in Appendix A). If the cell contains multiple reef ridges, the offshore boundary is the toe of the reef ridge furthest inshore even if the toe is less than -15m AHD depth for example Comet Bay (R06C10) and Burns Beach salient to Two Rocks (R06G29 to R06H31).

Onshore boundaries of secondary cells include potential landform activity at an inter-decadal scale. The onshore boundary corresponds to the landward extent of the foredune plain, narrow parabolic dunes or frontal dunes as defined by the Quindalup Q4 category[50] or its equivalent. As noted above, an exception to this are low to moderately high cliffed coast without dunes or engineered coasts with extensive shore parallel structures without dunes to landward, where the Landgate MHWM to 2006 is used as the onshore boundary (Table 2). In developed areas, such as Mersey Point (R06D13), the foreshore reserve has been used to establish the onshore boundary. In flood-prone land with installed mitigation works, such as Bunbury (R06B5) and Mandurah (R06C10), the landward extent of estuarine landforms or made ground is used as the onshore boundary. Sediment activity could extend beyond the onshore boundaries of secondary cells in some circumstances. The central line, watershed or ridge line is used as the onshore boundary for promontories and islands where the onshore boundaries of secondary cells are coincident (e.g. central line of Woodman Point, R06E19 and R06D20).

Tertiary cells: local-scale, short-term processes and morphology

Tertiary cells incorporate the reworking and movement of sediment near the shore and associated potential seasonal to inter-annual landform response (Figure A series in Appendix A). Tertiary cells perform similar functions to those of secondary cells, often on a finer scale. Their alongshore boundaries and offshore boundaries coincide in some places. Beachface points on the alongshore boundaries of tertiary cells (Table 1), along with onshore and offshore boundaries (Table 2) are highly subject to change. They may be transgressed by extreme events and modified by low frequency coastal processes.

Tertiary sediment cells were identified for the Vlamingh coast, including Garden and Rottnest Islands, and excluding the small reefs, islets and west of the shipping channel through Success and Parmelia Banks.

Beachface points on the alongshore boundaries of tertiary cells restrict sediment transport at a seasonal to inter-annual scale. Fixed boundaries include rocky outcrops along the shore, such as Bickley Point (R06DRI1a) on Rottnest Island. They also include engineered structures, such as marinas and harbours, which restrict sediment transport in depths shallower than the offshore boundaries (-5m AHD, -7m AHD, or -15m AHD isobaths). The installation of engineered structures potentially may change the alongshore boundaries of tertiary cells and lead to development of new cells. Ambulatory boundaries are associated with zones of convergence or divergence associated with local wave refraction and diffraction patterns[19,17]. Ambulatory boundaries at a tertiary cell scale may be located at the tip of accretionary landforms, such as at Pinnaroo Point (R06F27c) or Mersey Point (R06D13a), as the change in aspect and wave sheltering restrict sediment transport at a seasonal to inter-annual scale.

The offshore boundaries of tertiary cells were mainly defined by three isobaths (Table 2):

1. The -15m AHD isobath has been used in the nearshore zone of the relatively unsheltered and unconsolidated sandy coast between Bunbury and Mandurah (R06B5a to R06C9b). Based on empirical formulae from the USA the majority of sediment transport by waves and wave driven currents take place in this zone[63];
2. The -7m AHD isobath was used in the lee of large natural structures with reduced sheltering and where substantially attenuated swell is a significant component of the wave regime. Areas where this occurs include sections of Geographe Bay to Bunbury (R06A2c to R06A4b), Comet Bay to Cape Peron excluding Warnbro Sound (R06C10a, R06C10b and R06D13a to R06D14c), Fremantle to Trigg (R06F25a to R06F26d), and the exposed western side of Garden Island (R06DGI4c to R06D14d); and
3. The -5m AHD isobath was used for more sheltered sections of the coast. In places, this approximately corresponds with the toe of reef platforms, subtidal terraces or large sand shoals flanking the shore. It is applicable where sheltering by offshore reefs and islands results in locally generated wind-waves and partially attenuated swell being prevailing components of the wave regime.

Isobaths have not been used to establish offshore boundaries where beaches are perched on rock platforms with subtidal cliffed seaward margins, such as near Two Rocks (R06H31a). The seaward margin of the rock platform is used in such circumstances. In places where there are wide terraces or sediment banks the toe of the feature has been used, such as on the sheltered eastern side of Garden Island (R06GI2a to R06GI4f).

The onshore boundaries of tertiary cells indicate the landward extent of average seasonal processes, which may be superseded annually. Onshore boundaries are either alongshore swales between the foredunes and

the frontal dunes or the landward toe of the frontal dunes if foredunes are eroded or absent (Table 2). These landforms are highly changeable. It is likely discrepancies will occur between what was mapped and what may be observed at present or in the near future. Such discrepancies should signal a requirement for more detailed mapping and accurate identification of boundary and landform change at a tertiary scale. The onshore boundaries of tertiary cells are not indicative of the landward extent required for engineering, planning and management investigations. However, they may be used as a marker to establish higher frequency changes at the shore.

Exceptions to the landward extents of landforms as onshore boundaries are cliffed coasts or engineered coasts with extensive shore parallel structures (e.g. seawalls) without dunes to landward; and the central line on promontories or islands (e.g. Garden Island).

Rivers, streams and drains

The main estuarine systems of the area are the Vasse-Wonnerup, Collie and Preston, Peel-Harvey, Swan-Canning and Moore River estuaries (Figure 1). There are also many small streams and wetland drains that extend to the coast. Most of the ocean entrances of rivers, streams and drains have barred mouths that can breach and flow intermittently[67,68]. The mouths can switch from being a sediment source during flood events, to potentially acting as sediment sinks during intervening periods.

Onshore boundaries for rivers and drains in the Vlamingh Region have been represented in datasets and the figures in this report as a truncation between the dune and alluvial landforms on opposite banks of the rivers or as a truncation across reclaimed ground in Port areas. In this respect the onshore boundary does not comprehensively represent the onshore extent of estuarine processes within each river or drain. Further investigation of landforms and sediment budgets adjacent to rivers, streams or drains should include:

- The landward extent of the majority of sediment exchange, which is often indicated by flood-tide shoals within estuary mouths.
- All alluvial landforms with connection to the coast;
- The potential for alluvial landforms to become estuarine with changing climatic conditions;
- The capacity for flooding;
- Sediment transport along the river;
- Maintenance dredging or bypassing at Port Geographe, Bunbury, Dawesville, Mandurah and Fremantle[69]; and
- Sediment transport fluxes associated with opening and closing of sand bars across river mouths.

Marine sections of the alongshore cell boundaries may follow the submarine paleo-channels of rivers, which are likely to trap sediment or divert sediment movement. For the Vlamingh coast the marine sections of some primary boundaries follow paleo-channels of the Collie River (Bunbury Harbour R06B), Swan River (South Mole Fremantle R06F) and Moore River (Guilderton R06I). At a secondary cell scale engineered features restrict sediment and control the alongshore boundaries at Bunbury Harbour and South Mole Fremantle, with the paleo-channels of the Capel River (R06A3) and Moore River providing the main control. The barred Moore River mouth is functional within a tertiary cell and does not constitute a boundary at that scale.

Cell labels

The cell labelling convention follows the direction of prevailing littoral drift according to:

1. Region – increasing order of R01, R02 to R13 from the South Australia border[26]. The Vlamingh Region is region R06;
2. Primary cell – upper case letter resetting for each region;
3. Secondary cell – number resetting for each region. Rottnest Island and Garden Island secondary cells are labelled RI1 to RI4 and GI1 to GI4 respectively;
4. Tertiary cell – lower case letter resetting for each secondary cell with letters increasing in the direction of littoral drift or clockwise around islands, for example 14a; and
5. Quaternary cell – Roman numeral resetting for each tertiary cell, for example 14ai. Quaternary cells were not applicable in this investigation.

Vlamingh cells are labelled to the tertiary cell, for example R06A1a, from south to north following the direction of prevailing littoral drift.

Sediment cell results along the Vlamingh coast

Nine primary cells, 40 secondary cells and 81 tertiary cells were identified along the Vlamingh coast between Cape Naturaliste and the Moore River. The hierarchy of cells is presented as maps, tables and electronic datasets available from the Department of Transport (Table 3), along with the coastal sediment cells spatial browser (see Note 1 below Table 3).

Table 3: Location of cell results for the Vlamingh Region

Item	Further information included	Location in report
Beachface points on the alongshore boundaries[1]	Information on the beachface point on alongshore boundaries at all three sediment cell scales. This includes features that define the beachface point, coordinates and character of the boundary	Tables in Appendix D
Alongshore boundaries[1]	Information on the features that define the marine and terrestrial sections of the alongshore boundaries for all three sediment cell scales	
Onshore and offshore boundaries[1]	Information on the features that define the onshore and offshore boundaries for cells at all three sediment cell scales	
Cell names	Hierarchy of cell names including cell labels	Table 4
Maps of cells	Primary and secondary cells at 1:1,250,000 scale at A4 size	Figure 2 and Figure 3
	Secondary and tertiary cells at 1:100,000 scale at A4 size	Figures A.1-A.18 in Appendix A
Coincidence of cell boundaries	Boundary names and coincidence at different levels in the hierarchy	Table 5

Note: 1. The boundaries and beachface points may be viewed as Google Earth KMZ files on the Department of Transport website. A spatial browser to view the datasets will be available in 2016, with the address to be provided on the Department of Transport website. Electronic datasets of boundaries and beachface points are available from the Department of Transport upon request in geodatabase format or ESRI shapefile format.

Cell boundaries

The alongshore spatial scale of cells in the Vlamingh Region varies with wave exposure, geologic framework, sediment availability, aspect and its location on an island. The mean length of cells was 44km (13-87km), 10km (0.7-28km) and 5km (0.7-20km) for primary, secondary and tertiary cells respectively (Table 6). Larger cells in the size ranges are present on open coasts with reduced reef sheltering and large rock outcrops, with smaller cells in the size ranges on coasts with increased geological control, such as coasts with tombolos or in the lee of large islands. Secondary and tertiary cell boundaries may be coincident for coasts that are open or have inherited features.

There is some consistency in scale with littoral cells reported from elsewhere, overseas and on the WA coast. Spatial scales of primary cells (13-87km) are smaller than the littoral cells in England, Wales and Scotland (50-300km)[13,14] and the Pilbara Region (100-455km)[48]; and at a similar scale to cells in the Mid-West and Northampton Regions (37-78km, 33-66km)[46,47], California (10-95km)[20] and Hawkes Bay, New Zealand (20-60km)[70]. The Vlamingh Region has more smaller primary cells than the adjacent Mid-West Region[46], because of large islands within the primary cell boundaries and the more continuous offshore ridges providing more sheltering in the Vlamingh Region. The local primary and secondary cell scales correspond with sub-cell scales in the United Kingdom. The comparison across the hierarchy of cells provides confidence in linking cell dimensions to the geologic framework, sediment availability and different metocean processes driving shoreline change at each scale.

Nine (69%) primary cell boundaries are also secondary and tertiary cell boundaries (Table 5). Exceptions occur for large inherited features in Warnbro Sound (R06C), the edge of Parmelia Bank (R06D/R06E) at a remnant spit (R06D/R06E); and a barred river mouth at Guilderton (R06I). Thirty-seven (91%) secondary cell boundaries are also tertiary cell boundaries, with 46 (55%) unique tertiary cell boundaries.

The cell hierarchy and boundary character classification (Table 4; Table 7) reveal the complexity of the coastal system of the region which has varied rock control and inherited features. The majority (≈85%) of boundaries are open at all three scales with varying degrees of sediment transport leakage. Notably, sediment flow directions may be reversed with changes in meteorological and oceanographic conditions, with some boundaries effectively closed for one sediment transport direction.

Boundaries are ambulatory (≈30%) where rock control is on the sub-tidal part of the shoreface and may be defined as a zone where there is limited to no rock control on the beachface. At all scales, half of all cell boundaries are points and half are zones, with more than 60% of mainland tertiary cells characterised as a zone. There are more ambulatory boundaries at the tertiary scale (39% total with 48% on the mainland) than the primary scale (23%). Landforms adjacent to tertiary cell boundaries are susceptible to variation as a result of both sub-tidal and inter-tidal rock control.

Table 4: Primary, secondary and tertiary sediment cells of the Vlamingh Region

Region	Primary	Secondary	Tertiary
R07. Mid-West Region	Beyond Study Area	Beyond Study Area	d. Guilderton S to Guilderton N
R06. Vlamingh Region from Cape Naturaliste to Moore River	I. Mallee Reef salient to Moore River	32. Mallee Reef salient to Moore River	c. Wilbinga Rocks to Guilderton S
			b. Wilbinga to Wilbinga Rocks
			a. Mallee Reef salient to Wilbinga
	H. Yanchep to Mallee Reef salient	31. Wreck Point to Mallee Reef Salient	a. Wreck Point to Mallee Reef salient
		30. Yanchep to Wreck Point	b. Yanchep Headland N to Wreck Point
			a. Yanchep to Yanchep Headland N
	G. Pinnaroo Point to Yanchep	29. Burns Beach Salient to Yanchep	d. Alkimos to Yanchep
			c. Quinns Rock N to Alkimos
			b. Mindarie Keys N to Quinns Rock N
			a. Burns Beach salient to Mindarie Keys N
		28. Pinnaroo Point to Burns Beach Salient	b. Ocean Reef Marina to Burns Beach Salient
			a. Pinnaroo Point to South of Ocean Reef Marina
	F. South Mole Fremantle to Pinnaroo Point	27. Trigg to Pinnaroo Point	c. Hillarys Marina to Pinnaroo Point
			b. South Sorrento to Hillarys Marina
			a. Trigg to South Sorrento
		26. Mudurup Rocks to Trigg	d. Brighton Road to Trigg
			c. Empire Avenue to Brighton Road
			b. north Swanbourne Pipe to Empire Avenue
			a. Mudurup Rocks to north Swanbourne pipe
		25. South Mole Fremantle to Mudurup Rocks	b. Leighton salient to Mudurup Rocks
			a. Rous Head to Leighton salient
	D. Warnbro to South Mole Fremantle including Rottnest Island and excluding Cockburn Sound (Section 3: Northern section from Woodman Point groyne to South Mole Fremantle)	22. Catherine Point to South Mole Fremantle	a. Catherine Point to South Mole Fremantle
		21. Woodman Point to Catherine Point	a. Woodman Point to Catherine Point
		20. Woodman Point groyne to Woodman Point	a. Woodman Point groyne to Woodman Point
	E. Cockburn Sound (Section 1: Mainland Section from Palm Beach Rockingham to Woodman Point groyne)	19. Australian Maritime Complex to Woodman Point groyne	a. Australian Maritime Complex to Woodman Point groyne
		18. James Point to Australian Maritime Complex	a. James Point to Australian Maritime Complex
		17. Palm Beach Rockingham to James Point	a. Palm Beach Rockingham to James Point
	D. Warnbro to South Mole Fremantle including Rottnest Island and excluding Cockburn Sound (Section 1: Southern section from Warnbro to Palm Beach Rockingham)	16. Garden Island Causeway to Palm Beach Rockingham	a. Garden Island Causeway to Palm Beach Rockingham
		15. Cape Peron to mid-Southern Flats and Garden Island Causeway	a. Cape Peron to mid-Southern Flats and Garden Island Causeway
		14. Mersey Point to Cape Peron	c. Bird Island to Cape Peron
			b. Seal Island to Bird Island
			a. Mersey Point to Seal Island
		13. Safety Bay to Mersey Point	a. Safety Bay to Mersey Point
	C. Cape Bouvard to Warnbro	12. North Becher Point to Safety Bay (excluding Warnbro basin)	a. North Becher Point to Safety Bay (excluding Warnbro Basin)
		11. Ansteys Car Park to North Becher Point	a. Ansteys Car Park to North Becher Point
		10. Robert Point to Ansteys Car Park	b. San Remo to Ansteys Car Park
			a. Robert Point to San Remo
		9. Cape Bouvard to Robert Point	b. Dawesville to Robert Point
			a. Cape Bouvard to Dawesville

Region	Primary	Secondary	Tertiary
R06. Vlamingh Region from Cape Naturaliste to Moore River	B. Bunbury Harbour to Cape Bouvard	8. Preston Beach North to Cape Bouvard	b. Lake Clifton North to Cape Bouvard
			a. Preston Beach North to Lake Clifton North
		7. Lake Preston South to Preston Beach North	a. Lake Preston South to Preston Beach North
		6. Binningup to Lake Preston South	b. Myalup North to Preston South
			a. Binningup to Myalup North
		5. Bunbury Harbour to Binningup	c. Buffalo Road to Binningup
			b. Leschenault South to Buffalo Road
			a. Bunbury Harbour to Leschenault South
	A. Cape Naturaliste to Bunbury Harbour	4. Capel River mouth to Bunbury Harbour	b. Stirling Beach to Bunbury Harbour
			a. Capel River mouth to Stirling Beach
		3. Norman Road to Capel River Mouth	d. Forrest Beach to Capel River Mouth
			c. Wonnerup to Forrest Beach
			b. Busselton to Wonnerup
			a. Norman Road to Busselton
		2. Point Piquet to Norman Road	d. Marybrook to Norman Road
			c. Point Templar to Marybrook
			b. Point Daking to Point Templar
			a. Point Piquet to Point Daking
		1. Cape Naturaliste to Point Piquet	a. Cape Naturaliste to Point Piquet
	Garden Island Ridge		
	D. Warnbro to South Mole Fremantle including Rottnest Island and excluding Cockburn Sound (Section 2: Garden Island west to Second Head, Success and Parmelia Banks west of the shipping channel & Rottnest Island)	RI4. North Point to Philip Point	b. Bathurst Point to Philip Point
			a. North Point to Bathurst Point
		RI3. Cape Vlamingh to North Point	c. Rocky Bay to North Point
			b. Abraham Point to Rocky Bay
			a. Cape Vlamingh to Abraham Point
		RI2. Parker Point to Cape Vlamingh	c. South Point to Cape Vlamingh
			b. Kitson Point to South Point
			a. Parker Point to Kitson Point
		RI1: Philip Point to Parker Point	b. Bickley Point to Parker Point
			a. Philip Point to Bickley Point
		24. Stragglers Rocks to West Shipping Channel, northwest Success Bank	*No tertiary cells defined for reefs and islets*
		23. Carnac Island to Stragglers Rocks, west Parmelia & Success Banks	
		GI3: Parkin Point to Collie Head and to mid-Southern Flats (Links with cell GI2)	GI2a. Garden Island Jetty to Parkin Point spit (extends into GI2)
			a. Parkin Point spit to Collie Head
		14. Section 2 from Collie Head to Baudin Point (Garden Island S)	d. Collie Head to Baudin Point
		GI4: Baudin Point to Dance Head to Carnac Island	a. Baudin Point to Buache Bay
			b. Buache Bay to Point Atwick
			c. Point Atwick to Entrance Point
			d. Entrance Point to Beacon Head
			e. Beacon Head to Second Head
	E. Cockburn Sound (Section 2: Garden Island east Section from Second Head to Parkin Point)		f. Second Head to Armaments Jetty
		GI1. Dance Head to Colpoys Point	a. Armaments Jetty to Cliff Point
			b. Cliff Point to Colpoys Point
		GI2: Colpoys Point to Parkin Point	GI2a. Garden Island Jetty to Parkin Point spit (extends into GI4)

Table 5: Sediment cell alongshore boundaries of the Vlamingh Region

Coordinates, alongshore boundary character, onshore and offshore boundaries, along with marine and terrestrial sections of the alongshore boundary are in the geodatabase, the sediment cells spatial browser and Appendix D

Cell alongshore boundary name	Cell boundaries
Mainland	
Guilderton N	3°
Moore River	1°, 2°
Guilderton S	3°
Wilbinga Rocks	3°
Wilbinga	3°
Mallee Reef salient	1°, 2°, 3°
Wreck Point	2°, 3°
Yanchep headland N	3°
Yanchep	1°, 2°, 3°
Alkimos	3°
Quinns Rock N	3°
Mindarie Keys N	3°
Burns Beach Salient	2°, 3°
South of Ocean Reef Marina	3°
Pinnaroo Point	1°, 2°, 3°
Hillarys Marina N	3°
Hillarys Marina	3°
South Sorrento	3°
Trigg	2°, 3°
Brighton Road	3°
Empire Avenue	3°
north Swanbourne pipe	3°
Mudurup Rocks	2°, 3°
Leighton salient	3°
Rous Head	3°
South Mole Fremantle	1°, 2°, 3°
Catherine Point	2°, 3°
Woodman Point	2°, 3°
Woodman Point groyne	1°, 2°, 3°
Australian Maritime Complex	2°, 3°
James Point	2°, 3°
Palm Beach Rockingham	1°, 2°, 3°
Garden Island causeway	2°, 3°
Cape Peron	2°, 3°
Bird Island	3°
Seal Island	3°
Mersey Point	2°, 3°
Safety Bay	2°, 3°
Warnbro	1°
North Becher Point	2°, 3°
Ansteys Car Park	2°, 3°
San Remo	3°
Robert Point	2°, 3°
Dawesville	3°
Cape Bouvard	1°, 2°, 3°
Lake Clifton North	3°
Preston Beach North	2°, 3°
Lake Preston South	2°, 3°
Myalup North	3°
Binningup	2°, 3°
Buffalo Road	3°
Leschenault South	3°
Bunbury Harbour	1°, 2°, 3°
Stirling Beach	3°
Capel River Mouth	2°, 3°
Forrest Beach	3°
Wonnerup	3°
Busselton	3°
Norman Road	2°, 3°
Marybrook	3°
Point Templar	3°
Point Daking	3°
Point Piquet	2°, 3°
Cape Naturaliste	1°, 2°, 3°
Rottnest Island	
Philip Point	2°, 3°
Bathurst Point	3°
North Point	2°, 3°
Rocky Bay	3°
Abraham Point	3°
Cape Vlamingh	2°, 3°
South Point	3°
Kitson Point	3°
Parker Point	2°, 3°
Bickley Point	3°
Garden Island	
Second Head	1°, 3°
Dance Head	2°
Armaments Jetty	3°
Cliff Point	3°
Colpoys Point	2°, 3°
Garden Island Jetty (to Colpoys Pt)	3°
Parkin Point	1°, 2°
Parkin Point spit	3°
Collie Head	2°, 3°
Baudin Point	2°, 3°
Buache Bay	3°
Point Atwick	3°
Entrance Point	3°
Beacon Head	3°

Table 6: Alongshore length of cells of the Vlamingh Region

Cell level	Minimum length (km)	Maximum length (km)	Mean length (km)	Median length (km)
1°	13	87	44	29
2°	0.7	28	10	9
3°	0.7	20	5	4

Table 7: Alongshore boundary characteristics of cells of the Vlamingh Region

Alongshore boundary characteristics for each cell are in the geodatabase, the sediment cells spatial browser and Appendix D

	All Vlamingh Region boundaries						Mainland boundaries only	
	Primary		Secondary		Tertiary		Tertiary	
	Count	%	Count	%	Count	%	Count	%
Point	7	54%	22	55%	44	52%	24	39%
Zone	6	46%	18	45%	40	48%	38	61%
Fixed	10	77%	23	58%	51	61%	32	52%
Ambulatory	3	23%	17	43%	33	39%	30	48%
Open	2	15%	5	13%	11	13%	8	13%
Closed	11	85%	35	88%	73	87%	54	87%

Along coast variation of sediment cells

Geographic differences in geology, sediments and processes cause alongshore variation in the characteristics of sediment cells over both regional and sub-regional scales. These differences change the relative influence of the criteria used to define sediment cells boundaries. They identify which attributes best define the sediment cells and at what scale.

Intra-regional variation in sediment cells of the Vlamingh Region is described according to primary cells, linkages with the seafloor terrain, onshore sedimentary landforms and coastal processes. The Vlamingh Region comprises offshore reefs, a series of mainly submerged limestone ridges and islands; submarine rocky pavement; inshore basins and inter-barrier lagoons, sea grass meadows, sand banks, shore platforms, cliffs and bluffs; estuaries; and several types of barrier dunes along the shore including mobile sand sheets[34,35]. The barriers include broad salients, cuspate forelands, tombolos, foredune plains, beach ridge plains and high ridges of parabolic dunes. Some foredunes and parabolic dunes impound back-barrier lagoons. The distribution of these landforms differs between the four broad areas comprising the region.

The coast is fronted by a shelf that is approximately 50km wide out to 50m depth[33]. Changes in the plan form of the reefs and cliffs, their position of outcropping along the shore; sheltering by Cape Naturaliste and islands of the Garden Island Ridge; and the development of large sedimentary landforms contribute to local variation in coastal aspect and exposure. Hence, there is significant variation in the relative intensity of meteorological and oceanographic processes affecting the shore.

The southern part of the region (Cells R06A and R06B) corresponds with the sector between Cape Naturaliste and Robert Point identified previously[11]. The southern cell (R06A) includes the broad shallow waters of Geographe Bay and sandy beaches between granite outcrops from Cape Naturaliste to Point Daking to basalt outcrops at Bunbury. The bay has a number of rivers and streams that discharge into estuaries, estuarine and alluvial flats fronted by foredune plains (Point Daking to Forrest Beach) and barrier lagoons (Forrest Beach to Point Casuarina). The foredune plains have a contemporary sand supply from migratory bars. Cell R06B is more exposed to swell waves, with shore-parallel reefs and some areas of rock outcropping along the shore, particularly as cliffs and bluffs in the north. Dunes and parabolic dunes impound lagoons to landward. Human intervention at Bunbury Harbour and the Cut transfer erosion along the coast due to strong alongshore sediment transport potential in this area.

Between Mandurah and Fremantle (Cells R06C to R06E) the coast is sheltered by limestone ridges and inshore basins with Five Fathom Bank Ridge and Garden Island Ridge including the large islands of Garden Island and Rottnest Island. A third ridge, the Spearwood Ridge, outcrops in areas along the coast as beach rock, bluffs and cliffs. This section of coast has been the main area of Holocene sediment deposition along the coast from Cape Naturaliste to Fremantle. As sea level rose to its peak in approximately 7,000-6,000 years ago sediment was pushed landward through low sectors of reef to form large banks and sedimentary accumulation features along the shore, such as the Rockingham-Becher foredune plain. Inshore basins were formed adjacent to large sand banks in Warnbro Sound, Cockburn Sound (nested cell R06E) and Owen Anchorage.

The Swan River, its paleo-channel and the river training walls (north and south mole) are the southern extent of the next section of coast between Fremantle and the cuspate foreland at Hillarys (R06F). This cell is located in the lee of Rottnest Island, with dunes and sand sheets overlaying older Pleistocene limestone that outcrops at many locations along the shore; at Cottesloe, Swanbourne, and Trigg to Sorrento for example.

In the northern part of the region (Cells R06G to R06I) the shore is sheltered by three continuous ridge and reef chains as well as complex inshore reefs. The three ridges of Staggie, Marmion Reef and Spearwood are parallel to the shore. There is substantial variation in ridge height along the coast. This variation apparently contributes to the formation of coastal landforms such as the salients and cuspate forelands at Quinns Rocks and Wreck Point. Rock outcrops along the shore as subtidal pavements, inter-tidal platforms, small bluffs and headlands. Four marinas are located in these three cells, providing further interruption of sediment transport patterns and feedback affecting adjacent coastal landforms.

Inter-regional variation in sediment cells is summarised by comparing the criteria for mapping cells for the four regions of Vlamingh, Mid-West, Northampton and Pilbara. Criteria for defining sediment cells for the Vlamingh Region were more similar to the Mid-West[46] and Northampton Regions[47], than the Pilbara Region[48]. Despite the differences, a consistent approach has been used to determine the beachface point on the alongshore boundaries and follows the procedure described in the coastal compartments report[26]. Differences in criteria between the Vlamingh Region and Mid-West/Northampton Regions are related to engineering modifications and the presence of near continuous ridges formed by elongate reefs, large islands and basins in the Vlamingh Region (Appendix C). Differences in criteria between the Vlamingh Region and Pilbara Region is related to a shift in dominant forcing from waves in the southern region to tidal reworking, extreme waves and increased river activity in the Pilbara (Appendix C).

Applications

In this report, sediment cells are areas in which there is strong connectivity between marine and terrestrial landforms. Hence, they are natural management units, presented in a simple spatial format. Applications of sediment cells include identification of spatial context for coastal evaluations; a common framework for dialogue about the coast; support to coastal management decision-making and a range of technical uses largely relating to coastal stability assessment. Some uses of sediment cells are listed in Table 8 and briefly described below.

Table 8: Applications of sediment cells

Context	• Identification of area to be evaluated • May be used for problem scaling
Communication	• Cross-jurisdictional co-operation • Spatial basis readily comprehended by non-technical audience • Common framework for discussion between disciplines
Decision-Making	• Screening destabilising actions from high coastal amenity • Recognition of stabilisation trade-offs
Technical Use	• Improved coastal erosion assessment • Sediment budget development • Upscaling and downscaling of coastal information • Identification of key coastal processes • Landform vulnerability assessment

Context

As defined in this report, sediment cells provide an indication of a spatial area within which marine and terrestrial landforms are likely to be connected through processes of sediment exchange. This implies that either natural or imposed changes at any point in the cell may affect any other part, recognising such relationships are strongly bound by proximity. A fundamental use of sediment cells is therefore one of ***context***, to identify an area that should be considered in a coastal study. Specifically, questions that should be considered are:

- How may an imposed action, such as installation of a groyne, affect the wider coast through changes to the sediment budget?
- Have changes to the wider area influenced locally observed response?

Note that this does not mean that sediment cells must be used to define a study area or model area. These are typically smaller due to data or budget limitations.

A qualitative assessment within the sediment cells context is often valuable for problem scaling when dealing with coastal instability. Considering whether an observed issue is prevalent within a cell or adjacent cells may provide guidance on the type of management solutions available, and therefore suggest the form of technical advice most likely to be useful (Figure 6). For example (labelling corresponds to panels in Figure 6):

A. If there is a balance of erosion and accretion within a sediment cell, there is potential opportunity to manage the problem through coastal stabilisation works, which transfer stresses along the coast;
B. For a coastal stability issue that is affecting the majority of a sediment cell, it is appropriate to improve coastal resilience, including techniques that improve the transfer of sand from the nearshore to the beach and dune system;
C. If erosion and accretion occur differently between cells, it is possible that the stress can be more evenly distributed, including artificial interventions such as bypassing. However, limited natural sediment transfer at cell boundaries determine that balancing erosion and accretion requires long-term management;
D. If erosion or accretion is prevalent across multiple cells, the issue is likely to be dominant in the long term. This typically requires a decision about where to focus the problem, such as through identification of sacrificial coastal nodes.

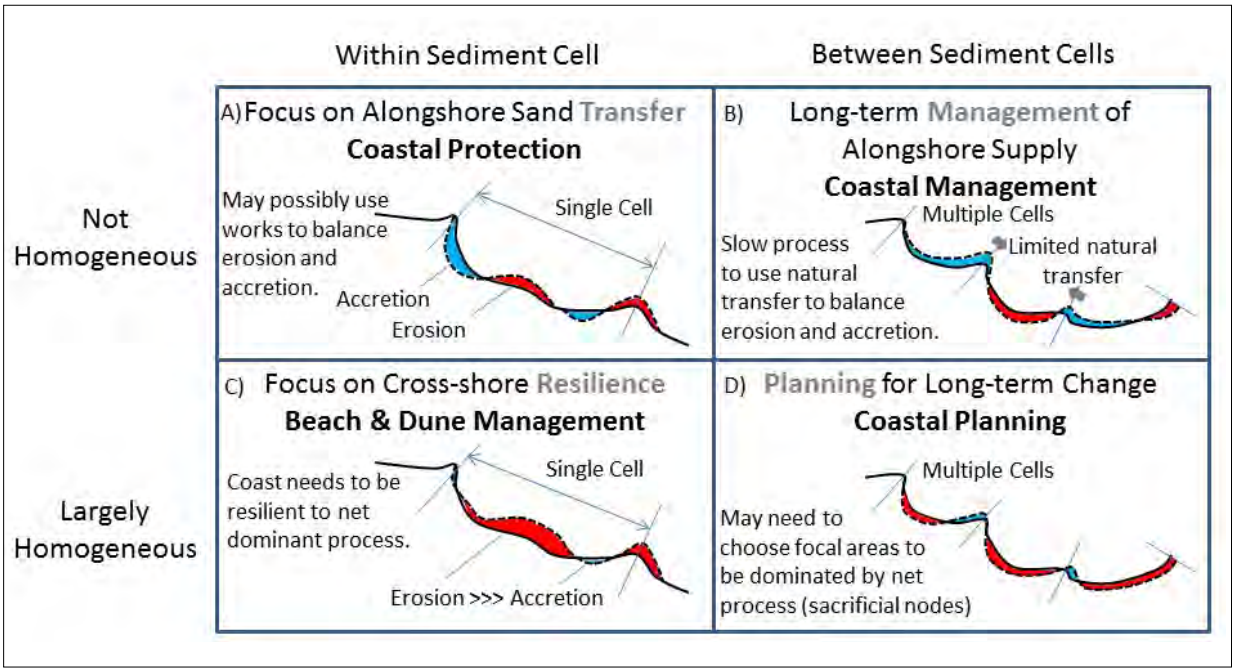


Figure 6: Use of sediment cells for problem scaling

Communication

A key feature of the sediment cell framework is its development from physical attributes rather than a jurisdictional basis. This highlights situations where communication between coastal managers may be necessary, and supports formation of strategic planning groups such as the Peron-Naturaliste Partnership (R06A to R06D) or Cockburn Sound Coastal Alliance (R06D and R06E).

The relatively simple spatial representation of sediment cells may be a valuable tool for communication between technical agencies and the general public. Recent application of coastal process connectivity mapping[24] has highlighted the value of simple spatial tools to help explain the basis for coastal management decisions to a non-technical audience.

The value of communicating through a common spatial framework may also enhance dialogue between technical staff involved in different disciplines. The framework of sediment cells and coastal compartments are designed to be of use for coastal management across multiple scales, from engineering through to strategic planning[26]. However, the strong relationship between habitats and morphology[71], includes links between catchments areas and sediment cells. This more broadly suggests that sediment cells may have value as natural management units when considering natural resource management or coastal ecosystem services.

Decision-making

Recognition of the inter-connected nature of marine and terrestrial landforms within a sediment cell may support simplified decision-making by coastal managers, including local and State government agencies.

For agencies managing large areas, sediment cells can be used for low-cost geographic screening, particularly when combined with the direction of net alongshore sediment transport. As the cells provide preliminary guidance regarding the possible extent of development impacts, the cells framework may be used to guide the distribution of infrastructure. For example, destabilising infrastructure may be preferentially excluded from a cell containing sensitive or high amenity coastal areas. Alternately, a largely isolated single cell may be identified as a strategic coastal node, with focused coastal protection works and interventions creating a minimised coastal footprint.

An objective of the sediment cells definition is to focus coastal managers' attention upon the connected nature of marine and terrestrial landforms. This is intended to disrupt expectation that the whole coast under management can be made stable. For every effort toward stabilisation, the consequent trade-off should be clearly identified and understood. This way of thinking reduces the likelihood of tail-chasing through successive coastal stabilisation works.

Technical use

A major technical use for sediment cells is to improve erosion hazard assessments by better integrating regional and local coastal change. Regional changes may include the effects of climate or sea level fluctuations and the consequent variations in sand supply. Local changes include storm responses and coastal interactions with natural and artificial structures. Improved knowledge of how local changes may have broader impact is essential to good coastal planning[20,21,22,,72,73,74]. Equally, refined understanding of how regional change influences local response can improve setback assessment[75] and structural design[76].

Sediment cells evaluated for regional processes should be identified based on the relative magnitude of local coastal change and the proximity to cell boundaries. Large-scale engineering works, such as ports and harbours, should be considered over the full hierarchy of primary, secondary and tertiary sediment cells to ensure adequate identification of possible effects. However, most planning and engineering investigations require consideration at a secondary cell scale as this incorporates broad sediment transport processes over inter-decadal timescales. If proposed works are unlikely to restrict sediment transport on an inter-annual scale, assessment may occur at tertiary cell scale. In all cases, proximity to a cell boundary may suggest the need to consider adjacent cells.

Landform information used to develop the sediment cells, including indications of sediment transport pathways and sinks, is equally important to the development of quantitative sediment budgets. Consequently, the sediment cells framework provides a useful spatial basis for the development of sediment budgets[1,2,6]. The effect of timescale on sediment budget variability is acknowledged along the Vlamingh coast, with ocean-estuary exchange and pulses of sand supply contributing to these fluctuations. A recent example of a detailed application of a sediment budget-based coastal assessment is the study in the Geraldton area of the Mid-West Region[49] (Cell R07F).

Definition of sediment cells (and coastal compartments[26]) over multiple spatial scales supports the processes of upscaling and downscaling, where information collected or applicable at one particular scale is made meaningful at another larger or smaller spatial scale. Upscaling involves the aggregation of information from a finer scale, often sparse across the wider area. Downscaling involves interpretation of coarse scale information at a finer scale, usually through the use of additional information. The concepts of upscaling and downscaling are important tools for combining regional and local coastal change assessments, often using a sediment budget approach.

Connectivity of marine and terrestrial landforms is used as a basis for sediment cell definition. The identified landforms and pathways for transport may also suggest the key active coastal process and therefore indicate appropriate conceptual models for coastal dynamics. Mapping of coastal morphology in the Vlamingh Region has been described as part of the WACoast series[34,35].

Modification of cell boundaries

Although the cell boundaries have been presented as a spatial framework, they are based upon interpretation of geomorphic information. Therefore boundaries may require revision according to either the intended application or due to further relevant information being obtained. Common reasons to update the database describing the cells may include:

- Large-scale change that will affect cell connectivity;
- Coastal change near a cell boundary;
- Modification due to engineering works; or
- More detailed evaluation of active coastal behaviour.

Sediment cell connectivity

Determination of the number and scale of sediment cells used for coastal assessment should involve consideration of the magnitude and timescale of coastal change as well as the relative connectivity between sediment cells. It is appropriate to consider multiple sediment cells when evaluating larger or more sustained coastal change, or when assessing cells with moderate or high connectivity. Cell connectivity is indicated by the nature of the coastal boundary, with higher connectivity occurring where:

- The boundary is open or ambulatory; for example, sediment transfer occurring across boundaries on salients and cuspate forelands;
- Reversal of littoral drift direction is known to occur;
- There is an onshore feed of sediment;
- A boundary is located on a sediment source or sink; or
- Boundaries providing headland control of estuary entrances to coastal lowlands.

Investigation of coastal processes should recognise the potential role of connectivity between cells, including the relative significance of prevailing and extreme events in driving linkage of adjacent cells.

In situations where coastal change is substantial, such as coastal adjustment subsequent to mass deposition from a river system, or the potential impact of sea level rise over the next hundred years, there is potential for change to affect even rock boundaries. Users of the cell framework on mixed rock and sand coasts, such as the Vlamingh coast, should consider:

1. Sections of coast which have occasional outcrops of rock and are progressively eroding will potentially reach points where either the rock has reduced influenced on the coast, or a newly exposed area of rock starts to control the coastal configuration. These changes of coastal state may effectively alter sediment cell boundaries.
2. The influence of rock features that control the coast through sheltering may change with sediment supply. The resulting sandy features, salients or cuspate forelands, may migrate under changing meteorological, oceanographic or sediment supply conditions. This can occur following a loss of offshore reef control, as has been reported for a calcarenite coast[77], or if there is a reduction in sediment supply such as caused by Fremantle Port breakwaters (south and north mole).

Proximity to cell boundaries

As the influence of a local coastal change is strongest in its immediate vicinity, it is possible for the effect of a moderate change to be transferred across a cell boundary. In such a situation, adjacent sediment cells should be assessed simultaneously.

Modification due to engineering works

Engineering works may modify the nature of sediment cell boundaries and in some instances, might create new boundaries. An example of modifying the cell boundary has occurred at the causeway to Garden Island (R0D15), where the influence of the rock structure interrupts the mobile sediments on the bank of Southern Flats.

Detailed evaluation of coastal behaviour

Detailed coastal assessment, including sediment analysis, sediment transport assessment or higher frequency evaluation of coastal configuration may provide better representation of how the sediment cell boundary operates. Cell boundaries may need to be reviewed following such investigations.

Recent work in the Mid-West Region provides an example of how sediment analysis may be used to verify and resolve cell boundaries[49]. An overview of the study findings is included in the Mid-West Region cells report[46]. Useful studies in the Vlamingh Region containing previous sediment analysis are referred to in Table B.1 (Appendix B). An example is provided by the relationship between regionally varying oceanography and the resulting shelf sediments in the Vlamingh Region[33]. Processes affecting the distribution of sediments and variability in sediment supply from nearshore sources in the studies could be investigated to help develop sediment budgets.

Possible studies to further resolve cell boundaries requires consideration of how the cells are to be applied, the time and space scales and the range of landforms within the domain of interest. For example, when assessing over an extended time scale for climate change adaptation assessment, there may be sensitivity to buried rock. A program of seismic surveys could therefore refine the onshore boundary. A second example is where coastal dunes define the onshore boundary of secondary cells, as the degree of dune mobility and the time scale of change will directly affect the area of interest. In this situation, active dune movement may be identified through aerial photograph interpretation or sediment analysis.

Further work to increase the resolution of cell boundaries may involve:

1. Ensuring the temporal and spatial resolution of data are consistent between datasets and fit for purpose at the scale at which they are being applied;
2. Extension of the criteria used to identify the cell boundaries to include criteria describing sediment characteristics and the limits to their distribution;
3. Identification of the potential for change of ambulatory boundaries at a local scale related to projected variation in climate and ocean processes, along with more detailed information of underlying rock structures;
4. Verification of sediment cells through determination of sediment character, composition, depth and distribution;
5. Determination of the contribution of barred estuaries to cell functions; and
6. Revision of cell boundaries in the event of large-scale engineering works, such as ports or harbours, restrict sediment transport at relevant time and space scales.

Proposed modification of cell boundaries should be presented to the dataset custodian, the Western Australian Department of Transport. The modifications should be presented in either ESRI Shapefile format or as Google Earth KMZ files with metadata and supporting documentation. Department of Transport officers will integrate the modifications into the geodatabase if deemed appropriate.

References

[1] Bowen AJ and Inman DL. (1966) *Budget of littoral sands in the vicinity of Point Arguello, California.* United States Army CERC Technical Memorandum No. 19.

[2] Komar PD. (1996) The budget of littoral sediments, concepts and applications. Shore and Beach. 64 (3): 18 – 26.

[3] van Rijn LC. (1998) *Principles of Coastal Morphology*. Aqua Publications, NL.

[4] McGlashan DJ and Duck RW. (2002) The Evolution of Coastal Management Units: Towards the PDMU. *Littoral 2002, The Changing Coast.* 29-33.

[5] Cowell PJ, Stive MJF, Niedoroda AW, de Vriend DJ, Swift DJP, Kaminsky GM and Capobianco M. (2003a) The coastal-tract (Part 1): a conceptual approach to aggregated modeling of low-order coastal change. *Journal of Coastal Research*, 19 (4): 812-827.

[6] Rosati JD. (2005) Concepts in sediment budgets. *Journal of Coastal Research,* 21(2): 307–322.

[7] Cooper NJ & Pontee NI. (2006) Appraisal and evolution of the littoral 'sediment cell' concept in applied coastal management: Experiences from England and Wales. *Ocean and Coastal Management*, 49: 498-510.

[8] Whitehouse R, Balson P, Beech N, Brampton A, Blott S, Burningham H, Cooper N, French J, Guthrie G, Hanson S, Nicholls R, Pearson S, Pye K, Rossington K, Sutherland J and Walkden M. (2009) *Characterisation and prediction of large scale, long-term change of coastal geomorphological behaviours:* Final science report. Science Report SC060074/SR1. Joint DEFRA and Environment Agency Flood and Coastal Erosion Risk Management R & D Programme, Environment Agency and Department for Environment, Food and Rural Affairs, United Kingdom.

[9] Inman DL and Frautschy JD. (1966) Littoral processes and the development of shorelines. *Proceedings of Coastal Engineering Santa Barbara Specialty Conference*, American Society of Civil Engineering, 511–536.

[10] Davies JL. (1974) The coastal sediment compartment. *Australian Geographical Studies*. 12: 139-151.

[11] Searle DJ and Semeniuk V. (1985) The natural sectors of the Rottnest Shelf coast adjoining the Swan Coastal Plain. *Journal of the Royal Society of Western Australia,* 67: 116-136.

[12] Griggs GB. (1987) Littoral Cells and Harbour Dredging Along the California Coast. *Environmental, Geological and Water Science*, 10 (1): 7-20.

[13] Motyka JM and Brampton AH. (1993) *Coastal Management: Mapping of Littoral Cells*. Wallingford UK: HR Wallingford. Hydraulics Research Report SR 328.

[14] HR Wallingford. (1997) *Coastal cells in Scotland.* Scottish Natural Heritage. Research, Survey and Monitoring Report 56.

[15] McGlashan DJ and Duck RW. (2000) Undeveloped Coasts: a protocol for the assessment of development potential. *Periodicum Biologorum*, 102(1):329-332. Cited within McGlashan & Duck (2002).

[16] Department for Environment, Food and Rural Affairs: DEFRA. (2006) *Shoreline management plan guidance.* United Kingdom. www.defra.gov.uk

[17] Sanderson PG and Eliot I. (1999) Compartmentalisation of beachface sediments along the southwestern coast of Australia. ***Marine Geology,*** 162: 145-164.

[18] Stapor FW & May JP. (1983) The cellular nature of littoral drift along the northeast Florida Coast. *Marine Geology,* 51: 217-237.

[19] Carter B. (1988) *Coastal environments: an introduction to the physical, ecological, and cultural systems of coastlines*, Academic Press, New York.

[20] California Coastal Sediment Management Workgroup. (2006) *California Coastal Sediment Master Plan Status Report; Draft for Public Review and Comment.* California Geological Survey, Santa Rosa CA.

[21] MESSINA. (2006) *Integrating the Shoreline into Spatial Policies.* Practical Guide prepared as part of the Managing European Shorelines and Sharing Information on Nearshore Areas (MESSINA). Prepared by IGN France International, Isle of Wight Council, University of Szczecin, Community of Agglomeration for the Thau Basin and Municipality of Rewal. Produced for European Union.

[22]van Rijn LC. (2010) *Coastal erosion control based on the concept of sediment cells*. Prepared for the European Commission, Concepts and Science for Coastal Erosion Management, Conscience.

[23] Eliot M, Stul T & Eliot I. (2013) Revisiting Landforms in Coastal Engineering, *In: Proceedings of Coasts & Ports 2013 Conference*, Manly, Sydney, 11-13 September 2013.

[24] French J and Burningham H. (2009) *Mapping the connectivity of large scale coastal geomorphological systems: Coastal system mapping with Cmap Tools tutorial*. Science Report SC060074/PR2. Joint DEFRA and Environment Agency Flood and Coastal Erosion Risk Management R and D Programme, Environment Agency and Department for Environment, Food and Rural Affairs, United Kingdom.

[25] McLean RF. (2000) Australia's coastal vulnerability assessment studies: recent upscaling or downscaling? *Proceedings of APN/SURVAS/LOICZ Joint Conference on coastal impacts of climate change and adaptation in the Asia-Pacific region*, Kobe, Japan, November 14-16, 2000, 29-33.

[26] Eliot I, Nutt C, Gozzard B, Higgins M, Buckley E and Bowyer J. (2011) *Coastal Compartments of Western Australia: A Physical Framework for Marine and Coastal Planning*. Report 80-02. Damara WA Pty Ltd. Report to the Departments of Environment and Conservation, Planning and Transport. Environmental Protection Authority.

[27] Richardson L, Mathews E and Heap A. (2005) *Geomorphology and Sedimentology of the South West Planning Area of Australia: Review and synthesis of relevant literature in support of Regional Marine Planning.* Geoscience Australia Report Record 2005/17.

[28] Damara WA Pty Ltd. (2009) *The Yalgorup Coast: Binningup to Cape Bouvard, Western Australia*. Draft report prepared for the Department of Planning & Department of Conservation and Environment.

[29] Stul T. (2005) *Physical characteristics of Perth Beaches, Western Australia*. Honours Thesis in Environmental Engineering. Centre for Water Research. The University of Western Australia.

[30] Damara WA Pty Ltd. (2010) *Shire of Busselton Coastal Erosion Study – Assessment of Climate Change Impacts*. Prepared for Shire of Busselton. Draft Report 96-01-A.

[31] Masselink G and Pattiaratchi CB (2001). Seasonal variation in nearshore processes and beach morphology along the sheltered coastline of Perth, Western Australia. *Marine Geology,* 172: 242-263.

[32] Pattiaratchi C and Eliot M. (2008) Sea Level Variability in South-western Australia: From hours to decades. *Proceedings of the 31st ASCE international conference on coastal engineering.* Hamburg, Germany.

[33] Collins LB. (1988) Sediments and history of the Rottnest Shelf, southwestern Australia: a swell dominated, non-tropical carbonate margin. *Sedimentary Petrology*, 60: 15–29.

[34] Gozzard JR. (2011a) *WACoast – Cape Naturaliste to Lancelin*. Geological Survey of Western Australia digital dataset.

[35] Gozzard JR. (2011b) *WACoast –Rottnest Island*. Geological Survey of Western Australia digital dataset.

[36] Gozzard JR (2011c). Sea to scarp – geology, landscape, and land use planning in the southern Swan Coastal Plain. Geological Survey of Western Australia.

[37] Short AD. (2005) *Beaches of the Western Australian Coast: Eucla to Roebuck Bay*, Sydney University Press, Sydney.

[38] Western Australian Planning Commission: WAPC. (2003) 'Chapter 2 – Coastal Environments' in *Coastal Planning and Management Manual: A community Guide for Protecting and Conserving The Western Australian Coast*. WAPC, Perth.

[39] Eliot I, Gozzard B, Eliot M, Stul T and McCormack G. (2012) *The Coast of the Shires of Gingin and Dandaragan, Western Australia: Geology, Geomorphology & Vulnerability.* Damara WA Pty Ltd and Geological Survey of Western Australia, Innaloo, Western Australia.

[40] Schwartz ML. (2005) *Encyclopedia of Coastal Science*. Encyclopedia of Earth Sciences Series. Springer, The Netherlands.

[41] LeProvost, Semeniuk & Chalmer. (1986) *Sediment sources, transport paths and sinks of the Inner Rottnest Shelf between Bunbury and Rockingham for use in determining volumes of littoral drift past the proposed Dawesville Cut*. Draft report R149 prepared for Riedel & Byrne Consulting Engineers. Appendix C to the Dawesville Channel Coastal Engineering Studies.

[42] Riedel & Byrne. (1987) *Dawesville Channel Coastal Engineering Studies: Coastal Processes – An Engineering Assessment*. Appendix B. Prepared by Riedel & Byrne Consulting Engineers.

[43] Eliot I, Tonts M, Eliot M, Walsh G and Collins J. (2005) *Recreational Beach Users in the Perth Metropolitan Area*. The Institute of Regional Development. School of Earth and Geographical Sciences. Faculty of Natural and Agricultural Sciences. University of Western Australia.

[44] Stul T, Eliot I and Pattiaratchi C (2007). Sediment Cells Along the Perth Metropolitan Coast, *In Proceedings of 2007 Coasts and Ports Australasian Conference, Melbourne, Australia, 18–20 July 2007*. Engineers Australia, Canberra.

[45] Stul T, Gozzard JR, Eliot IG and Eliot MJ (2012) *Coastal Sediment Cells between Cape Naturaliste and the Moore River, Western Australia*. Report prepared by Damara WA Pty Ltd and Geological Survey of Western Australia for the Western Australian Department of Transport, Fremantle – Superseded by this report.

[46] Stul T, Gozzard JR, Eliot IG and Eliot MJ (2014a) *Coastal Sediment Cells for the Mid-West Region between the Moore River and Glenfield Beach, Western Australia*. Report prepared by Seashore Engineering Pty Ltd and Geological Survey of Western Australia for the Western Australian Department of Transport, Fremantle.

[47] Stul T, Gozzard JR, Eliot IG and Eliot MJ (2014b) *Coastal Sediment Cells for the Northampton Region between Glenfield Beach and the Murchison River, Western Australia*. Report prepared by Seashore Engineering Pty Ltd and Geological Survey of Western Australia for the Western Australian Department of Transport, Fremantle.

[48] Stul T, Gozzard JR, Eliot IG and Eliot MJ (2014c) *Coastal Sediment Cells for the Pilbara Region between Giralia and Beebingarra Creek, Western Australia*. Report prepared by Seashore Engineering Pty Ltd and Geological Survey of Western Australia for the Western Australian Department of Transport, Fremantle.

[49] Tecchiato C and Collins LB. (2012) *Geraldton Embayments Coastal Sediment Budget Study*. Coastal Vulnerability and Risk Assessment Program - Project 2 - Stage 2: Sediment Mapping for Identification of Sediment Sources, Transport Pathways and Sinks for Components of the Batavia Coast, With Special Consideration of the Inshore Waters and Coast between the Greenough River and Buller River. First Year Final Report for the WA Department of Transport, Curtin University, Bentley. Western Australia.

[50] MacArthur WM and Bartle GA. (1980) *Landforms and soils as an aid to urban planning in the Perth Metropolitan Northwest Corridor, Western Australia*. Land Resources Management Series No. 5, CSIRO, Melbourne.

[51] Wells MR, Oma VPM and Richards NLB. (1985) *Shire of Rockingham – a study of land resources and planning considerations*. Department of Agriculture, Western Australia, Technical Report 44.

[52] Wells MR and Clarke AJ. (1986) *Shire of Wanneroo, a study of land resources and planning considerations*. Resource Management Technical Report 47. Department of Agriculture, Western Australia. 1:25,000 soil-landscape maps.

[53] Wells MR. (1989) *Land capability study of the Shires of Mandurah and Murray*. Department of Agriculture, Western Australia, Land Resource Series No. 2.

[54] van Gool D. (1990) *Land resources in the northern section of the Peel-Harvey catchment, Swan Coastal Plain, Western Australia*. Department of Agriculture, Western Australia.

[55] Tille P and Lantzke N. (1991) *Busselton - Margaret River - Augusta land capability study*. Land Resources Series No. 5, Department of Agriculture, Western Australia. 1:50,000 soil-landscape map and report.

[56] van Gool D and Kipling B. (1992) *Land resources in the southern section of the Peel-Harvey catchment, Swan Coastal Plain, Western Australia*. Department of Agriculture, Western Australia.

[57] Barnesby BA and Proulx-Nixon ME. (2000) *Land resources from Harvey to Capel on the Swan Coastal Plain, Western Australia*. Department of Agriculture, Western Australia. 1:50,000 soil-landscape map.

[58] Gozzard JR. (2007) Geology and Landforms of the Perth Region. Western Australia. Geological Survey of Western Australia.

[59] Semeniuk V and Searle DJ. (1986) Variability of Holocene sealevel history along the southwestern coast of Australia – Evidence for the effect of significant local tectonism. *Marine Geology*, 72: 47-58.

[60] Wyrwoll K-H, Zhu ZR, Kendrick GA, Collins LB and Eisenhauser A. (1995) Holocene sea-level events in Western Australia: revisiting old question'. In: CW Finkl (ed.), *Holocene cycles: climate, sea level, and coastal sedimentation. Journal of Coastal Research*, Special Issue no. 17: 321–326. Coastal Education and Research Foundation.

[61] DA Lord and Associates. (1998) *Sedimentology of Success and Parmelia Banks, Owen Anchorage, (Western Australia) - Summary Report*. For Cockburn Cement Limited. Report no. 95/008/6.

[62] Hollings B. (2004) *Sediment Dynamics of Warnbro Sound, Western Australia*, Unpublished Engineering Honours Thesis. University of Western Australia.

[63] Hallermeier RJ. (1981) *Seaward Limit of Significant Sand Transport by Waves: An Annual Zonation for Seasonal Profiles*. United States Army Corps of Engineers. Coastal engineering technical aid no. 81-2.

[64] Searle DJ and Semeniuk V. (1988) Petrology and origin of beach sand along the Rottnest Shelf coast, Southwestern Australia. *Journal of the Royal Society of Western Australia*, 70(4): 119-128.

[65] Oldham CE, Lavery PS, McMahon K, Pattiaratchi CP and Chiffings TW. (2010) *Seagrass wrack dynamics in Geographe Bay*, Western Australia. Prepared for Department of Transport and Shire of Busselton.

[66] Pattiaratchi C and Wijeratne S. (2011) *Seagrass dynamics in Geographe Bay, Western Australia*. Prepared by the University of Western Australia for the Department of Transport and the Shire of Busselton.

[67] Hodgkin EP and Hesp PA (1998). Estuaries to salt lakes: Holocene transformation of the estuarine ecosystems of southwestern Australia. *Marine and Freshwater Research*, 49: 183-201.

[68] Brearley A (2005). *Ernest Hodgkin's Swanland: Estuaries and Coastal Lagoons of Southwestern Australia*. University of Western Australia Press, Crawley.

[69] Dubczuk LT. (2007) Annual Mechanical Sand Bypassing at the Mandurah Ocean Entrance and Dawesville Channel. In: Proceedings of 2007 Coasts and Ports Australasian Conference, Melbourne, Australia, 18–20 July 2007. Engineers Australia, Canberra.

[70] Komar PD. (2005) *Hawke's Bay Environmental Change, Shoreline Erosion & Management Issues*. Asset Management Group Technical Report ISSN 1174 3085. Prepared for Napier City Council, Port of Napier Ltd and Hawke's Bay Regional Council.

[71] Lyne V, Fuller M, Last P, Butler A, Martin M & Scott R. (2006) *Ecosystem characterisation of Australia's North West Shelf. North West Shelf Joint Environmental Management Study*. Technical Report No. 12. CSIRO.

[72] Patsch K and Griggs G. (2006) *Littoral cells, sand budgets and beaches: Understanding California's shoreline*. Institute of Marine Sciences, University of California, Santa Cruz.

[73] Inman DL and Jenkins SA. (1984) The Nile littoral cell and man's impact on the coastal zone of the southeastern Mediterranean, In: *Proceedings of the 19th Coastal Engineering Conference*, American Society of Civil Engineers, 2: 1600-1617.

[74] Komar PD. (2010) Shoreline Evolution and Management of Hawke's Bay, New Zealand: Tectonics, Coastal Processes and Human Impacts. *Journal of Coastal Research*, 26 (1): 143-156.

[75] Eliot M. (2013) *Application of Geomorphic Frameworks to Sea-Level Rise Impact Assessment*. Prepared for Geoscience Australia by Damara WA Pty Ltd, Report 193-01-Rev0.

[76] Thomson GG, Khalil SM & Tate B. (2005) Sediment budgets as an aid for breakwater design: Raccoon Island case study. *Proceedings of the 14th Biennial Coastal Zone Conference*, New Orleans, Louisiana July 17-21, 2005.

[77] Fotheringham D. (2009) *Shoreline Erosion at Port Office Rock Near Beachport, South Australia*. Coastal Management Branch, Department for Environment and Heritage South Australia, Technical Report 2009/09.

Coastal Sediment Cells for the Vlamingh Coast

Appendices A to D

Appendix A
Secondary and Tertiary Cells

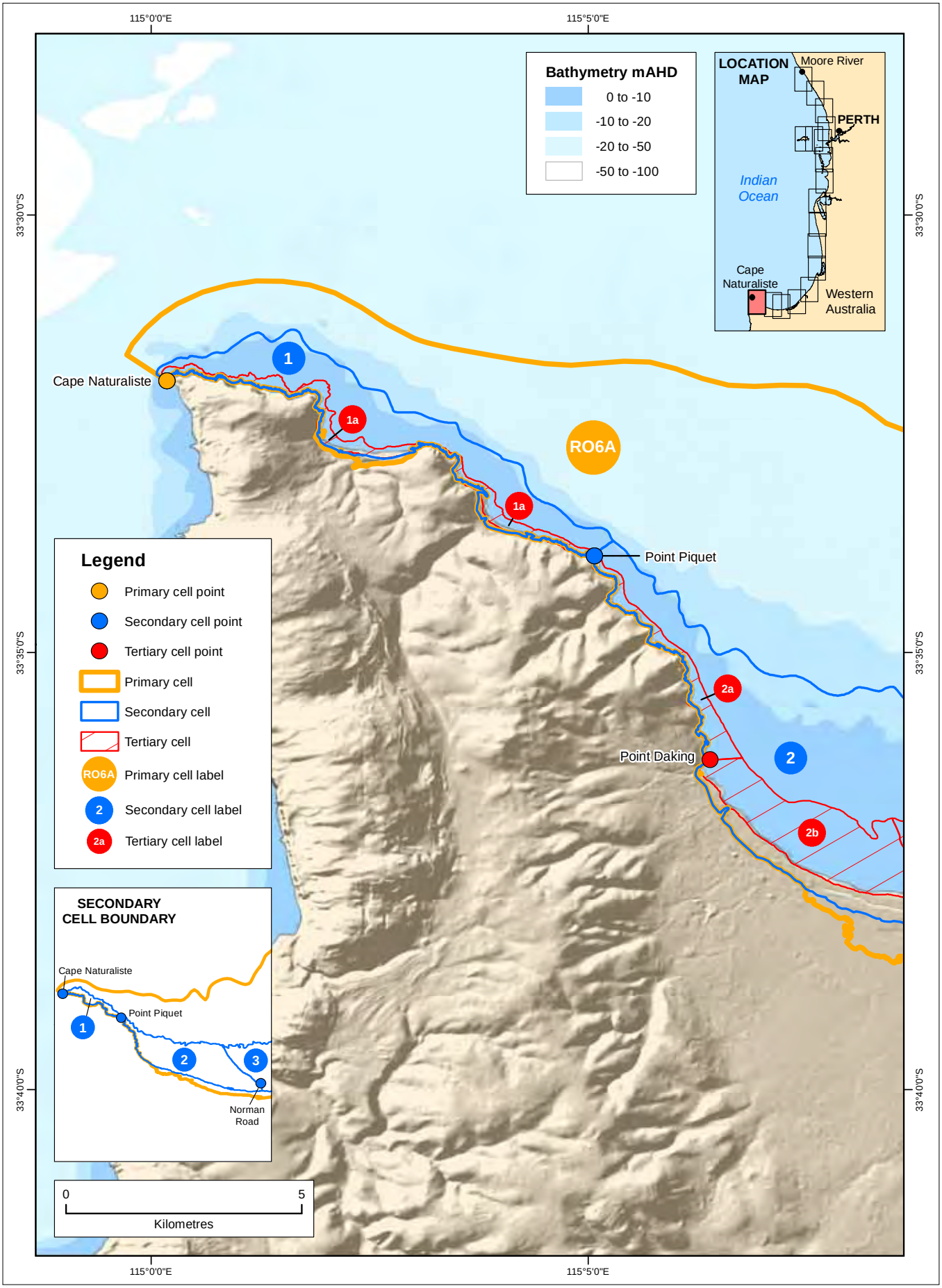


Figure A.1: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

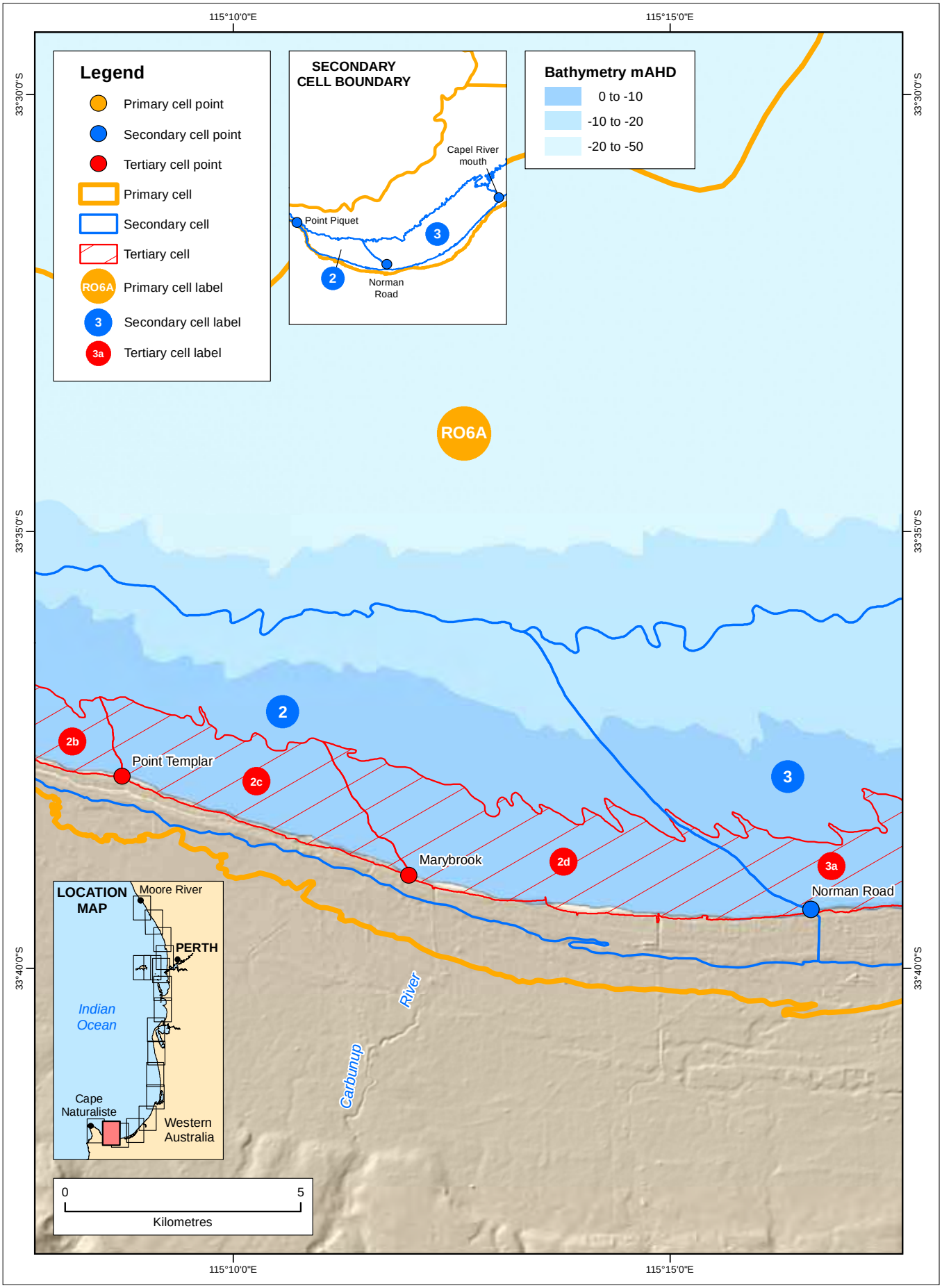


Figure A.2: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

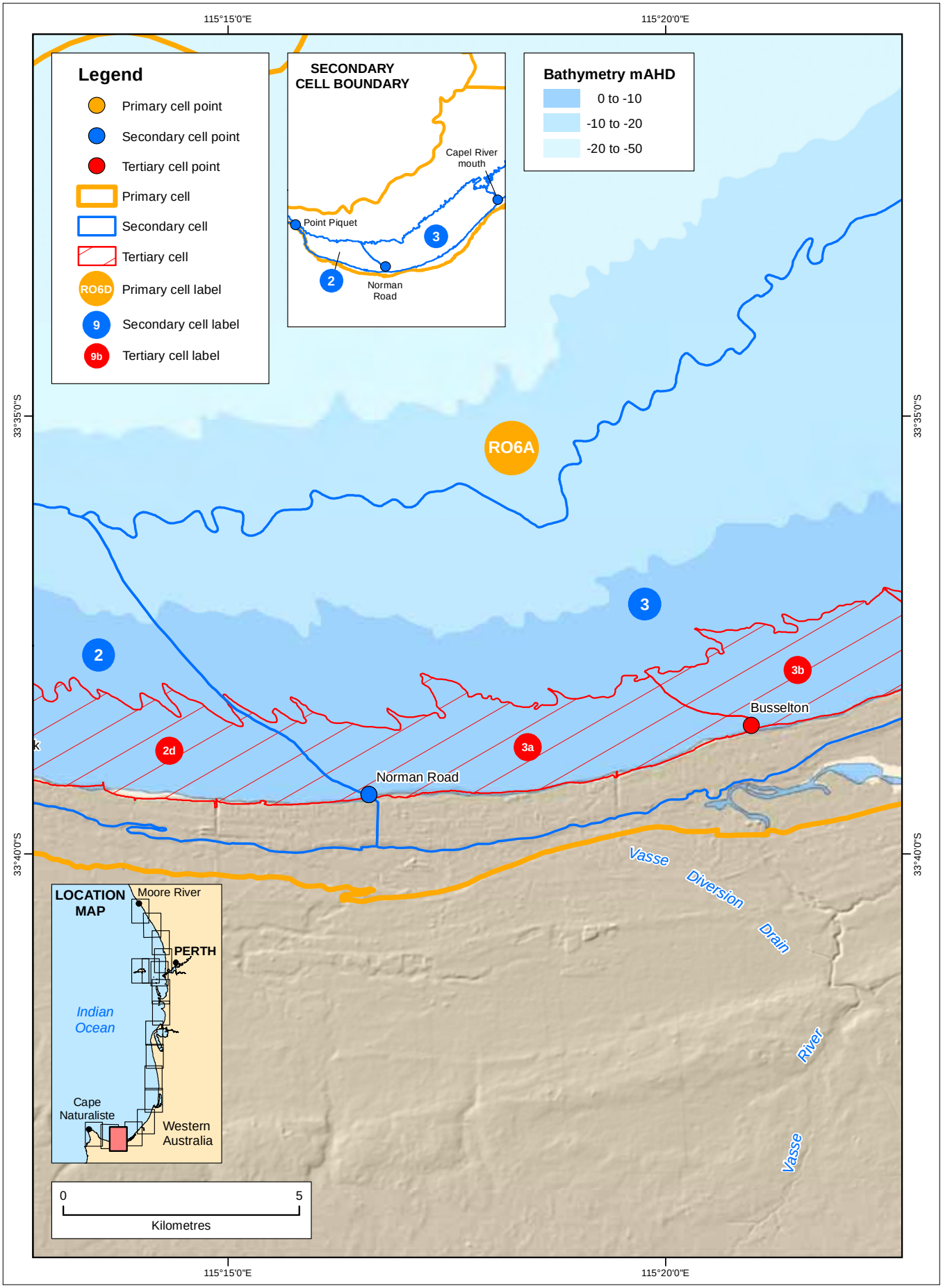


Figure A.3: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

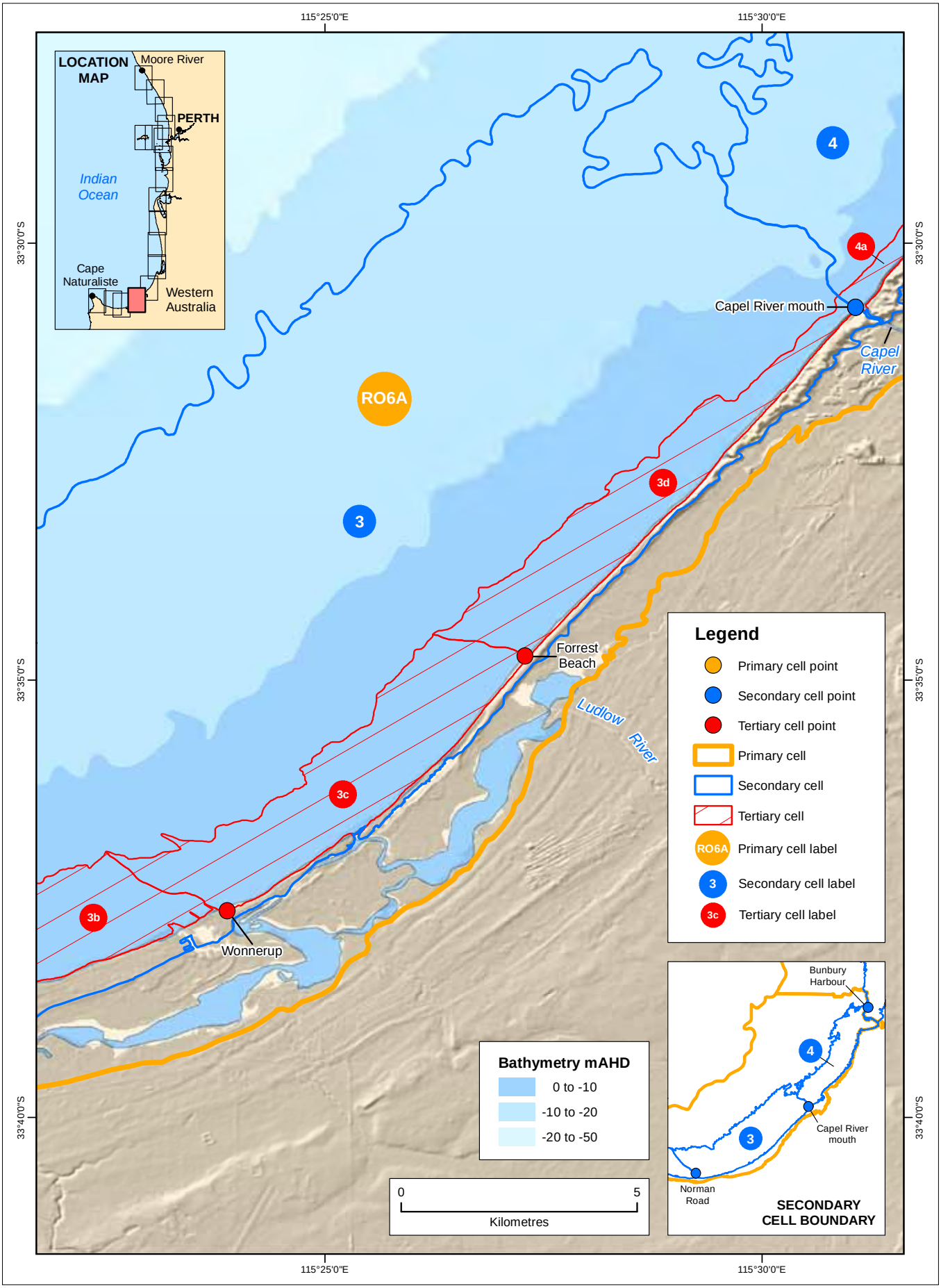


Figure A.4: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

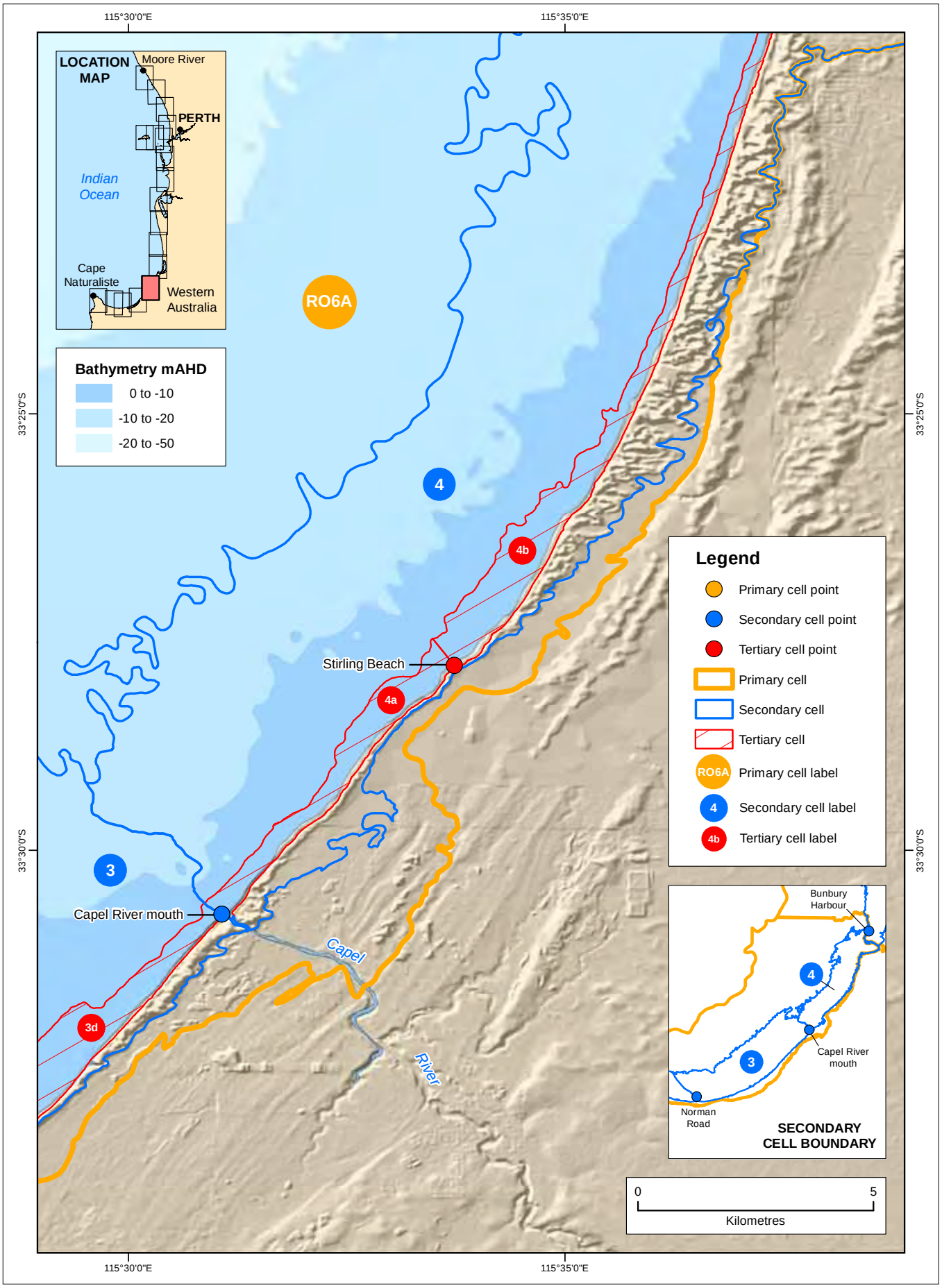


Figure A.5: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

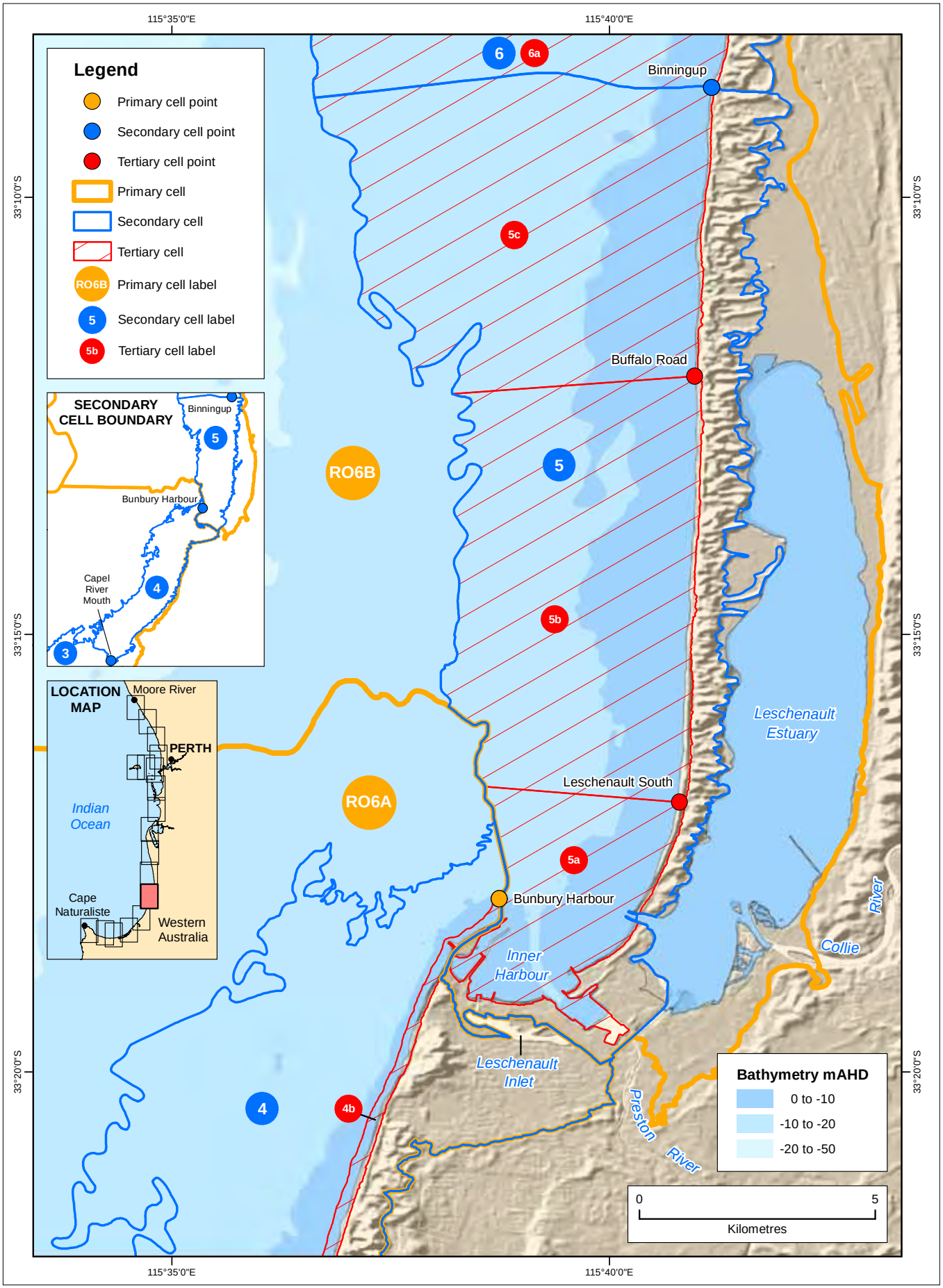


Figure A.6: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

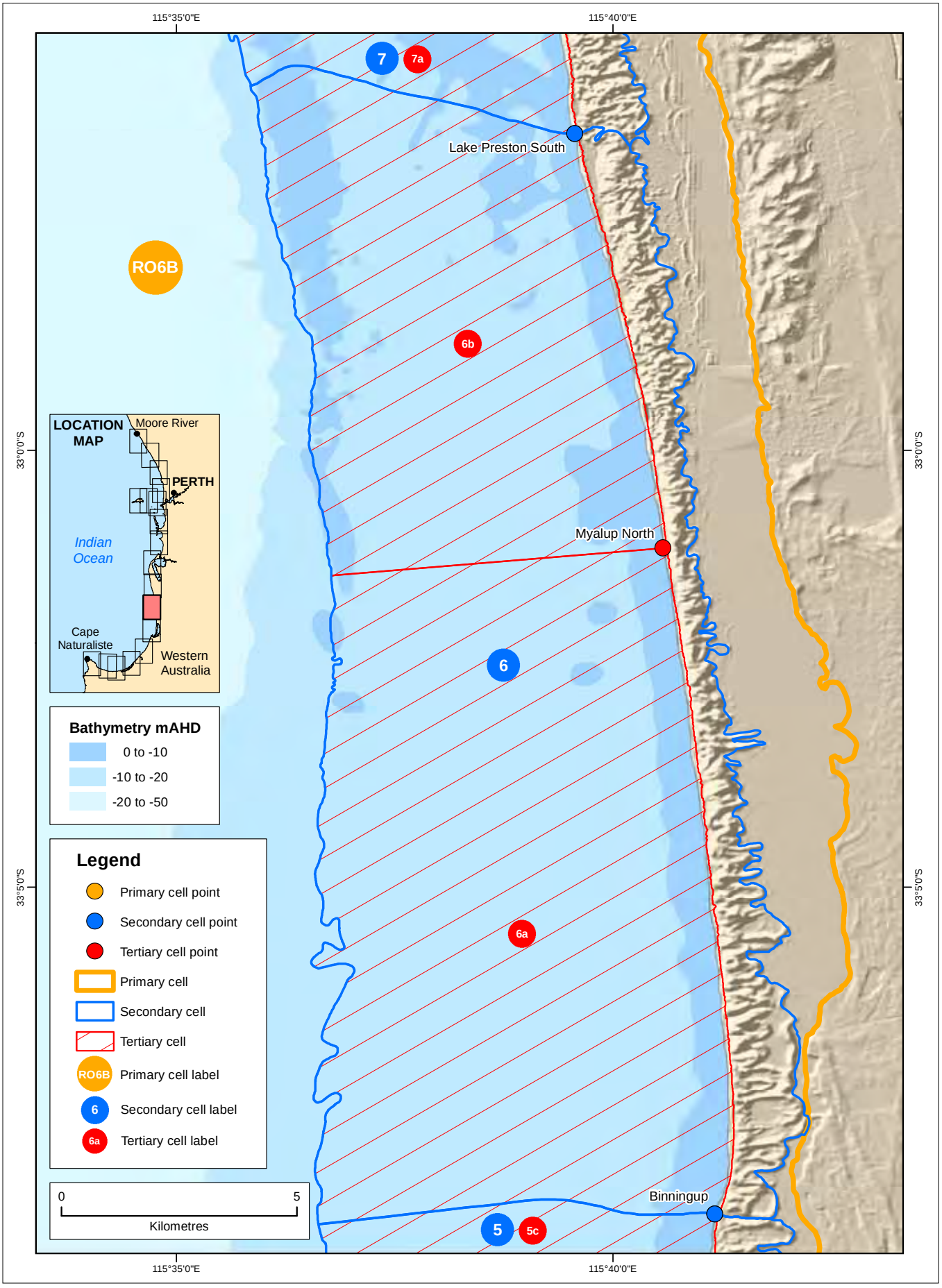


Figure A.7: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

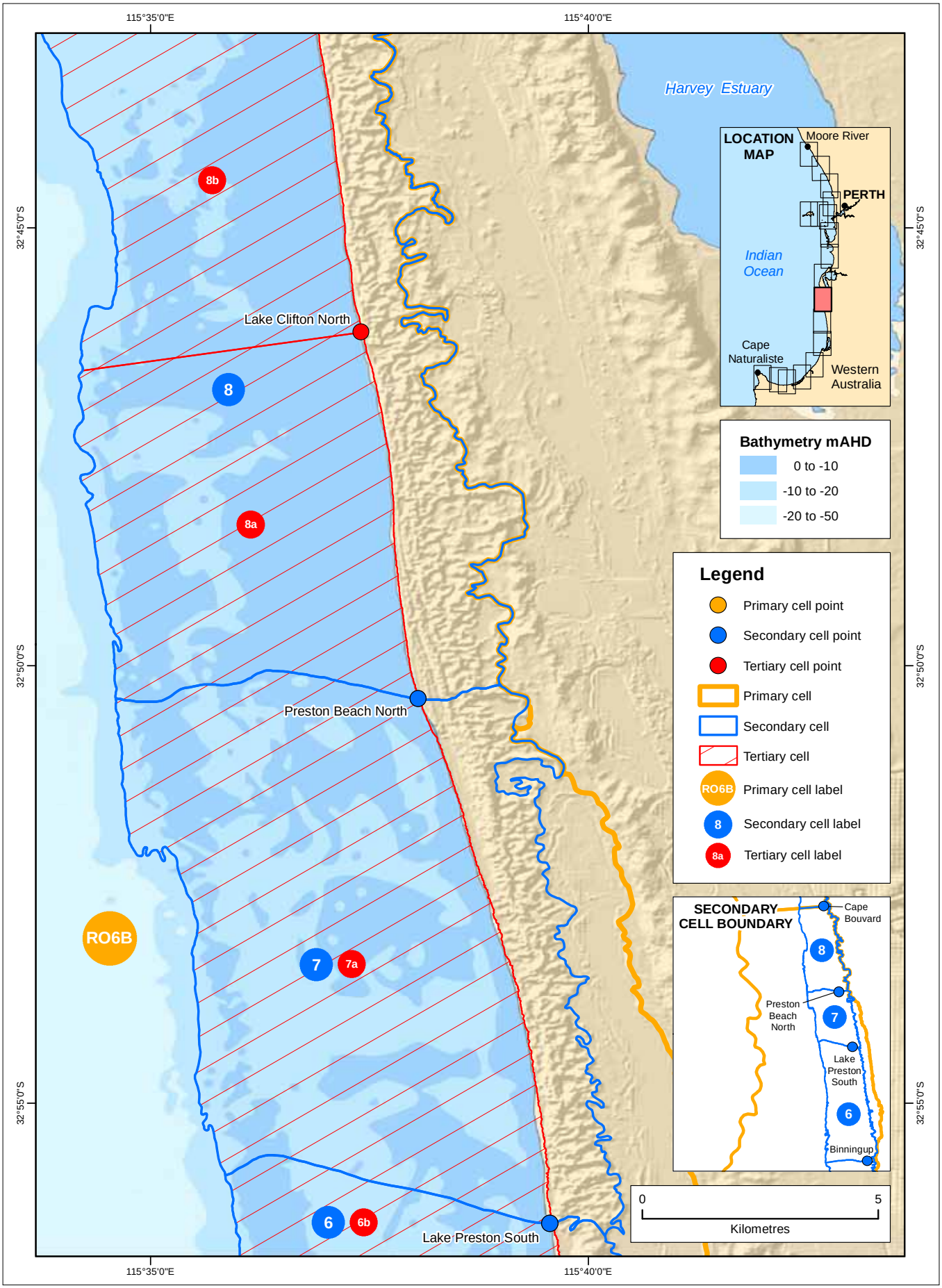


Figure A.8: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

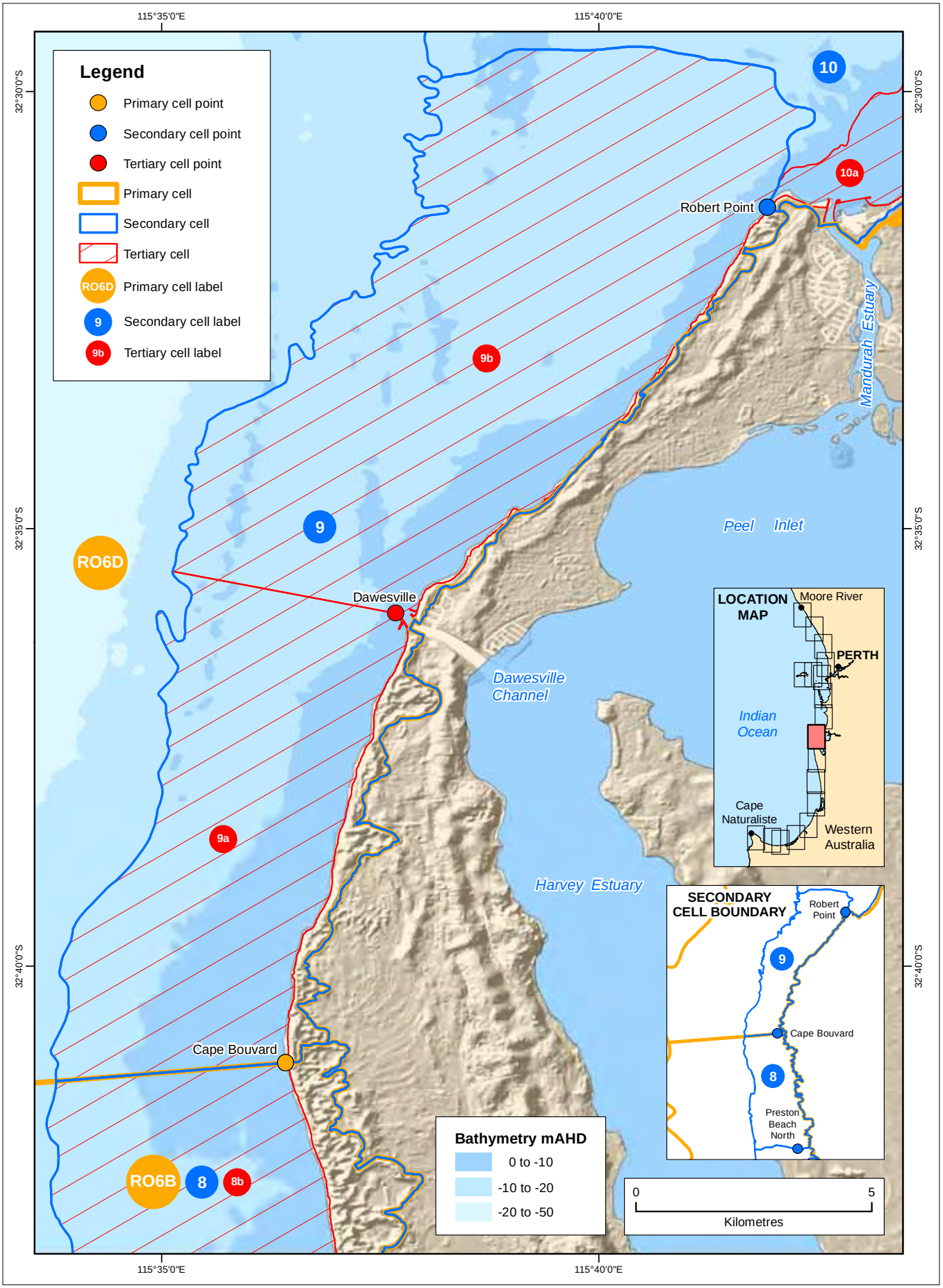


Figure A.9: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

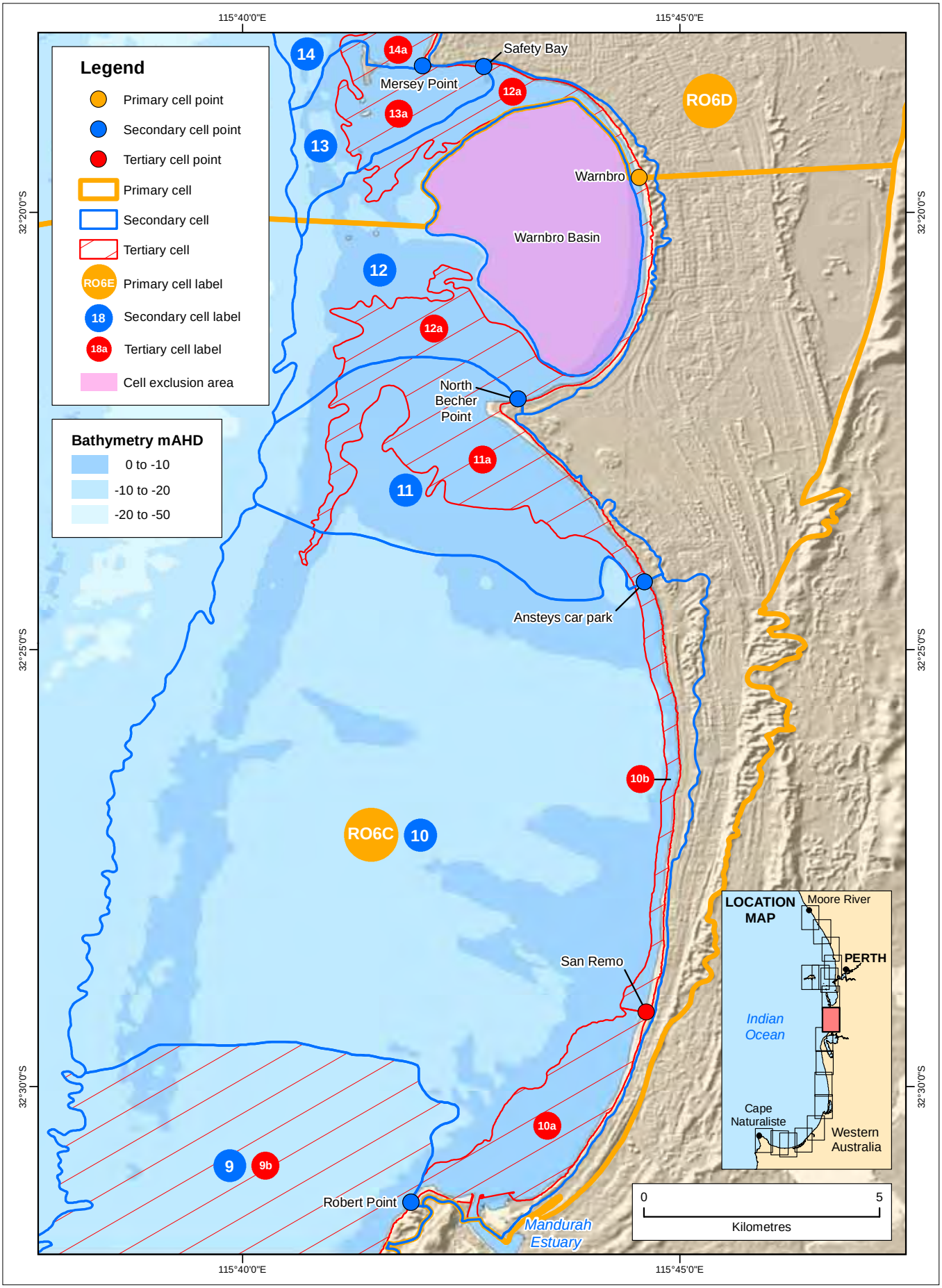


Figure A.10: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

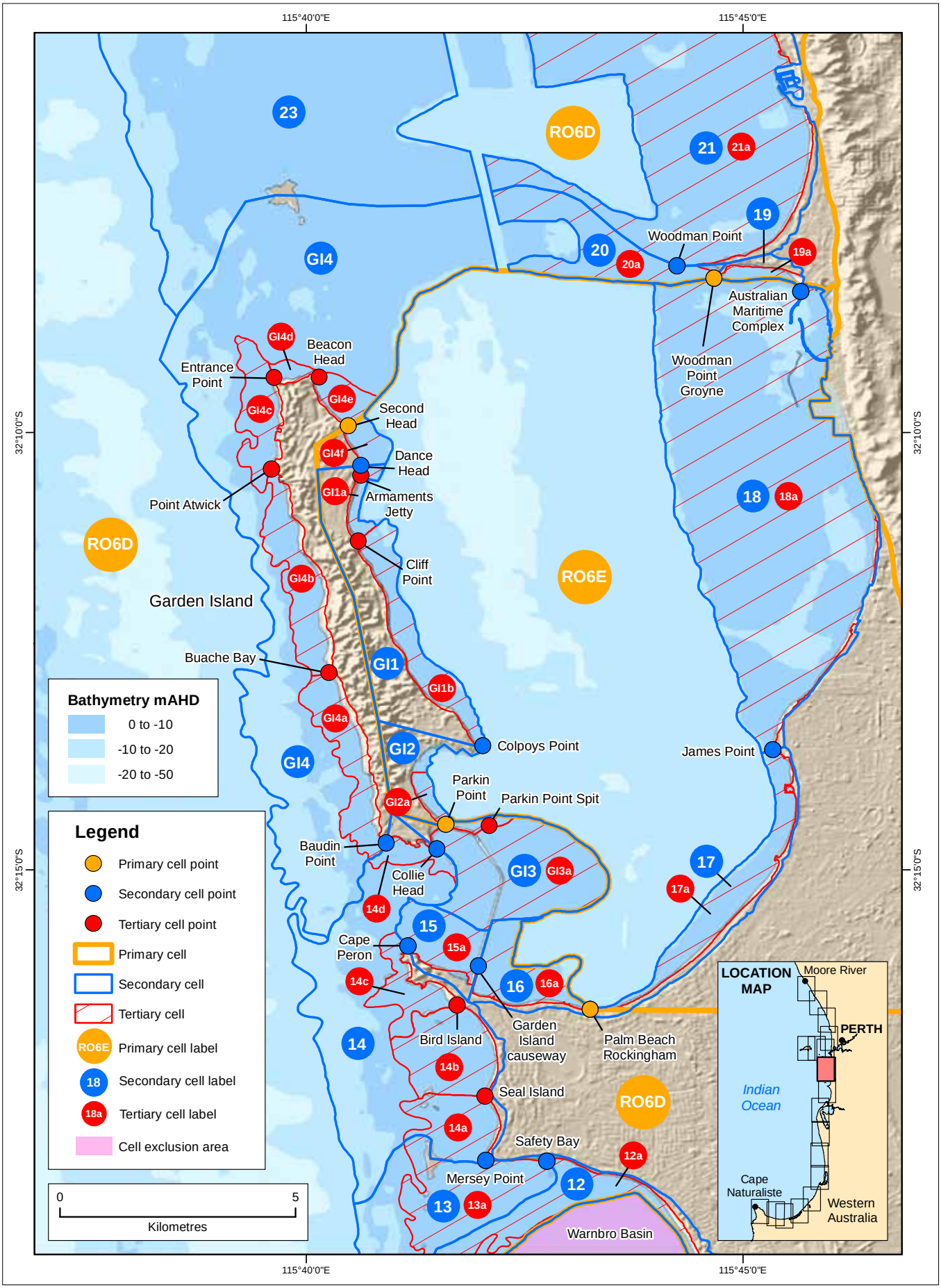


Figure A.11: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

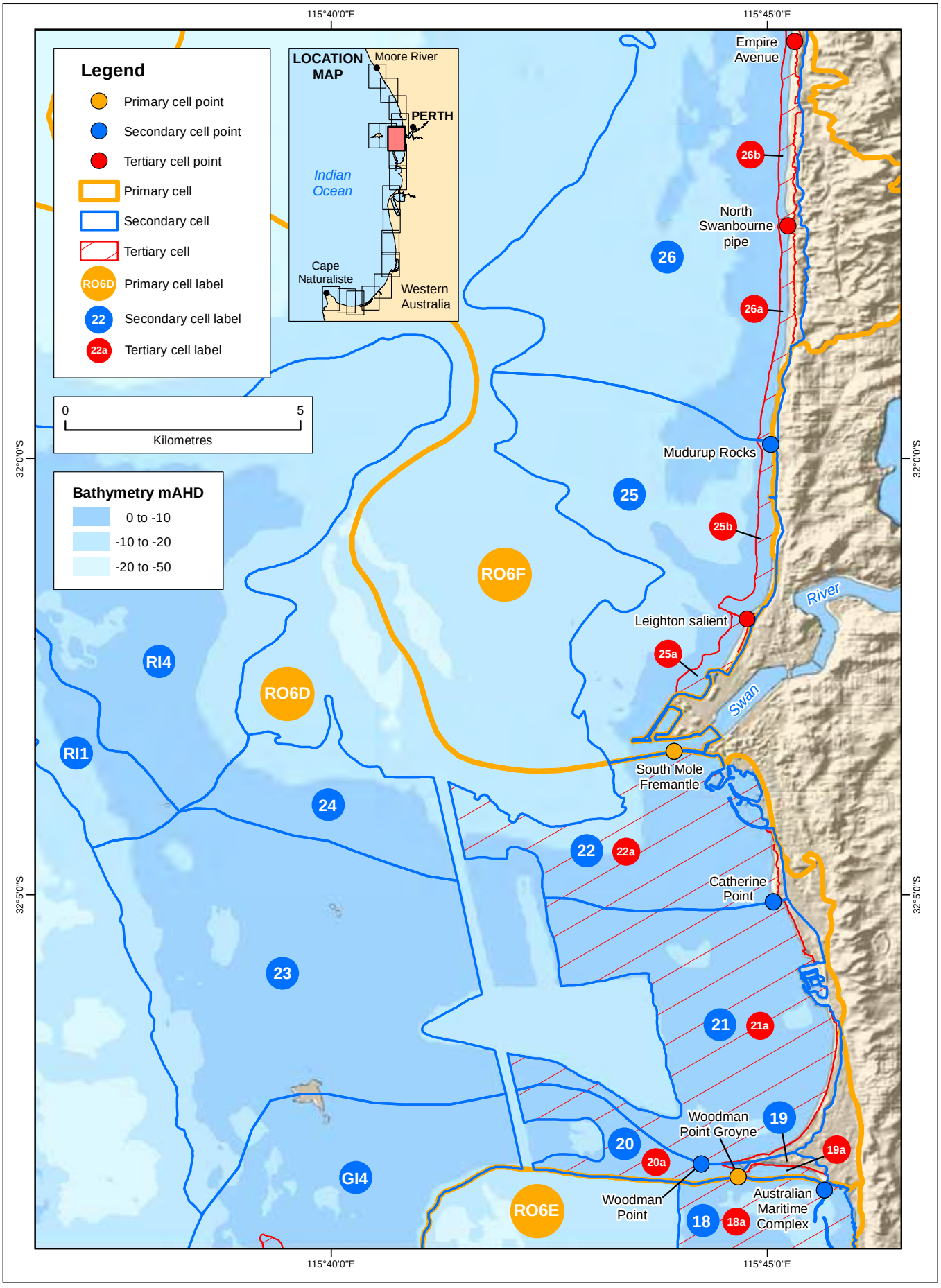


Figure A.12: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

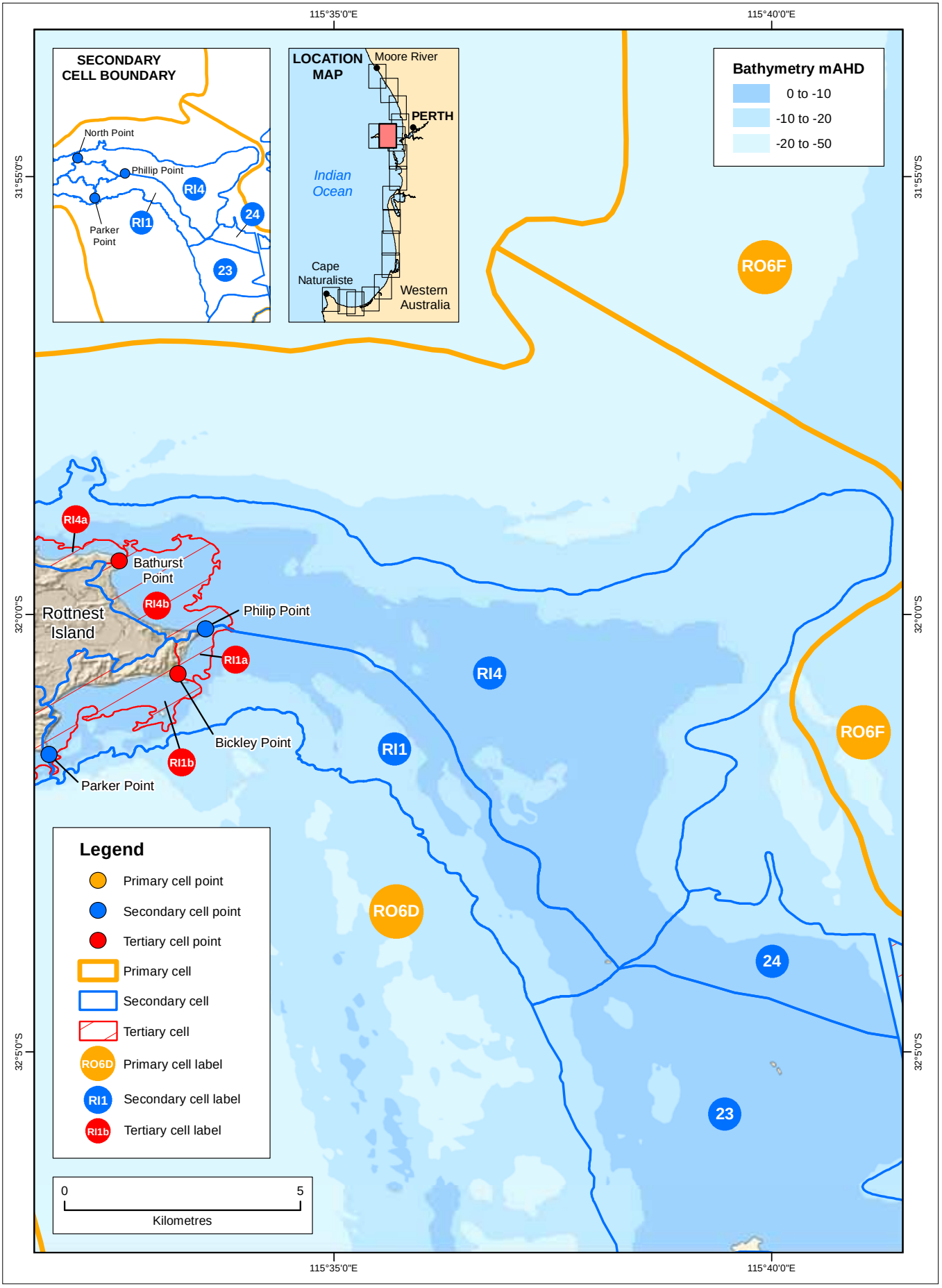


Figure A.13: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

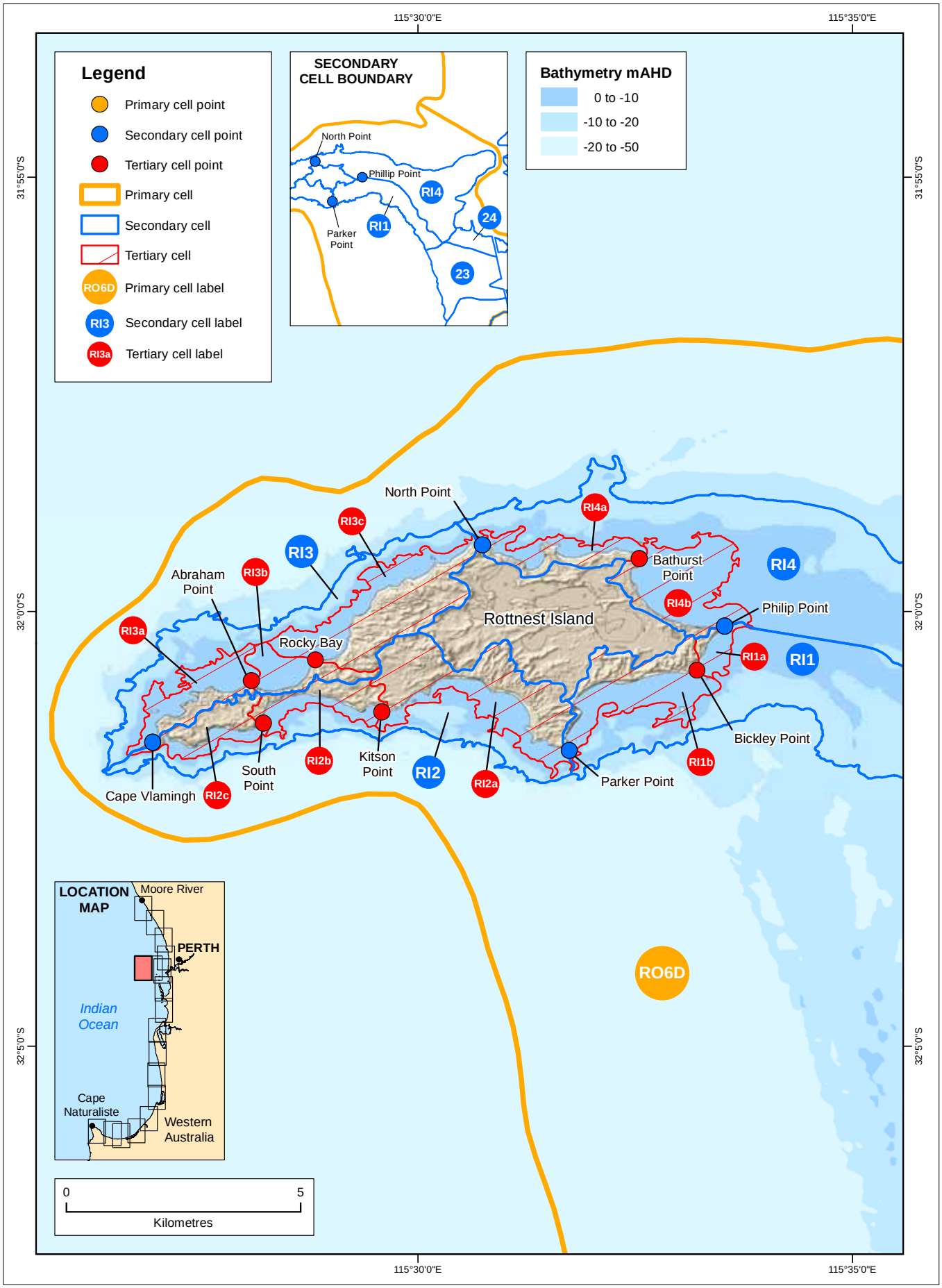


Figure A.14: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

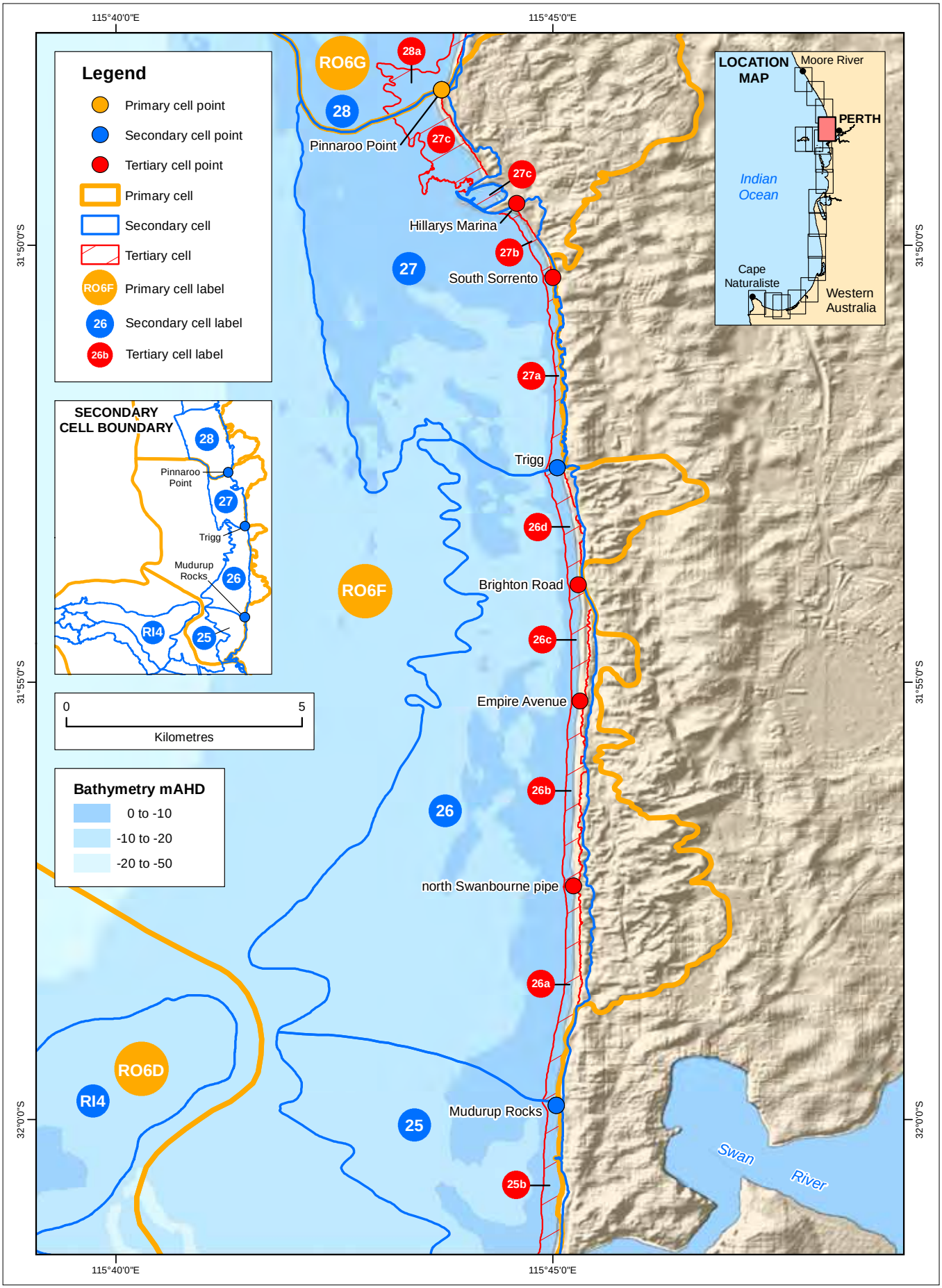


Figure A.15: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

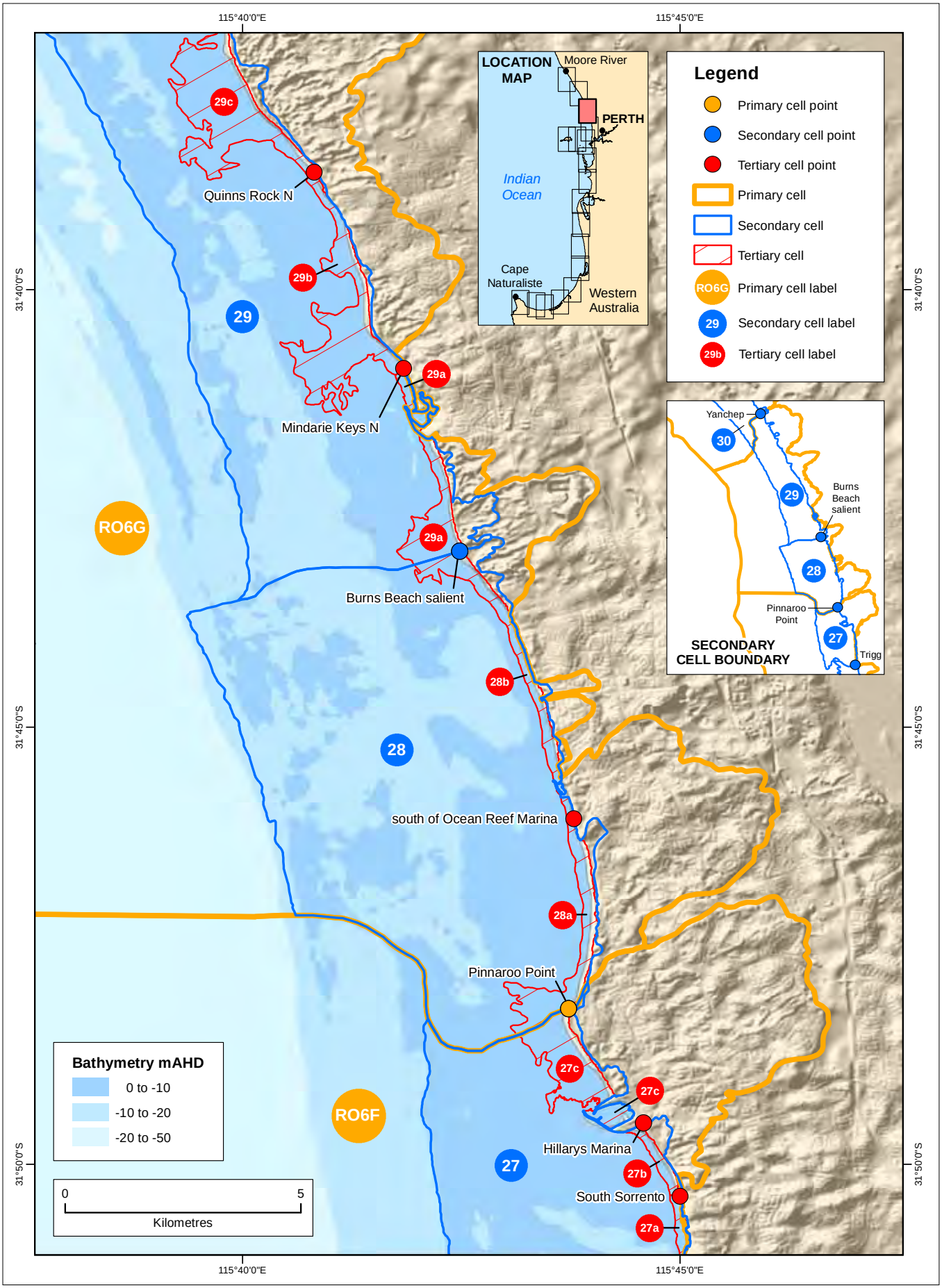


Figure A.16: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

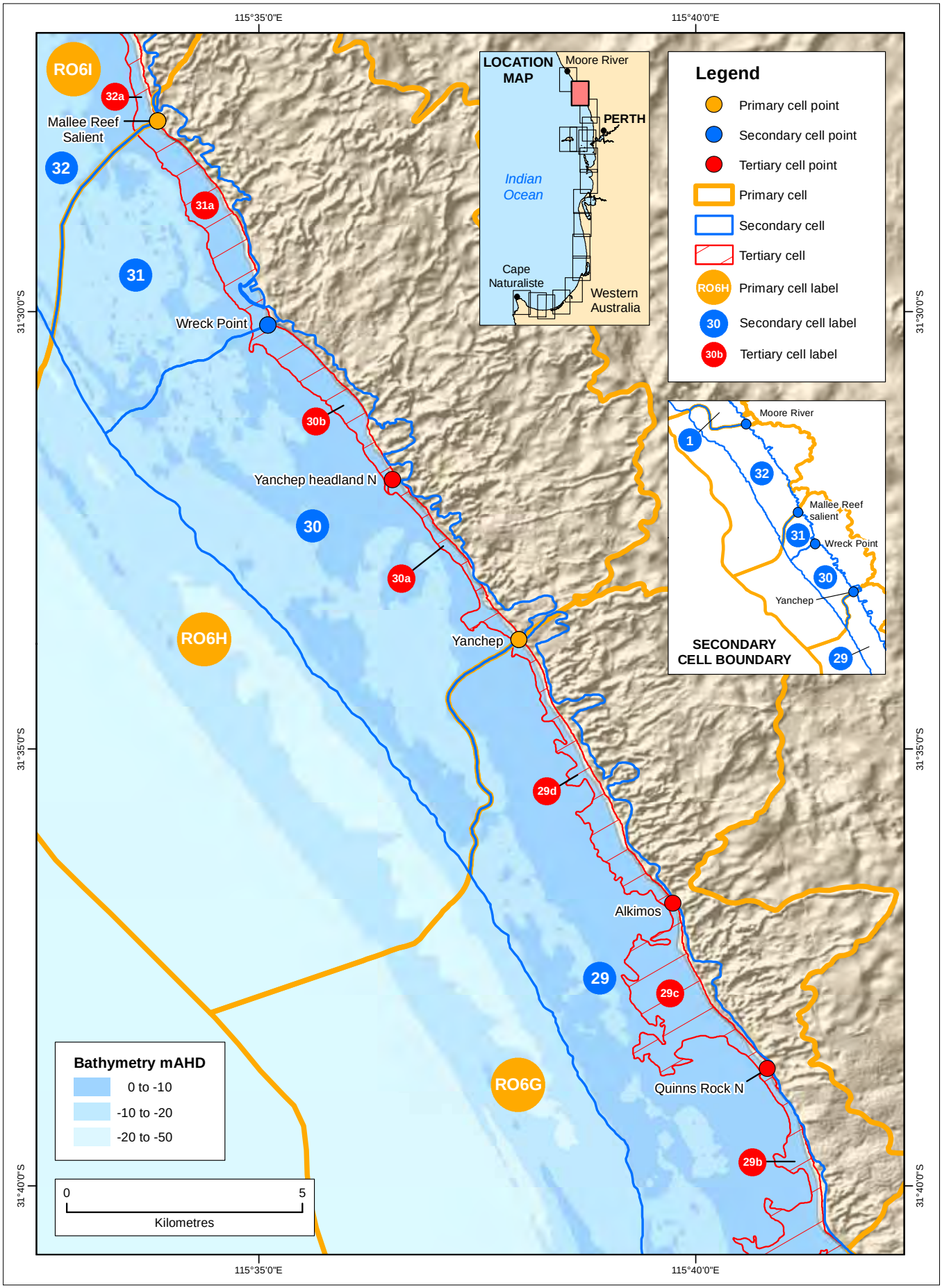


Figure A.17: Secondary and tertiary cells of the Vlamingh Region

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

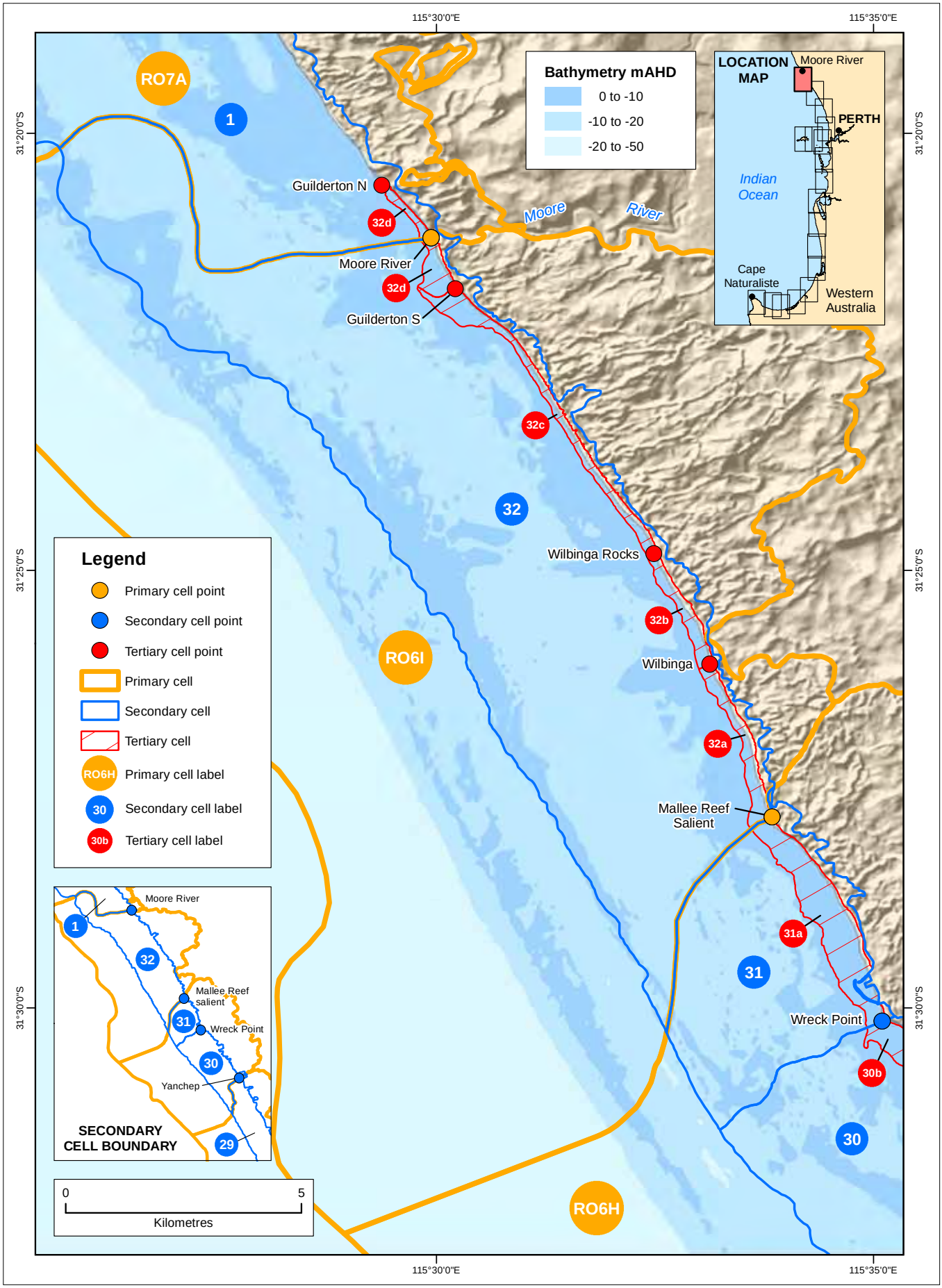


Figure A.18: Secondary and tertiary cells of the Vlamingh Regionn

Figure is at scale of 1:100,000 at A4. A primary cell point is also a secondary and tertiary cell point. A secondary cell point is also a tertiary cell point. This map should not be used for navigation purposes. Bathymetry information supplied by Department of Transport with depths in metres below Australian Height Datum. Shaded relief model supplied by Geological Survey of WA, Department of Mines and Petroleum. An inset is included for secondary cells not included wholly in any of this series of figures.

Appendix B
Data sets

Table B.1: Data Sources used for determining cell boundaries in the Vlamingh Region

Source	Dataset
Context	• Geological and geomorphological information and photographs contained in the WACoast[1] database.
	• Sediment information, with some examples provided in cited references[2] .
Remotely sensed datasets	• *Bathymetry*: Department of Transport nearshore and inshore LiDAR, Department of Transport (previously Department of Marine and Harbours) nautical charts and Department of Planning polygons derived from Department of Transport nautical charts. The LiDAR imagery was captured in 2009 and provides bathymetric detail at 5m grid spacing to approximately 25m below MSL[3]. All depths use the vertical datum of Australian Height Datum (AHD). Alternative information could have been used, however it was generally of a larger spatial resolution than needed, with reduced spatial accuracy. These datasets include the Australian Navy hydrographic charts, Geoscience Australia bathymetry, General Bathymetric Chart of the Oceans (GEBCO) bathymetry.
	• *Topography*: Geological Survey of Western Australia shaded relief model derived from the Landgate high-resolution digital elevation model. Alternative sources include Department of Water onshore LiDAR, Landgate topographic contours and spot heights.
	• *Vertical aerial imagery*: Landgate orthophotography from 2006-2008. Satellite imagery could be an alternative information source, but is generally of reduced spatial resolution and accuracy.
	• *Historic coastal change*: Department of Transport shoreline movement plots[4], including plan books DPI433, DPI67, DPI568, DPI374, DPI567 and DPI351. Historic aerial imagery can also provide context for coastal change, including recent changes identified by the time-series available through NearMap or Google Earth.. • *Shoreline*: The shoreline used as the basis for mapping is the Mean High Water Mark (MHWM) to 2006 prepared by Landgate and used by the Department of Environment and Conservation as the basis for the coastal compartment mapping[5]. This dataset is based on a combination of the cadastral and topographic coasts and is updated in areas as required based on government priority. It is unlikely to represent the location of the MHWM in 2006.
	• *Rivers*: 1:1M and 1:250k scale rivers by the Department of Water.
Landform mapping	• Digital dataset of the Holocene dunes and other landforms at 1:20,000 scale to 3km inland of Landgate MHWM to 2006 as part of WACoast datasets[1], unpublished digital datasets of landforms at 1:20,000 scale compiled in 1985-1987 by the Geological Survey of Western Australia and the Quindalup Q4 category[6].
	• Heads up digitising of foredunes, frontal dunes or the foreshore reserve at the 1:2000-scale..
	• 1:100k geology maps (GSWA) show the Holocene extent for primary cell onshore boundaries.
Naming conventions	• AUSLIG. (1993) Topographic Series, 1:100 000 Map Sheets for Western Australia. Commonwealth Government, Canberra.
	• Geological Survey of Western Australia. (2007) Atlas of 1:250 000 Geological Series Map Images..
	• Department of Transport nautical charts and Australian Navy hydrographic charts.

(Footnotes)

1 Gozzard JR. (2011a) *WACoast – Cape Naturaliste to Lancelin.* Geological Survey of Western Australia digital dataset.
Gozzard JR. (2011b) *WACoast – Rottnest Island.* Geological Survey of Western Australia digital dataset.

2 Semeniuk V and Johnson DP. (1982) Recent and Pleistocene Beach/Dune Sequences, Western Australia. *Sedimentary Geology*. 32: 301-328,
Semeniuk V and Searle DJ. (1986a) The Whitfords Cusp – its geomorphology, stratigraphy and age structure. *Journal of the Royal Society of Western Australia*, 68 (2): 29-36.
Collins LB. (1988) Sediments and history of the Rottnest Shelf, southwestern Australia: a swell dominated, non-tropical carbonate margin. *Sedimentary Petrology*, 60: 15–29.
Searle DJ and Semeniuk V. (1988) Petrology and origin of beach sand along the Rottnest Shelf coast, Southwestern Australia. *Journal of the Royal Society of Western Australia*, 70(4): 119-128.
DA Lord and Associates. (1998) *Sedimentology of Success and Parmelia Banks, Owen Anchorage, (Western Australia) - Summary Report*. For Cockburn Cement Limited. Report no. 95/008/6.
Richardson L, Mathews E and Heap A. (2005) *Geomorphology and Sedimentology of the South West Planning Area of Australia: Review and synthesis of relevant literature in support of Regional Marine Planning*. Geoscience Australia Report Record 2005/17.
Stul T. (2005) *Physical characteristics of Perth Beaches, Western Australia*. Honours Thesis in Environmental Engineering. Centre for Water Research. The University of Western Australia.

3 Fugro LADS Corporation (2009). *Report of Survey, Western Australia, Two Rocks to Cape Naturaliste: Bathymetry and Seabed Survey*, LiDAR. April/May 2009, Adelaide, Australia.

4 Public Works Department, Department for Planning and Infrastructure and Department of Transport coastline movement or shoreline movement plots are now summarised in a database: https://mapsengine.google.com/09372590152434720789-17447516222354999649-4/mapview/?authuser=0

5 Eliot I, Nutt C, Gozzard B, Higgins M, Buckley E and Bowyer J. (2011) *Coastal Compartments of Western Australia: A Physical Framework for Marine and Coastal Planning*. Report 80-02. Damara WA Pty Ltd. Report to the Departments of Environment and Conservation, Planning and Transport. Environmental Protection Authority.

6 MacArthur WM and Bartle GA. (1980) *Landforms and soils as an aid to urban planning in the Perth Metropolitan Northwest Corridor, Western Australia*. Land Resources Management Series No. 5, CSIRO, Melbourne.

Appendix C
Regional variation in criteria

Table C.1: Comparison of cell criteria for the Vlamingh, Mid-West and Pilbara Regions

The same criteria apply for Mid-West and Northampton Regions. All reference to Mid-West Region should be read as Mid-West and Northampton Regions.

	Vlamingh Region compared to Mid-West Region	Vlamingh Region compared to Pilbara Region
Beachface point	Same criteria used for Vlamingh and Mid-West Regions.	Same criteria used for Vlamingh and Pilbara Regions, except engineering structures did not define any primary beachface points in the Pilbara. Vlamingh cells were defined based on changes in land systems and the geological framework. Pilbara cells were frequently defined to include areas with likely sediment supply by individual river systems, incorporating whole deltas within broader cells.
Offshore boundaries and marine section of the alongshore boundary	*Offshore boundaries* for the Mid-West have one criterion per cell level corresponding to depths of -30m AHD for primary cells, -15m AHD for secondary cells and -5m AHD for tertiary cells. The Vlamingh Region has multiple depth criteria for offshore boundaries at secondary and tertiary cell levels due to sheltering by continuous ridgelines of elongate reefs, large offshore islands, large sediment banks and basins.	*Offshore boundaries* of cells in the Pilbara Region are related to tidal reworking of sediment and waves, whereas waves are the primary process for cells in the Vlamingh Region. One consequence of this difference is offshore boundaries generally occur at shallower depths for the Pilbara Region in areas where tidal reworking and extreme waves provide the dominant environmental forcing. The Vlamingh Region has multiple depth criteria for offshore boundaries at secondary and tertiary cell levels due to sheltering by continuous ridgelines of elongate reefs, large offshore islands within primary cell offshore boundaries, large sediment banks and basins.
	Marine sections of the alongshore boundaries were mapped as orthogonal to the coast in the Mid-West Region where limited bathymetric information was available, with more detailed bathymetry available for the Vlamingh Region. Mapping the toe of Holocene sediment banks in the Vlamingh Region is not included for the Mid-West Region.	*Marine sections* of the alongshore boundaries in the Vlamingh Region are fixed by toes of Holocene sediment banks, submerged rock outcrops and islands and follow lines of sediment transport convergence on banks and reefs. Marine sections cannot be easily resolved in the Pilbara Region due to extensive tidal reworking of sediments from multiple rivers across the broad nearshore area, combined with limited bathymetric information. Marine sections were often not orthogonal to the coast, but were skewed in the direction of the dominant current or wave forcing following high points in the bathymetry or ridge lines of islands.
Onshore boundaries and terrestrial section of the alongshore boundary	The Vlamingh Region is the most densely populated area of the Western Australian coast with extensive coastal modifications. Hence more criteria for onshore boundaries and the terrestrial section of alongshore boundaries are related to engineering works.	The Vlamingh and Pilbara coasts have been modified in densely populated or industrialised areas. The physical extent of the engineered structures and reclaimed land in the Pilbara tends to not extend beyond the area of the majority of tidal reworking of riverine sediments. Therefore engineering works tend to be excluded as criteria for onshore boundaries and terrestrial sections of alongshore boundaries in the Pilbara.
	Natural *onshore boundaries* of cells in the Vlamingh Region are mainly the landward extent of Holocene land systems. Two exceptions are included for the Mid-West Region to ensure exclusion of dunes without a connection to the coast and inclusion of dunes abutting rocky topography to landward, such as colluvial foot slopes and cliffs.	Natural *onshore boundaries* for primary cells in the Pilbara Region are linked to elevation contours for the extensive systems of outwash plains, with Holocene land systems used in the Vlamingh Region. Onshore boundaries for secondary and tertiary cell scales in the Pilbara Region relate to the landward extent of supratidal landforms and inter-tidal landforms respectively, excluding the presence of dunes, cliffs and engineered coasts.
	Terrestrial sections of the alongshore boundaries also include discontinuities in large mobile dunes or narrow dune barriers for the Mid-West Region.	*Terrestrial sections* of the alongshore boundaries are defined in the Vlamingh Region by discontinuities in dune barriers and large landforms, or following the centerline of an engineered structure. The terrestrial sections cannot easily be resolved in the Pilbara Region due to extensive marine and fluvial interactions at multiple scales over the low-lying topography. Most frequently the boundary was mapped to ridgelines and connecting high points that separate basins.

Appendix D
Beachface points and cell boundary information

Table D.1: Rationale for selection of primary cell beachface points in the Vlamingh Region
Co-ordinates in Latitude and Longitude rounded to 3 decimal places

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Primary Cells
Moore River	-31.353	115.499	2°	Zone, Ambulatory, Open	Rock structure restricting sediment transport at a decadal scale; Geomorphic feature (Moore River channel)	R06I, R07A
Mallee Reef salient	-31.464	115.564	2°, 3°	Zone, Fixed, Open	Rock structure restricting sediment transport at a decadal scale; Geomorphic feature (salient)	R06H, R06I
Yanchep	-31.563	115.633	2°, 3°	Zone, Ambulatory, Open	Geomorphic feature (onshore feed and discontinuity in dune system)	R06G, R06H
Pinnaroo Point	-31.804	115.729	2°, 3°	Zone, Ambulatory, Open	Geomorphic feature (cuspate foreland); Adjacent cells have a different shoreline aspect restricting sediment transport at a decadal scale	R06F, R06G
South Mole Fremantle	-32.056	115.732	2°, 3°	Point, Fixed, Closed	Engineered structure (South Mole Fremantle and dredged channel)	R06D, R06F
Woodman Point groyne	-32.137	115.744	2°, 3°	Point, Fixed, Closed	Geomorphic feature (end of Parmelia Bank/ start of Cockburn Sound); Engineered structure (groyne and reclaimed peninsular)	R06D, R06E
Palm Beach Rockingham	-32.277	115.721	2°, 3°	Point, Fixed, Open	Geomorphic feature (end of Southern Flats); Adjacent cells have a different shoreline aspect restricting sediment transport at a decadal scale	R06D, R06E
Second Head	-32.165	115.675	3°	Point, Fixed, Open	Rock structure restricting sediment transport at a decadal scale; Geomorphic feature (Parmelia Bank edge)	R06D, R06E
Parkin Point	-32.241	115.693	2°	Point, Fixed, Open	Geomorphic feature (old spit); Adjacent cells have a different shoreline aspect restricting sediment transport at a decadal scale	R06D, R06E
Warnbro	-32.327	115.742	-	Zone, Fixed, Open	Geomorphic feature (northern end of high dunes); (note: point of divergence)	R06C, R06D
Cape Bouvard	-32.685	115.607	2°, 3°	Zone, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at a decadal scale	R06B, R06C
Bunbury Harbour	-33.300	115.646	2°, 3°	Point, Fixed, Open	Rock structure restricting sediment transport at a decadal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a decadal scale; Engineered structure	R06A, R06B
Cape Naturaliste	-33.532	115.003	2°, 3°	Point, Fixed, Open	Rock structure restricting sediment transport at a decadal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a decadal scale	Last cell in region R05, R06A

Table D.2: Rationale for selection of primary cell onshore, offshore and alongshore boundaries in the Vlamingh Region

Primary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06I. Mallee Reef salient to Moore River	-30m AHD isobath farthest from shore (seaward of shore parallel ridge)	Landward extent of Holocene land systems	Mallee Reef salient	Broad area of sediment transport convergence (high point of Mallee Reef)	Boundary of, or discontinuity in, a Holocene land system	Moore River	Deepest point of depression or contour reentrant (Moore River palaeochannel)	Boundary of, or discontinuity in, a Holocene land system
R06H. Yanchep to Mallee Reef salient	-30m AHD isobath farthest from shore (seaward of shore parallel ridge)	Landward extent of Holocene land systems	Yanchep	Broad area of sediment transport convergence (high point of Hugill Reef); Deepest point of depression (depression in two offshore ridges)	Centreline of engineered structure or feature (edge of car park, Section 3)	Mallee Reef salient	Broad area of sediment transport convergence (high point of Mallee Reef)	Boundary of, or discontinuity in, a Holocene land system
R06G. Pinnaroo Point to Yanchep	-30m AHD isobath farthest from shore	Landward extent of Holocene land systems; Landgate MHWM to 2006 for moderately to high cliffed coasts without dunes (north of Ocean Reef Marina); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Mindarie)	Pinnaroo Point	Broad area of sediment transport convergence (ridge of Lal Bank and offshore reefs)	Boundary of, or discontinuity in, a Holocene land system	Yanchep	Broad area of sediment transport convergence (high point of Hugill Reef); Deepest point of depression or contour reentrant (depression in two offshore ridges)	Boundary of, or discontinuity in, a Holocene land system
R06F. South Mole Fremantle to Pinnaroo Point	-30m AHD isobath farthest from shore	Landward extent of Holocene land systems; Landgate MHWM to 2006 for moderately to high cliffed coasts without dunes (Trigg to South Sorrento)	South Mole Fremantle	Deepest point of depression or contour reentrant (Swan River palaeochannel)	Central ridge line for an island (Garden Island, Section 2)	Pinnaroo Point	Broad area of sediment transport convergence (ridge of Lal Bank and offshore reefs)	Boundary of, or discontinuity in, a Holocene land system
R06E. Cockburn Sound (Section 1: Mainland from Palm Beach Rockingham to Woodman Point groyne, Section 2: Garden Island east from Second Head to Parking Point)	No boundary; Basin within Cockburn Sound	Landward extent of Holocene land systems (Section1); Central ridge line for an island (Garden Island, Section 2)	Palm Beach Rockingham (Section 1), Second Head (Section 2)	Toe of Holocene sediment bank (Southern Flats for Section 1 and Parmelia Bank for Section 2)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in land system between adjacent cells (E-W line picked as part of Rockingham-Becher Plain, Section 1); Central ridge line for an island (Garden Island, Section 2)	Woodman Point groyne (Section 1), Parkin Point (Section 2)	Toe of Holocene sediment bank (Parmelia Bank for Section 1, Southern Flats for Section 2)	Centreline of engineered structure or feature (edge of car park, Section 1); Central ridge line for an island (Garden Island, Section 2)

Primary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06D. Warnbro to South Mole Fremantle including Rottnest Island and excluding Cockburn Sound (Section 1: Southern from Warnbro to Palm Beach Rockingham, Section 2: Garden Island west to Second Head, Success and Parmelia Banks west of the shipping channel & Rottnest Island, Section 3: Northern from Woodman point groyne to South Mole Fremantle)	-30m AHD isobath farthest from shore (immediately seaward of continuous shore parallel ridge)	Landward extent of Holocene land systems (Section 1, Section 3 also including an old shoreline in the northern extent); Central ridge line for an island (Garden Island, Section 2); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Challenger to South Mole, Section 3)	Warnbro (Section 1), Parkin Point (Section 2), Woodman Point groyne (Section 3)	Toe of Holocene sediment bank (toe of North Sands for Section 1, Southern Flats for Section 2 and Parmelia Bank for Section 3); Deepest point of depression or contour reentrant (gap between North and South Sands in lee of Coventry Reef, Section 1)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in land system between adjacent cells (through high point in dunes, Section 1); Central ridge line for an island (Garden Island, Section 2); Centreline of engineered structure or feature (edge of car park, Section 3)	Palm Beach Rockingham (Section 1), Second Head (Section 2), South Mole Fremantle (Section 3	Toe of Holocene sediment bank (Southern Flats for Section 1, Parmelia Bank for Section 2); Deepest point of depression or contour reentrant (Swan River palaeochannel, Section 3)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in land system between adjacent cells (E-W line picked as part of Rockingham-Becher Plain, Section 1); Central ridge line for an island (Garden Island, Section 2); Boundary of, or discontinuity in, a Holocene land system (Section 3)
R06C. Cape Bouvard to Warnbro	-30m AHD isobath farthest from shore (immediately seaward of continuous shore parallel ridge)	Landward extent of Holocene land systems	Cape Bouvard	Broad area of sediment transport convergence (lee of unnamed reef)	Boundary of, or discontinuity in, a Holocene land system	Warnbro	Toe of Holocene sediment bank (toe of North Sands); Deepest point of depression or contour reentrant (gap between North and South Sands in lee of Coventry Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in land system between adjacent cells (through high point in dunes)
R06B. Bunbury Harbour to Cape Bouvard	-30m AHD isobath farthest from shore (on inner shelf plain)	Landward extent of Holocene land systems (small section of made ground used on Estuary Drive in Bunbury)	Bunbury Harbour	Deepest point of depression or contour reentrant (Collie River palaeochannel)	Boundary of, or discontinuity in, a Holocene land system	Cape Bouvard	Broad area of sediment transport convergence (lee of unnamed reef)	Boundary of, or discontinuity in, a Holocene land system
R06A. Cape Naturaliste to Bunbury Harbour	-30m AHD isobath farthest from shore (on inner shelf plain)	Landward extent of Holocene land systems	Cape Naturaliste	Broad area of sediment transport convergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in land system between adjacent cells (orthogonal to coast)	Bunbury Harbour	Deepest point of depression or contour reentrant (Collie River palaeochannel)	Boundary of, or discontinuity in, a Holocene land system

Table D.3: Rationale for selection of secondary cell beachface points in the Vlamingh Region
Co-ordinates in Latitude and Longitude rounded to 3 decimal places

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Secondary Cells
Moore River	-31.353	115.499	1°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (Moore River channel)	R06I32, R07A1
Mallee Reef salient	-31.464	115.564	1°, 3°	Zone, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (salient)	R06H31, R06I32
Wreck Point	-31.503	115.585	3°	Point, Ambulatory, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (salient)	R06H30, R06H31
Yanchep	-31.563	115.633	1°, 3°	Zone, Ambulatory, Open	Geomorphic feature (onshore feed and discontinuity in dune system)	R06G29, R06H30
Burns Beach Salient	-31.717	115.708	3°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (salient)	R06G28, R06G29
Pinnaroo Point	-31.804	115.729	1°, 3°	Zone, Ambulatory, Open	Geomorphic feature (cuspate foreland); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06F27, R06G28
Trigg	-31.876	115.751	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (salient)	R06F26, R06F27
Mudurup Rocks	-31.997	115.751	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (salient); Engineered structure or dredged channel (Cottesloe groyne)	R06F25, R06F26
South Mole Fremantle	-32.056	115.732	1°, 3°	Point, Fixed, Closed	Engineered structure or dredged channel (South Mole Fremantle and dredged channel)	R06D22, R06F25
Catherine Point	-32.085	115.751	3°	Point, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale; Engineered structure or dredged channel (Catherine Point groyne)	R06D21, R06D22
Woodman Point	-32.135	115.737	3°	Point, Fixed, Open	Engineered structure or dredged channel (WAPET groyne)	R06D20, R06D21
Woodman Point groyne	-32.137	115.744	1°, 3°	Point, Fixed, Closed	Geomorphic feature (end of Parmelia Bank/start of Cockburn Sound); Engineered structure or dredged channel (groyne and reclaimed peninsular)	R06E19, R06D20
Australian Maritime Complex	-32.140	115.761	3°	Point, Fixed, Closed	Geomorphic feature (southern end of Parmelia Bank); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale; Engineered structure or dredged channel (AMC)	R06E18, R06E19
James Point	-32.227	115.756	3°	Point, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale; Engineered structure or dredged channel (BP intake pipe)	R06E17, R06E18

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Secondary Cells
Palm Beach Rockingham	-32.277	115.721	1°, 3°	Point, Fixed, Open	Geomorphic feature (end of Southern Flats); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06D16, R06E17
Garden Island causeway	-32.268	115.700	3°	Point, Fixed, Closed	Engineered structure or dredged channel (Garden Island causeway)	R06D15, R06D16
Cape Peron	-32.265	115.686	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale ; Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06D14, R06D15
Mersey Point	-32.305	115.701	3°	Zone, Ambulatory, Open	Geomorphic feature (tombolo); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06D13, R06D14
Safety Bay	-32.306	115.713	3°	Zone, Ambulatory, Open	Geomorphic feature (focal location of onshore sediment feed by North Sands in lee of promontory); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06C12, R06D13
North Becher Point	-32.369	115.719	3°	Zone, Ambulatory, Open	Geomorphic feature (focal location of onshore sediment feed by South Sands in lee of promontory); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06C11, R06C12
Ansteys Car Park	-32.404	115.743	3°	Zone, Ambulatory, Open	Geomorphic feature (northern extent of parabolic dunes); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06C10, R06C11
Robert Point	-32.522	115.699	3°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (salient)	R06C9, R06C10
Cape Bouvard	-32.685	115.607	1°, 3°	Zone, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06B8, R06C9
Preston Beach North	-32.840	115.634	3°	Zone, Ambulatory, Open	Geomorphic feature (salient and northern extent of broad mobile dunes)	R06B7, R06B8
Lake Preston South	-32.940	115.659	3°	Zone, Ambulatory, Open	Geomorphic feature (salient and northern extent of broad mobile dunes)	R06B6, R06B7
Binningup	-33.146	115.686	3°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at an annual scale (rock platform); Geomorphic feature (salient)	R06B5, R06B6
Bunbury Harbour	-33.300	115.646	1°, 3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale; Engineered structure or dredged channel	R06A4, R06B5
Capel River Mouth	-33.512	115.518	3°	Zone, Ambulatory, Open	Geomorphic feature (Capel River mouth)	R06A3, R06A4
Norman Road	-33.655	115.277	3°	Zone, Ambulatory, Open	Geomorphic feature (transverse bar connected to shore at a salient)	R06A2, R06A3

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Secondary Cells
Point Piquet	-33.565	115.084	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale	R06A1, R06A2
Cape Naturaliste	-33.532	115.003	1°, 3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	Last cell in Region R05, R06A1
Rottnest Island						
North Point	-31.987	115.512	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06DRI4, R06DRI3
Cape Vlamingh	-32.025	115.449	3°	Point, Fixed, Closed	Rock structures restricting sediment transport at an annual scale; Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06DRI3, R06DRI2
Parker Point	-32.027	115.529	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06DRI2, R06DRI1
Philip Point	-32.003	115.559	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Geomorphic feature (spit); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06DRI1, R06DRI4
Garden Island						
Dance Head	-32.173	115.677	-	Zone, Ambulatory, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06DGI4, R06EGI1
Baudin Point	-32.245	115.682	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale; Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06D14, R06DGI4
Collie Head	-32.246	115.692	3°	Point, Fixed, Open	Rock structures restricting sediment transport at an annual scale	R06DGI3, R06D14
Parkin Point	-32.241	115.693	1°	Point, Fixed, Open	Geomorphic feature (old spit); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale	R06EGI2, R06DGI3
Colpoys Point	-32.226	115.700	3°	Zone, Ambulatory, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at an annual scale; Engineered structure or dredged channel (groyne)	R06EGI1, R06EGI2

Table D.4: Rationale for selection of secondary cell onshore, offshore and alongshore boundaries in the Vlamingh Region

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06I32. Mallee Reef salient to Moore River	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of frontal dunes	Mallee Reef salient	Area of sediment transport convergence on banks or reefs (high point of Mallee Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Moore River	Deepest point of depression or contour reentrant (Moore River palaeochannel)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06H31. Wreck Point to Mallee Reef Salient	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of frontal dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Two Rocks marina)	Wreck Point	Deepest point of depression or contour reentrant (depression in two offshore ridges)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Mallee Reef salient	Area of sediment transport convergence on banks or reefs (high point of Mallee Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06H30. Yanchep to Wreck Point	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of frontal dunes; Landgate (Yanchep headland)	Yanchep	Area of sediment transport convergence on banks or reefs (high point of Hugill Reef); Deepest point of depression or contour reentrant (depression in two offshore ridges)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Wreck Point	Fixed by submerged rock outcrops or islands (high point of Gretel Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06G29. Burns Beach Salient to Yanchep	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of frontal dunes (in non-engineered or non-cliffed areas); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Mindarie Keys); Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes (Mindarie Keys to Mindarie Keys N)	Burns Beach salient	Fixed by submerged rock outcrops or islands (unnamed reef); A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Yanchep	Area of sediment transport convergence on banks or reefs (high point of Hugill Reef); Deepest point of depression or contour reentrant (depression in two offshore ridges)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06G28. Pinnaroo Point to Burns Beach Salient	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of narrow parabolic dunes (to south of Ocean Reef marina); Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes (S of Ocean Reef marina, S of Burns Beach); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Ocean Reef marina); Landward extent of foreshore reserve in built areas (north of Ocean Reef marina except for where cliff is present)	Pinnaroo Point	Area of sediment transport convergence on banks or reefs (ridge of Lal Bank and offshore reefs)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Burns Beach salient	Fixed by submerged rock outcrops or islands (unnamed reef); A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06F27. Trigg to Pinnaroo Point	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of foreshore reserve in built areas & Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes (Trigg to Sorrento); Landward extent of frontal dunes (Sorrento to Hillary; Hillarys to Pinnaroo Points); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Hillarys)	Trigg	A marine extension of the beachface point to the offshore boundary (incorporates depression offshore of Trigg Island)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Pinnaroo Point	Area of sediment transport convergence on banks or reefs (ridge of Lal Bank and offshore reefs)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06F26. Mudurup Rocks to Trigg	Continuous -15m AHD isobath closest to shore (Mudurup Rocks to Empire Avenue); Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges (Empire Avenue to Trigg)	Landward extent of foreshore reserve in built areas (Mudurup Rocks to Swanbourne); Landward extent of frontal dunes (Swanbourne to Trigg)	Mudurup Rocks	Centreline of an engineered structure or toe of a dredged channel (Cottesloe groyne); A marine extension of the beachface point to the offshore boundary	Centreline of engineered structure or feature (Cottesloe groyne)	Trigg	A marine extension of the beachface point to the offshore boundary (incorporates depression offshore of Trigg Island)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06F25. South Mole Fremantle to Mudurup Rocks	Continuous -15m AHD isobath closest to shore	Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (to Port Beach); Landward extent of frontal dunes (Port Beach to Mudurup Rocks); Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes (Mudurup Rocks)	South Mole Fremantle	Centreline of an engineered structure or toe of a dredged channel (dredged channel and centreline of South Mole Fremantle)	No terrestrial section	Mudurup Rocks	Centreline of an engineered structure or toe of a dredged channel (Cottesloe groyne); A marine extension of the beachface point to the offshore boundary	Centreline of engineered structure or feature (Cottesloe groyne)
R06D24. Stragglers Rocks to West Shipping Channel, northwest Success Bank	Continuous -15m AHD isobath closest to shore (historically would have been, but dredged shipping channel has disconnected the banks and this cell from the coast); Toe of sediment bank (dredged shipping channel through Success Bank)	Not applicable as the cell does not extend onshore	Not applicable as does not connect to the beachface	Area of sediment transport convergence on banks or reefs	No terrestrial section	Not applicable as does not connect to the beachface	Toe of Holocene sediment banks (Success Bank into Gage Roads)	No terrestrial section
R06D23. Carnac Island to Stragglers Rocks,west Parmelia and Success Banks	Continuous -15m AHD isobath closest to shore (historically would have been, but dredged shipping channel has disconnected the banks and this cell from the coast); Toe of sediment bank (dredged shipping channel through Success and Parmelia Banks)	Not applicable as the cell does not extend onshore	Not applicable as does not connect to the beachface	Area of sediment transport convergence on banks or reefs (including through Carnac Island)	No terrestrial section	Not applicable as does not connect to the beachface	Area of sediment transport convergence on banks or reefs	No terrestrial section
R06D22. Catherine Point to South Mole Fremantle	Continuous -15m AHD isobath closest to shore; Toe of sediment bank (Dredged navigation channel and Cockburn Cement dredged area and toe of Success Bank)	Landward extent of foreshore reserve in built areas (to Fishing Sailing Club); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Harbours)	Catherine Point	Area of sediment transport convergence on banks or reefs (crest of Success Bank)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	South Mole Fremantle	Centreline of an engineered structure or toe of a dredged channel (dredged channel and centreline of South Mole Fremantle)	No terrestrial section

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06D21. Woodman Point to Catherine Point	Toe of sediment bank (Middle Ground and Dredged navigation channel and Cockburn Cement dredged area on Parmelia Bank and Success Banks)	Landward extent of frontal dunes (higher beach ridges); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Port Coogee); Landward extent of foreshore reserve in built areas (from Port Coogee to Catherine Point groyne)	Woodman Point	Area of sediment transport convergence on banks or reefs (crest of Parmelia Bank)	Centreline of engineered structure or feature (WAPET groyne)	Catherine Point	Area of sediment transport convergence on banks or reefs (crest of Success Bank)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06D20. Woodman Point groyne to Woodman Point	Toe of sediment bank (Dredged navigation channel and Cockburn Cement dredged area on Parmelia Bank)	Central line, watershed or ridge line on promontories or islands (central line of Woodman Point)	Woodman Point groyne	Centreline of an engineered structure or toe of a dredged channel (Woodman Point groyne)	Centreline of engineered structure or feature (Woodman Point groyne)	Woodman Point	Area of sediment transport convergence on banks or reefs (crest of Parmelia Bank)	Centreline of engineered structure or feature (WAPET groyne)
R06E19. Australian Maritime Complex to Woodman Point groyne	Toe of sediment bank (Parmelia Bank)	Landward extent of narrow parabolic dunes; Central line, watershed or ridge line on promontories or islands (central line of Woodman Point)	Australian Maritime Complex	Toe of Holocene sediment banks (Parmelia Bank)	No terrestrial section	Woodman Point Groyne	Centreline of an engineered structure or toe of a dredged channel (Woodman Point groyne)	Centreline of engineered structure or feature (Woodman Point groyne)
R06E18. James Point to Australian Maritime Complex	Toe of sediment bank (Jervoise Bay Bank)	Landward extent of frontal dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (around Power Station); Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes (Challenger Beach to AMC)	James Point	Centreline of an engineered structure or toe of a dredged channel (BP intake pipe)	Centreline of engineered structure or feature (BP intake pipe)	Australian Maritime Complex	Toe of Holocene sediment banks (Parmelia Bank)	No terrestrial section
R06E17. Palm Beach Rockingham to James Point	Toe of sediment bank	Landward extent of frontal dunes	Palm Beach Rockingham	Area of sediment transport convergence on banks or reefs (Southern Flats)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	James Point	A marine extension of the beachface point to the offshore boundary	Centreline of engineered structure or feature (BP intake pipe)

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06D16. Garden Island Causeway to Palm Beach Rockingham	Toe of sediment bank (Southern Flats)	Landward extent of frontal dunes	Garden Island causeway	Centreline of an engineered structure or toe of a dredged channel (Garden Island causeway)	Centreline of engineered structure or feature (Garden Island causeway)	Palm Beach Rockingham	Area of sediment transport convergence on banks or reefs (Southern Flats)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06D15. Cape Peron to mid-Southern Flats and Garden Island Causeway	Toe of sediment bank (Southern Flats)	Central line, watershed or ridge line on promontories or islands (central line of Cape Peron peninsular)	Cape Peron	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Garden Island causeway	Centreline of an engineered structure or toe of a dredged channel (Garden Island causeway)	Centreline of engineered structure or feature (Garden Island causeway)
R06D14. Mersey Point to Cape Peron and southern Garden Island (Section 1: Mersey Point to Cape Peron, Section 2: Collie Head to Baudin Point)	Continuous -15m AHD isobath closest to shore (and Garden Island to north)	Landward extent of narrow parabolic dunes (to Bird Island, Section 1); Central line, watershed or ridge line on promontories or islands (central line of Cape Peron peninsular for Section 1, central line of Garden Island for Section 2)	Mersey Point (Section 1), Collie Head (Section 2)	Area of sediment transport convergence on banks or reefs (tombolo to Penguin Island and then reef ridge)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Cape Peron (Section 1), Baudin Point (Section 2)	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06D13. Safety Bay to Mersey Point	Continuous -15m AHD isobath closest to shore	Landward extent of foreshore reserve in built areas	Safety Bay	Area of sediment transport convergence on banks or reefs (follows crest of bar through Tern Island to Third Rock, to outer reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Mersey Point	Area of sediment transport convergence on banks or reefs (tombolo to Penguin Island and then reef ridge)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06C12. North Becher Point to Safety Bay (excluding Warnbro basin)	Continuous -15m AHD isobath closest to shore	Landward extent of foredune plain; Landward extent of narrow parabolic dunes; Landward extent of foreshore reserve in built areas (from Waikiki to Safety Bay)	North Becher Point	Area of sediment transport convergence on banks or reefs (follows crest of bar to outer reef to capture northern transport)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Safety Bay	Area of sediment transport convergence on banks or reefs (follows crest of bar through Tern Island to Third Rock, to outer reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06C11. Ansteys Car Park to North Becher Point	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of narrow parabolic dunes	Ansteys Car Park	Fixed by submerged rock outcrops or islands (inshore reef); A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	North Becher Point	Area of sediment transport convergence on banks or reefs (follows crest of bar to outer reef to capture northern transport)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06C10. Robert Point to Ansteys Car Park	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges	Landward extent of narrow parabolic dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (made ground of Mandurah Ocean Marina)	Robert Point	A marine extension of the beachface point to the offshore boundary (boundary between depression and sandwaves)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Ansteys Car Park	Fixed by submerged rock outcrops or islands (inshore reef); A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06C9. Cape Bouvard to Robert Point	Continuous -15m AHD isobath closest to shore (Cape Bouvard to north of Dawesville); Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges (north of Dawesville to Robert Point)	Landward extent of narrow parabolic dunes (to Dawesville); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Dawesville); Landward extent of narrow parabolic dunes & Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes (Dawesville to Robert Point)	Cape Bouvard	A marine extension of the beachface point to the offshore boundary (line crosses unnamed reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Robert Point	A marine extension of the beachface point to the offshore boundary (boundary between depression and sandwaves)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06B8. Preston Beach North to Cape Bouvard	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes	Preston Beach North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Cape Bouvard	A marine extension of the beachface point to the offshore boundary (line crosses unnamed reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06B7. Lake Preston South to Preston Beach North	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes	Lake Preston South	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Preston Beach North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06B6. Binningup to Lake Preston South	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes	Binningup	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Lake Preston South	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06B5. Bunbury Harbour to Binningup	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes (includes the Cut); Central line, watershed or ridge line on promontories or islands (Bunbury Harbour to Pt Casuarina); Landward extent of estuarine landforms or made ground for flood-prone land with installed mitigation works (from Pt Casuarina to intersection of Koombana and Estuary Drives. Follows made ground to the NE then NW towards the parabolic dunes south of the Cut)	Bunbury Harbour	A marine extension of the beachface point to the offshore boundary	No terrestrial section (engineered structure)	Binningup	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06A4. Capel River mouth to Bunbury Harbour	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes (Capel River Mouth to estuarine area in S Bunbury); Landward extent of estuarine landforms or made ground for flood-prone land with installed mitigation works (from intersection of Koombana and Estuary Drives to Point Casuarina); Central line, watershed or ridge line on promontories or islands (Point Casuarina to Bunbury Harbour boundary)	Capel River Mouth	Deepest point of depression or contour reentrant (Capel River palaeochannel)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (river channel)	Bunbury Harbour	A marine extension of the beachface point to the offshore boundary	No terrestrial section (engineered structure)
R06A3. Norman Road to Capel River Mouth	Continuous -15m AHD isobath closest to shore	Landward extent of foredune plain (until Peppermint Grove beach); Landward extent of narrow parabolic dunes (from Peppermint Grove Beach to Capel River Mouth)	Norman Road	Area of sediment transport convergence on banks or reefs (transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Capel River Mouth	Deepest point of depression or contour reentrant (Capel River palaeochannel)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (river channel)

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06A2. Point Piquet to Norman Road	Continuous -15m AHD isobath closest to shore	Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes	Point Piquet	A marine extension of the beachface point to the offshore boundary	No terrestrial section	Norman Road	Area of sediment transport convergence on banks or reefs (transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06A1. Cape Naturaliste to Point Piquet	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes; Landgate MHWM to 2006 for low to moderately high cliffed coasts without dunes	Cape Naturaliste	A marine extension of the beachface point to the offshore boundary	No terrestrial section	Point Piquet	A marine extension of the beachface point to the offshore boundary	No terrestrial section
R06DRI4. North Point to Philip Point	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes	North Point	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Philip Point	Fixed by submerged rock outcrops or islands; A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06DRI3. Cape Vlamingh to North Point	Continuous -15m AHD isobath closest to shore	Central line, watershed or ridge line on promontories or islands (watershed line Fairbridge Bluff to NW of Oliver Hill; Conical Hill to Vlamingh Head)	Cape Vlamingh	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	North Point	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06DRI2. Parker Point to Cape Vlamingh	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes (Parker Point to Fairbridge Bluff); Central line, watershed or ridge line on promontories or islands (watershed line Fairbridge Bluff to NW of Oliver Hill; Conical Hill to Vlamingh Head); Landward extent of narrow parabolic dunes (Dunes from NW of Oliver Hill to Conical Hill)	Parker Point	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Cape Vlamingh	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells
R06DRI1. Philip Point to Parker Point	Continuous -15m AHD isobath closest to shore	Landward extent of narrow parabolic dunes	Philip Point	Fixed by submerged rock outcrops or islands; A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells	Parker Point	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells

Secondary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06DGI3. Parkin Point to Collie Head and to mid-Southern Flats	Toe of sediment bank (Southern Flats to East and toe of bank to west of Garden Island causeway)	Central line, watershed or ridge line on promontories or islands (central line of Garden Island)	Parkin Point	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Collie Head	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06DGI4. Baudin Point to Dance Head to Carnac Island	Toe of reef ridge closest to shore <-15m AHD depth if multiple ridges (Baudin Point to Carnac Island); Toe of sediment bank (dredged shipping channel and Parmelia Bank)	Central line, watershed or ridge line on promontories or islands (central line of Garden Island)	Baudin Point	Fixed by submerged rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Dance Head	A marine extension of the beachface point to the offshore boundary (Dance Head to offshore boundary)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06EGI1. Dance Head to Colpoys Point	Toe of sediment bank	Central line, watershed or ridge line on promontories or islands (central line of Garden Island)	Dance Head	A marine extension of the beachface point to the offshore boundary (Dance Head to offshore boundary)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Colpoys Point	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)
R06EGI2. Colpoys Point to Parkin Point	Toe of sediment bank	Central line, watershed or ridge line on promontories or islands (central line of Garden Island)	Colpoys Point	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)	Parkin Point	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredune plains, parabolic dunes or frontal dunes between adjacent cells (orthogonal to coast)

Table D.5: Rationale for selection of tertiary cell beachface points in the Vlamingh Region
Co-ordinates in Latitude and Longitude rounded to 3 decimal places

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Tertiary Cells
Guilderton N	-31.343	115.490	-	Point, Fixed, Open	Engineered structure or dredged channel (groyne)	R06I32d, R07A1a
Guilderton S	-31.363	115.504	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06I32c, R06I32d
Wilbinga Rocks	-31.413	115.542	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (blowout)	R06I32b, R06I32c
Wilbinga	-31.435	115.552	-	Zone, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (salient)	R06I32a, R06I32b
Mallee Reef salient	-31.464	115.564	1°, 2°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (salient, at a primary scale it is the breakpoint in the Holocene dune field. Maintained at the tertiary scale. Note boundary is at mid-point of a blowout between two SE-NW beachface rock platforms)	R06H31a, R06I32a
Wreck Point	-31.503	115.585	2°	Point, Ambulatory, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (salient)	R06H30b, R06H31a
Yanchep headland N	-31.532	115.609	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (small salient)	R06H30a, R06H30b
Yanchep	-31.563	115.633	1°, 2°	Zone, Ambulatory, Open	Geomorphic feature (small salient from onshore feed and discontinuity in dune system)	R06G29d, R06H30a
Alkimos	-31.613	115.662	-	Zone, Ambulatory, Open	Geomorphic feature (Bay. A gap in bathymetry reflected on land. Separation between parabolics onshore)	R06G29c, R06G29d
Quinns Rock N	-31.644	115.680	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale (northern extent of bluff adjacent to beach)	R06G29b, R06G29c
Mindarie Keys N	-31.682	115.697	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale (northern extent of bluff adjacent to beach)	R06G29a, R06G29b
Burns Beach Salient	-31.717	115.708	2°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (salient)	R06G28b, R06G29a
South of Ocean Reef Marina	-31.767	115.730	-	Zone, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale (reach of rock. Links to offshore rock structures)	R06G28a, R06G28b
Pinnaroo Point	-31.804	115.729	1°, 2°	Zone, Ambulatory, Open	Geomorphic feature (cuspate foreland); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06F27c, R06G28a
Hillarys Marina	-31.820	115.737	-	Zone, Fixed, Closed	Engineered structure or dredged channel (Hillarys Marina. intersection of the MHWM [mobile boundary] with the engineered structure. Cell to South ends at southern breakwater and cell to the north starts at the Northern Breakwater)	R06F27b, R06F27c

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Tertiary Cells
South Sorrento	-31.840	115.750	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale	R06F27a, R06F27b
Trigg	-31.876	115.751	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (salient)	R06F26d, R06F27a
Brighton Road	-31.898	115.755	-	Zone, Ambulatory, Open	Geomorphic feature (Southern end of Scarborough rock salient including marine feature. It is also the northern extent of a sediment transport feed)	R06F26c, R06F26d
Empire Avenue	-31.920	115.755	-	Zone, Ambulatory, Open	Geomorphic feature (Start of offshore ridge of reef structures and located landward of shallow rock feature. Change from wide and shallow rock to narrow fringing rock in the submarine area. Relic shore-perpendicular sand features to the north. Also transition to scalloped dunes to north)	R06F26b, R06F26c
north Swanbourne pipe	-31.956	115.754	-	Point, Fixed, Open	Engineered structure or dredged channel (old sewerage pipe)	R06F26a, R06F26b
Mudurup Rocks	-31.997	115.751	2°	Point, Fixed, Closed	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (salient); Engineered structure or dredged channel (Cottesloe groyne)	R06F25b, R06F26a
Leighton salient	-32.031	115.746	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06F25a, R06F25b
South Mole Fremantle	-32.056	115.732	1°, 2°	Point, Fixed, Closed	Engineered structure or dredged channel (South Mole Fremantle and dredged channel. The subsequent tertiary cell would only really start at Rous Head as it is a wide boundary between South Mole Fremantle and Rous Head)	R06D22a, R06F25a
Catherine Point	-32.085	115.751	2°	Point, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale; Engineered structure or dredged channel (Catherine Point groyne)	R06D21a, R06D22a
Woodman Point	-32.135	115.737	2°	Point, Fixed, Open	Engineered structure or dredged channel (WAPET groyne)	R06D20a, R06D21a
Woodman Point groyne	-32.137	115.744	1°, 2°	Point, Fixed, Closed	Geomorphic feature (end of Parmelia Bank/start of Cockburn Sound); Engineered structure or dredged channel (groyne and reclaimed peninsular)	R06E19a, R06D20a
Australian Maritime Complex	-32.140	115.761	2°	Point, Fixed, Closed	Geomorphic feature (southern end of Parmelia Bank); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale; Engineered structure or dredged channel (AMC)	R06E18a, R06E19a
James Point	-32.227	115.756	2°	Point, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale; Engineered structure or dredged channel (BP intake pipe)	R06E17a, R06E18a

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Tertiary Cells
Palm Beach Rockingham	-32.277	115.721	1°, 2°	Zone, Fixed, Open	Geomorphic feature (end of Southern Flats); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06D16a, R06E17a
Garden Island causeway	-32.268	115.700	2°	Point, Fixed, Closed (Note: small gap in causeway)	Engineered structure or dredged channel (Garden Island causeway)	R06D15a, R06D16a
Cape Peron	-32.265	115.686	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06D14c, R06D15a
Bird Island	-32.276	115.695	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06D14b, R06D14c
Seal Island	-32.293	115.701	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06D14a, R06D14b
Mersey Point	-32.305	115.701	2°	Zone, Ambulatory, Open	Geomorphic feature (tombolo); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06D13a, R06D14a
Safety Bay	-32.306	115.713	2°	Zone, Ambulatory, Open	Geomorphic feature (focal location of onshore sediment feed by North Sands in lee of promontory); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06C12a, R06D13a
North Becher Point	-32.369	115.719	2°	Zone, Ambulatory, Open	Geomorphic feature (focal location of onshore sediment feed by South Sands in lee of promontory); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06C11a, R06C12a
Ansteys Car Park	-32.404	115.743	2°	Zone, Ambulatory, Open	Geomorphic feature (northern extent of parabolic dunes); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06C10b, R06C11a
San Remo	-32.486	115.744	-	Point, Fixed, Open	Geomorphic feature (closure of bank with beachface); Engineered structure or dredged channel (San Remo groyne)	R06C10a, R06C10b
Robert Point	-32.522	115.699	2°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (salient)	R06C9b, R06C10a
Dawesville	-32.599	115.628	-	Point, Fixed, Open (engineered bypassing occurs)	Engineered structure or dredged channel (Dawesville Training wall and dredged channel)	R06C9a, R06C9b

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Tertiary Cells
Cape Bouvard	-32.685	115.607	1°, 2°	Zone, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06B8b, R06C9a
Lake Clifton North	-32.770	115.623	-	Zone, Ambulatory, Open	Geomorphic feature (boundary of inshore marine basin)	R06B8a, R06B8b
Preston Beach North	-32.840	115.634	2°	Zone, Ambulatory, Open	Geomorphic feature (salient and northern extent of broad mobile dunes)	R06B7a, R06B8a
Lake Preston South	-32.940	115.659	2°	Zone, Ambulatory, Open	Geomorphic feature (salient and northern extent of broad mobile dunes)	R06B6b, R06B7a
Myalup North	-33.019	115.676	-	Zone, Ambulatory, Open	Geomorphic feature (northern extent of former marine lagoon)	R06B6a, R06B6b
Binningup	-33.146	115.686	2°	Zone, Ambulatory, Open	Rock structures restricting sediment transport at a seasonal scale (rock platform); Geomorphic feature (salient)	R06B5c, R06B6a
Buffalo Road	-33.201	115.683	-	Zone, Ambulatory, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (northern end of Leschenault inlet)	R06B5b, R06B5c
Leschenault South	-33.282	115.680	-	Zone, Ambulatory, Open	Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale (point of inflection in dunes and northern extent of shelter from Bunbury Harbour breakwater)	R06B5a, R06B5b
Bunbury Harbour	-33.300	115.646	1°, 2°	Point, Fixed, Closed	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale; Engineered structure or dredged channel	R06A4b, R06B5a
Stirling Beach	-33.465	115.562	-	Zone, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (southern end of lagoon system)	R06A4a, R06A4b
Capel River Mouth	-33.512	115.518	2°	Zone, Ambulatory, Open	Geomorphic feature (Capel River mouth)	R06A3d, R06A4a
Forrest Beach	-33.579	115.455	-	Zone, Ambulatory, Open	Geomorphic feature (salient and northern extent of Vasse-Wonnerup Inlet)	R06A3c, R06A3d
Wonnerup	-33.627	115.398	-	Point, Fixed, Open	Geomorphic feature (transverse bar connected to shore); Engineered structure or dredged channel (Port Geographe eastern groyne)	R06A3b, R06A3c
Busselton	-33.642	115.350	-	Zone, Ambulatory, Open	Geomorphic feature (transverse bar connected to shore at a salient)	R06A3a, R06A3b
Norman Road	-33.655	115.277	2°	Zone, Ambulatory, Open	Geomorphic feature (transverse bar connected to shore at a salient)	R06A2d, R06A3a
Marybrook	-33.649	115.200	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06A2c, R06A2d
Point Templar	-33.630	115.145	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06A2b, R06A2c

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Tertiary Cells
Point Daking	-33.604	115.107	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale	R06A2a, R06A2b
Point Piquet	-33.565	115.084	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale	R06A1a, R06A2a
Cape Naturaliste	-33.532	115.003	1°, 2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	Last cell in Region R05, R06A1a
Rottnest Island						
Philip Point	-32.003	115.559	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (spit); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI4b, R06DRI1a
Bathurst Point	-31.990	115.542	-	Zone, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI4a, R06DRI4b
North Point	-31.987	115.512	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI3c, R06DRI4a
Rocky Bay	-32.009	115.480	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06DRI3b, R06DRI3c
Abraham Point	-32.013	115.468	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI3a, R06DRI3b
Cape Vlamingh	-32.025	115.449	2°	Point, Fixed, Closed	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI2c, R06DRI3a
South Point	-32.021	115.470	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI2b, R06DRI2c
Kitson Point	-32.019	115.493	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI2a, R06DRI2b
Parker Point	-32.027	115.529	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI1b, R06DRI2a

Beachface Point Name	Lat.	Long.	Other Boundaries	Alongshore Boundary Character	Beachface Point	Associated Tertiary Cells
Bickley Point	-32.011	115.554	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DRI1a, R06DRI1b
Garden Island						
Second Head	-32.165	115.675	1°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Geomorphic feature (Parmelia Bank edge)	R06DGI4f, R06DGI4e
Armaments Jetty	-32.175	115.677	-	Point, Fixed, Open	Geomorphic feature (salient); Engineered structure or dredged channel (Armaments Jetty)	R06EGI1a, R06DGI4f
Cliff Point	-32.187	115.677	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale	R06EGI1b, R06EGI1a
Colpoys Point	-32.226	115.700	2°	Point, Fixed, Open	Geomorphic feature (salient); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale; Engineered structure or dredged channel (groyne)	R06EGI2a, R06EGI1b
Parkin Point spit	-32.242	115.702	-	Point, Ambulatory, Open	Geomorphic feature (spit linked to Garden Island causeway); Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DGI3a, R06EGI2a
Collie Head	-32.246	115.692	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale	R06D14d, R06DGI3a
Baudin Point	-32.245	115.682	2°	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DGI4a, R06D14d
Buache Bay	-32.212	115.671	-	Zone, Ambulatory, Open	Geomorphic feature (salient)	R06DGI4b, R06DGI4a
Point Atwick	-32.174	115.660	-	Point, Fixed, Closed	Rock structures restricting sediment transport at a seasonal scale	R06DGI4c, R06DGI4b
Entrance Point	-32.156	115.661	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DGI4d, R06DGI4c
Beacon Head	-32.156	115.669	-	Point, Fixed, Open	Rock structures restricting sediment transport at a seasonal scale; Adjacent cells have a different shoreline aspect restricting sediment transport at a seasonal scale	R06DGI4e, R06DGI4d

Table D.6: Rationale for selection of tertiary cell onshore, offshore and alongshore boundaries in the Vlamingh Region

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06I32d. Guilderton S to Guilderton N	-5m AHD isobath closest to shore	Landward extent of foredunes (Moore River bar included in mapping); Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Guilderton S	Focal point of sediment transport convergence on banks or reefs (high point of unnamed reefs)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Guilderton N	Centreline of an engineered structure or toe of a dredged area (orthogonal to groyne)	Centreline of engineered structure or feature (extension of centreline of structure)
R06I32c. Wilbinga Rocks to Guilderton S	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent	Wilbinga Rocks	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Guilderton S	Focal point of sediment transport convergence on banks or reefs (high point of unnamed reefs)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06I32b. Wilbinga to Wilbinga Rocks	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent (note: some rock outcrops along the shore)	Wilbinga	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Wilbinga Rocks	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06I32a. Mallee Reef Salient to Wilbinga	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent	Mallee Reef salient	Focal point of sediment transport convergence on banks or reefs (following higher order pattern of transport convergence in lee of Mallee Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (following higher order boundary)	Wilbinga	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06H31a. Wreck Point to Mallee Reef salient	Subtidal seaward margin of rock platform (reefs from LiDAR)	Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (rock outcrops); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Two Rocks marina breakwaters and inside marina)	Wreck Point	Fixed by rock outcrops or islands (high point of Gretel Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Mallee Reef salient	Focal point of sediment transport convergence on banks or reefs (following higher order pattern of transport convergence in lee of Mallee Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (following higher order boundary)
R06H30b. Yanchep Headland N to Wreck Point	-5m AHD isobath closest to shore; Subtidal seaward margin of rock platform	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Yanchep headland N	Fixed by rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Wreck Point	Fixed by rock outcrops or islands (high point of Gretel Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06H30a. Yanchep to Yanchep Headland N	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Yanchep	Fixed by rock outcrops or islands (landward of high point of Hugill Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Yanchep headland N	Fixed by rock outcrops or islands	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06G29d. Alkimos to Yanchep	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Alkimos	Fixed by rock outcrops or islands (follows northern end of subtidal pavement)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Yanchep	Fixed by rock outcrops or islands (landward of high point of Hugill Reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06G29c. Quinns Rock N to Alkimos	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Quinns Rock N	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Alkimos	Fixed by rock outcrops or islands (follows northern end of subtidal pavement)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06G29b. Mindarie Keys N to Quinns Rock N	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent (note two groynes and attached breakwater on salient); Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (bluff in north sections)	Mindarie Keys N	Fixed by rock outcrops or islands (adjacent to beachface); A marine extension of the beachface point to the offshore boundary (orthogonal)	No terrestrial section	Quinns Rock N	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06G29a. Burns Beach salient to Mindarie Keys N	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Mindarie Keys breakwaters and inside marina); Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (north of Mindarie Keys)	Burns Beach Salient	Fixed by rock outcrops or islands (unnamed reef); A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Mindarie Keys N	Fixed by rock outcrops or islands (adjacent to beachface); A marine extension of the beachface point to the offshore boundary (orthogonal)	No terrestrial section
R06G28b. Ocean Reef Marina to Burns Beach Salient	-5m AHD isobath closest to shore; Subtidal seaward margin of rock platform (majority)	Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (majority); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Ocean Reef marina); Landward extent of the frontal dune if the foredune is eroded or absent	South of Ocean Reef Marina	A marine extension of the beachface point to the offshore boundary (orthogonal)	No terrestrial section	Burns Beach Salient	Fixed by rock outcrops or islands (unnamed reef); A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06G28a. Pinnaroo Point to South of Ocean Reef Marina	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (northern cliffed sections)	Pinnaroo Point	Focal point of sediment transport convergence on banks or reefs (ridge of Lal Bank); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	South of Ocean Reef Marina	A marine extension of the beachface point to the offshore boundary (orthogonal)	No terrestrial section

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06F27c. Hillarys Marina to Pinnaroo Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Hillarys Marina	A marine extension of the beachface point to the offshore boundary (toe of Hillarys northern breakwater)	Centreline of engineered structure or feature (toe of structure)	Pinnaroo Point	Focal point of sediment transport convergence on banks or reefs (ridge of Lal Bank); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06F27b. South Sorrento to Hillarys Marina	-5m AHD isobath closest to shore	Landward extent of foredunes (three groynes and rock outcrops in southern section); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Marmion Angling Club revetment)	South Sorrento	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	Hillarys Marina	A marine extension of the beachface point to the offshore boundary (toe of Hillarys southern breakwater)	Centreline of engineered structure or feature (toe of structure)
R06F27a. Trigg to South Sorrento	-5m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Trigg	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	South Sorrento	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)
R06F26d. Brighton Road to Trigg	-7m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Brighton Road	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	Trigg	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)
R06F26c. Empire Avenue to Brighton Road	-7m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Empire Avenue	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	Brighton Road	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06F26b. North Swanbourne Pipe to Empire Avenue	-7m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	north Swanbourne pipe	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	Empire Avenue	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)
R06F26a. Mudurup Rocks to north Swanbourne pipe	-7m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward	Mudurup Rocks	A marine extension of the beachface point to the offshore boundary (orthogonal)	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)	north Swanbourne pipe	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)
R06F25b. Leighton salient to Mudurup Rocks	-7m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Beach St groyne and Cottesloe groyne)	Leighton salient	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	Mudurup Rocks	A marine extension of the beachface point to the offshore boundary (orthogonal)	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)
R06F25a. South Mole Fremantle to Leighton salient	-7m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward	South Mole Fremantle	A marine extension of the beachface point to the offshore boundary (dredged channel and centreline of South Mole Fremantle)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Leighton salient	A marine extension of the beachface point to the offshore boundary (orthogonal)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06D22a. Catherine Point to South Mole Fremantle	-5m AHD isobath closest to shore; Toe of terrace or sediment bank (Dredged navigation channel and Cockburn Cement dredged area and toe of Success Bank)	Landward extent of foredunes (to Fishing Sailing Club); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Harbours)	Catherine Point	Focal point of sediment transport convergence on banks or reefs (crest of Success Bank)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	South Mole Fremantle	A marine extension of the beachface point to the offshore boundary (dredged channel and centreline of South Mole Fremantle)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06D21a. Woodman Point to Catherine Point	Toe of terrace or sediment bank (Middle Ground and Dredged navigation channel and Cockburn Cement dredged area on Parmelia Bank and Success Banks)	Landward extent of foredunes (higher beach ridges); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Port Coogee)	Woodman Point	Focal point of sediment transport convergence on banks or reefs (crest of Parmelia Bank)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (WAPET groyne)	Catherine Point	Focal point of sediment transport convergence on banks or reefs (crest of Success Bank)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)
R06D20a. Woodman Point groyne to Woodman Point	Toe of terrace or sediment bank (and toe of dredged area)	Landward extent of foredunes	Woodman Point groyne	Centreline of an engineered structure or toe of a dredged area (Woodman Point groyne)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (Woodman Point groyne)	Woodman Point	Focal point of sediment transport convergence on banks or reefs (crest of Parmelia Bank)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (WAPET groyne)
R06E19a. Australian Maritime Complex to Woodman Point groyne	Toe of terrace or sediment bank	Landward extent of foredunes	Australian Maritime Complex	Toe of Holocene sediment bank (Parmelia Bank)	Centreline of engineered structure or feature (AMC breakwater)	Woodman Point groyne	Centreline of an engineered structure or toe of a dredged area (Woodman Point groyne)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (Woodman Point groyne)

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06E18a. James Point to Australian Maritime Complex	Toe of terrace or sediment bank	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (large engineered structure at AMC and numerous small breakwaters at southern end of cell)	James Point	Centreline of an engineered structure or toe of a dredged area (BP intake pipe)	Centreline of engineered structure or feature (BP intake pipe)	Australian Maritime Complex	Toe of Holocene sediment bank (Parmelia Bank)	Centreline of engineered structure or feature (AMC breakwater)
R06E17a. Palm Beach Rockingham to James Point	Toe of terrace or sediment bank	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (rock outcrops); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward	Palm Beach Rockingham	A marine extension of the beachface point to the offshore boundary (extension of offshore limit to beachface)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	James Point	Centreline of an engineered structure or toe of a dredged area (BP intake pipe)	Centreline of engineered structure or feature (BP intake pipe)
R06D16a. Garden Island Causeway to Palm Beach Rockingham	Toe of terrace or sediment bank (with orthogonal extension to Garden Island causeway)	Landward extent of foredunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (note numerous groynes and structures)	Garden Island causeway	Centreline of an engineered structure or toe of a dredged area (Garden Island causeway including gaps)	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)	Palm Beach Rockingham	A marine extension of the beachface point to the offshore boundary (extension of offshore limit to beachface)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06D15a. Cape Peron to mid-Southern Flats and Garden Island Causeway	Toe of terrace or sediment bank (mapped to a ridge for mid-southern flats)	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward	Cape Peron	Focal point of sediment transport convergence on banks or reefs; Fixed by rock outcrops or islands	No terrestrial section	Garden Island causeway	Centreline of an engineered structure or toe of a dredged area (Garden Island causeway including gaps)	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06D14c. Bird Island to Cape Peron	-7m AHD isobath closest to shore; Subtidal seaward margin of rock platform	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Bird Island	Focal point of sediment transport convergence on banks or reefs (lee of Bird Island); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Cape Peron	Focal point of sediment transport convergence on banks or reefs; Fixed by rock outcrops or islands	No terrestrial section
R06D14b. Seal Island to Bird Island	-7m AHD isobath closest to shore	Landward extent of foredunes	Seal Island	Focal point of sediment transport convergence on banks or reefs (lee of Seal Island); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Bird Island	Focal point of sediment transport convergence on banks or reefs (lee of Bird Island); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06D14a. Mersey Point to Seal Island	-7m AHD isobath closest to shore	Landward extent of foredunes	Mersey Point	Focal point of sediment transport convergence on banks or reefs (tombolo to Penguin Island and then reef ridge); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Seal Island	Focal point of sediment transport convergence on banks or reefs (lee of Seal Island); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06D13a. Safety Bay to Mersey Point	-7m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent (small structures and note buried seawall towards Mersey Point)	Safety Bay	Focal point of sediment transport convergence on banks or reefs (follows crest of bar through Tern Island to Third Rock); Sediment transport divergence	No terrestrial section (would be central line of spit and then orthogonal if shoreline was mapped in a different manner)	Mersey Point	Focal point of sediment transport convergence on banks or reefs (tombolo to Penguin Island and then reef ridge); Sediment transport divergence	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06C12a. North Becher Point to Safety Bay (excluding Warnbro Basin)	Toe of terrace or sediment bank	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent	North Becher Point	Focal point of sediment transport convergence on banks or reefs (follows crest of bar to capture northern transport)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Safety Bay	Focal point of sediment transport convergence on banks or reefs (follows crest of bar through Tern Island to Third Rock); Sediment transport divergence	No terrestrial section (would be central line of spit and then orthogonal if shoreline was mapped in a different manner)
R06C11a. Ansteys Car Park to North Becher Point	Toe of terrace or sediment bank	Landward extent of the frontal dune if the foredune is eroded or absent	Ansteys Car Park	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	North Becher Point	Focal point of sediment transport convergence on banks or reefs (follows crest of bar to capture northern transport)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06C10b. San Remo to Ansteys Car Park	-7m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent	San Remo	Centreline of an engineered structure or toe of a dredged area; A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Ansteys Car Park	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06C10a. Robert Point to San Remo	-7m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (numerous groynes and breakwaters. Mandurah channel has been ignored)	Robert Point	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (follows reef platform and then orthogonal to coast)	San Remo	Centreline of an engineered structure or toe of a dredged area; A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06C9b. Dawesville to Robert Point	-5m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (at Dawesville)	Dawesville	A marine extension of the beachface point to the offshore boundary	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)	Robert Point	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (follows reef platform and then orthogonal to coast)
R06C9a. Cape Bouvard to Dawesville	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (rock outcrops); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (only at Dawesville)	Cape Bouvard	A marine extension of the beachface point to the offshore boundary (line crosses unnamed reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Dawesville	A marine extension of the beachface point to the offshore boundary	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)
R06B8b. Lake Clifton North to Cape Bouvard	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent (majority)	Lake Clifton North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Cape Bouvard	A marine extension of the beachface point to the offshore boundary (line crosses unnamed reef)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06B8a. Preston Beach North to Lake Clifton North	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent (majority)	Preston Beach North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Lake Clifton North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06B7a. Lake Preston South to Preston Beach North	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent (majority)	Lake Preston South	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Preston Beach North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06B6b. Myalup North to Lake Preston South	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent (majority)	Myalup North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Lake Preston South	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06B6a. Binningup to Myalup North	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent	Binningup	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Myalup North	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06B5c. Buffalo Road to Binningup	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent	Buffalo Road	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Binningup	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06B5b. Leschenault South to Buffalo Road	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent	Leschenault South	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Buffalo Road	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06B5a. Bunbury Harbour to Leschenault South	-5m AHD isobath closest to shore	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent (local erosion of foredunes); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (included harbour and neglected two inlets: 1. Storm surge barrier; 2. Leschenault inlet cut)	Bunbury Harbour	A marine extension of the beachface point to the offshore boundary	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)	Leschenault South	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06A4b. Stirling Beach to Bunbury Harbour	-7m AHD isobath closest to shore	Landward extent of foredunes (majority); Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes; Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Bunbury back beach to Bunbury Harbour with small section of foredune at the north)	Stirling Beach	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Bunbury Harbour	A marine extension of the beachface point to the offshore boundary	No terrestrial section (would be central line of engineered structure if shoreline was mapped in a different manner)
R06A4a. Capel River mouth to Stirling Beach	-7m AHD isobath closest to shore	Landward extent of foredunes (Capel River mouth is largely ignored)	Capel River Mouth	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Stirling Beach	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06A3d. Forrest Beach to Capel River Mouth	-7m AHD isobath closest to shore	Landward extent of foredunes	Forrest Beach	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Capel River Mouth	A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06A3c. Wonnerup to Forrest Beach	-7m AHD isobath closest to shore	Landward extent of foredunes (with areas of foredune erosion. Note that Vasse-Wonnerup inlet is largely ignored)	Wonnerup	Centreline of an engineered structure or toe of a dredged area (Port Geographe eastern groyne); Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	No terrestrial section	Forrest Beach	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06A3b. Busselton to Wonnerup	-7m AHD isobath closest to shore	Landward extent of foredunes (majority); Landgate MHWM to 2006 on engineered coasts with shore parallel structures without dunes to landward (Busselton town beach and Wonnerup)	Busselton	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (followed transverse bar alignment)	Wonnerup	Centreline of an engineered structure or toe of a dredged area (Port Geographe eastern groyne); Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	No terrestrial section
R06A3a. Norman Road to Busselton	-7m AHD isobath closest to shore	Landward extent of foredunes (drains are largely ignored)	Norman Road	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (followed transverse bar alignment)	Busselton	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (followed transverse bar alignment)
R06A2d. Marybrook to Norman Road	-7m AHD isobath closest to shore	Landward extent of foredunes (drains are largely ignored)	Marybrook	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Norman Road	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (followed transverse bar alignment)
R06A2c. Point Templar to Marybrook	-7m AHD isobath closest to shore	Landward extent of foredunes (drains are largely ignored)	Point Templar	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Marybrook	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06A2b. Point Daking to Point Templar	-5m AHD isobath closest to shore	Landward extent of foredunes (drains are largely ignored)	Point Daking	A marine extension of the beachface point to the offshore boundary	No terrestrial section	Point Templar	Focal point of sediment transport convergence on banks or reefs (crest of transverse bar)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06A2a. Point Piquet to Point Daking	-5m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (majority is cliffed)	Point Piquet	A marine extension of the beachface point to the offshore boundary	No terrestrial section	Point Daking	A marine extension of the beachface point to the offshore boundary	No terrestrial section
R06A1a. Cape Naturaliste to Point Piquet	-5m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Cape Naturaliste	A marine extension of the beachface point to the offshore boundary	No terrestrial section	Point Piquet	A marine extension of the beachface point to the offshore boundary	No terrestrial section
Rottnest Island								
R06DRI4b. Bathurst Point to Philip Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Bathurst Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Philip Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06DRI4a. North Point to Bathurst Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	North Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Bathurst Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06DRI3c. Rocky Bay to North Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Rocky Bay	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	North Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06DRI3b. Abraham Point to Rocky Bay	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Abraham Point	Focal point of sediment transport convergence on banks or reefs; A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Rocky Bay	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06DRI3a. Cape Vlamingh to Abraham Point	-5m AHD isobath closest to shore	Central line, watershed or ridge line on promontories or islands (Ridge line from Vlamingh Head to Conical Hill); Landward extent of the frontal dune if the foredune is eroded or absent (Conical Hill to Abraham Point)	Cape Vlamingh	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Abraham Point	Focal point of sediment transport convergence on banks or reefs; A marine extension of the beachface point to the offshore boundary	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06DRI2c. South Point to Cape Vlamingh	-5m AHD isobath closest to shore	Central line, watershed or ridge line on promontories or islands (Ridge line from Conical Hill to Vlamingh Head); Landward extent of the frontal dune if the foredune is eroded or absent (Dunes defined from northwest for South Point to Conical Hill)	South Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Cape Vlamingh	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06DRI2b. Kitson Point to South Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent (dunes from northwest)	Kitson Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	South Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06DRI2a. Parker Point to Kitson Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent (Parker Point to Fairbridge Bluff); Central line, watershed or ridge line on promontories or islands (Ridge line from Fairbridge Bluff to NW of Oliver Hill); Landward extent of the frontal dune if the foredune is eroded or absent (defined from northwest dunes, NW Oliver Hill to Kitson Point)	Parker Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Kitson Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06DRI1b. Bickley Point to Parker Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Bickley Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Parker Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
R06DRI1a. Philip Point to Bickley Point	-5m AHD isobath closest to shore	Landward extent of the frontal dune if the foredune is eroded or absent	Philip Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells	Bickley Point	Focal point of sediment transport convergence on banks or reefs	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells
Garden Island								
R06DGI3a. Parkin Point spit to Collie Head	Toe of terrace or sediment bank (toe of bank and also in parts mapped to a ridge for mid-southern flats)	Landward extent of foredunes; Central line, watershed or ridge line on promontories or islands (road)	Parkin Point spit	Focal point of sediment transport convergence on banks or reefs	Centreline of engineered structure or feature (road)	Collie Head	Fixed by rock outcrops or islands (rock outcrop)	No terrestrial section
R06D14d. Collie Head to Baudin Point	-7m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Collie Head	Fixed by rock outcrops or islands (rock outcrop)	No terrestrial section	Baudin Point	Focal point of sediment transport convergence on banks or reefs	No terrestrial section

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06DGl4a. Baudin Point to Buache Bay	-7m AHD isobath closest to shore; Subtidal seaward margin of rock platform	Landward extent of foredunes	Baudin Point	Focal point of sediment transport convergence on banks or reefs	No terrestrial section	Buache Bay	A marine extension of the beachface point to the offshore boundary (to centre of submarine embayment)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)
R06DGl4b. Buache Bay to Point Atwick	-7m AHD isobath closest to shore; Subtidal seaward margin of rock platform	Landward extent of foredunes; Landward extent of the frontal dune if the foredune is eroded or absent; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (for the northern 350m, MHWM to 2006 at Point Atwick)	Buache Bay	A marine extension of the beachface point to the offshore boundary (to centre of submarine embayment)	An extension of marine section and beachface point directly to the onshore boundary if there is no change in foredunes or frontal dunes between adjacent cells (orthogonal to coast)	Point Atwick	Fixed by rock outcrops or islands (toe of en-echelon rock ridge)	No terrestrial section
R06DGl4c. Point Atwick to Entrance Point	-7m AHD isobath closest to shore; Subtidal seaward margin of rock platform	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes	Point Atwick	Fixed by rock outcrops or islands (toe of en-echelon rock ridge)	No terrestrial section	Entrance Point	Fixed by rock outcrops or islands	No terrestrial section
R06DGl4d. Entrance Point to Beacon Head	-5m AHD isobath closest to shore	Landward extent of foredunes; Landgate MHWM to 2006 for bluffed to cliffed coasts without dunes (cliffed coast at boundaries)	Entrance Point	Fixed by rock outcrops or islands	No terrestrial section	Beacon Head	A marine extension of the beachface point to the offshore boundary	No terrestrial section
R06DGl4e. Beacon Head to Second Head	-5m AHD isobath closest to shore	Landward extent of foredunes	Beacon Head	A marine extension of the beachface point to the offshore boundary	No terrestrial section	Second Head	Focal point of sediment transport convergence on banks or reefs	No terrestrial section

Tertiary Cell	Offshore Boundary	Onshore Boundary	"From" Alongshore Boundary			"To" Alongshore Boundary		
			Point	Marine Section	Terrestrial Section	Point	Marine Section	Terrestrial Section
R06DGI4f. Second Head to Armaments Jetty	Toe of terrace or sediment bank	Landward extent of foredunes	Second Head	Focal point of sediment transport convergence on banks or reefs	No terrestrial section	Armaments Jetty	Centreline of an engineered structure or toe of a dredged area (Armaments Jetty and dredged basin)	Centreline of engineered structure or feature (extension of Armaments Jetty)
R06EGI1a. Armaments Jetty to Cliff Point	Toe of terrace or sediment bank	Landward extent of foredunes	Armaments Jetty	Centreline of an engineered structure or toe of a dredged area (Armaments Jetty and dredged basin)	Centreline of engineered structure or feature (extension of Armaments Jetty)	Cliff Point	Centreline of an engineered structure or toe of a dredged area (edge of dredged basin)	No terrestrial section
R06EGI1b. Cliff Point to Colpoys Point	Toe of terrace or sediment bank	Landward extent of foredunes	Cliff Point	Centreline of an engineered structure or toe of a dredged area (edge of dredged basin)	No terrestrial section	Colpoys Point	A marine extension of the beachface point to the offshore boundary	Centreline of engineered structure or feature (groyne)
R06EGI2a. Colpoys Point to Parkin Point spit (extends into GI4)	Toe of terrace or sediment bank	Landward extent of foredunes	Colpoys Point	A marine extension of the beachface point to the offshore boundary	Centreline of engineered structure or feature (groyne)	Parkin Point spit	Focal point of sediment transport convergence on banks or reefs	Centreline of engineered structure or feature (road)

CONTACT

Department of Transport
1 Essex Street
Fremantle WA 6160
Telephone: (08) 9435 7527
Website: www.transport.wa.gov.au
Email: coastalmanagement@transport.wa.gov.au

DoT 1484-27-06