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Fraser Coast Regional Council

Individual Planning Study

Habitat and Biodiversity

February 2011

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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PREFACE

This individual planning study report was commissioned by the Fraser Coast Regional Council (Council) as part its Sustainable Growth Strategy project to assist and inform in the development of a new planning scheme for the entire local government area. It is important to understand that while the study report and its recommendations are a significant input, it does not necessarily represent the final integrated policy position of Council. Rather, the information will be used to assist the drafting of elements of the new planning scheme. The integration and balancing of a range of project inputs, community and State government engagement and other information which becomes available to Council will also influence the final policy content of the new planning scheme. Following an initial review by the State, a statutory public consultation process will occur where formal submissions are considered by Council and the State government before the planning scheme is finally adopted.

Executive Summary

Project Scope and Objectives

The primary objective for this study is to assess the habitat, biodiversity, threatening processes and current level of protection within the Fraser Council Regional Council (FCRC) area. The outcomes are:

- Identification of habitat and biodiversity values;
- Mapping of these values;
- Identification of major threatening processes; and
- Recommendations for further studies and management.

Existing Habitat and Biodiversity Values

The FCRC area contains a unique and diverse range of habitats and species of State, Regional and Local significance. Some of these values are conserved through gazetted protected areas, such as the Fraser Island World Heritage Area, the Ramsar listed Great Sandy Strait wetland, and National Parks and other conservation reserves. Large extents of the region's natural values are protected to some degree through State mapping and legislative triggers, such as regional ecosystems and significant wetlands.

A number of significant flora and fauna species exist in the FCRC area, with the region forming limits of geographic distribution for a number of species. Significant habitats, such as shorebird roosts, and wildlife corridors are also present.

The threats to species and habitat and potential management actions specific to the region have been assessed for certain areas and species.

There are a number of localised studies and mapping projects existing for specific areas or species, however very few are extended across the whole region or incorporate all aspects of habitat and biodiversity values.

Spatial Analysis

Spatial analysis was undertaken in order to map the existing and available data of State, Regional and Local significance for habitat and biodiversity values.

State significant areas were based on the Department of Environment and Resource Management's (DERM) dataset (yet to be released) for 'areas of ecological significance', which identifies areas of high or general ecological significance for both terrestrial and wetland habitats.

Regionally areas were limited in extent due to a lack in background studies and mapping at the regional scale and an adequate level of detail.

Locally significant areas were mapped for the potential Urban Expansion Areas identified by FCRC and these were digitised from satellite imagery and ground-truthed to verify habitat and biodiversity values (where access was possible). This identification of unmapped vegetation patches on a property scale is critical to preserving existing viable patches and providing connection across the local landscape. Priority protection should be given to the local wildlife

corridors potentially present and locally and regionally significant species that are currently not protected through State and Commonwealth legislation.

Implications and Recommendations

It is recommended that certain datasets currently being updated or that are pre-released be incorporated into the spatial analysis for Regional and Local significance areas. There are some studies that have been undertaken for local areas of the former City Councils of Maryborough and Hervey Bay that could be extended across the FCRC area to map the habitat and biodiversity values to be protected through the new planning scheme. Additional data is warranted for particular locally and regionally significant species and wildlife corridors.

Management strategies for the FCRC area need to prioritise locally and regionally significant values, as the data at this scale is lacking, where as State and Commonwealth legislative triggers and mapping adequately cover this region.

Management strategies need to be devised for the whole FCRC area and should be relevant to the habitat and biodiversity values at each significance level (State, Regional and Local). Protection should be given to those values not otherwise protected through State and Commonwealth legislation, for instance, the local wildlife corridors potentially present and locally and regionally significant species. It is considered that any areas of significance identified within the proposed urban footprint should be protected at a local level through the planning scheme.

In addition to this, FCRC planning codes could include protective measures for State-mapped areas in the Urban Expansion Areas, such as Regional Ecosystems, as there are exemptions for clearing ‘least concern’ and ‘of concern’ remnant communities in urban areas.

Field verification of current and future studies and mapping is recommended in order to provide a solid basis for protection and management strategies. Biocondition assessments could be developed to monitor the condition and future management within vegetation patches in the region. A biannual assessment of the datasets is recommended to identify where superseded and new datasets are available.

1. Introduction

1.1 Project Background

The Fraser Coast Regional Council (FCRC) has embarked on a Whole of Council Area Planning Project, which comprises two main components:

- Component 1 – Fraser Coast 2031: Sustainable Growth Strategy (SGS);
  - Step 1 (2009 – 2010): Visioning and information gathering, including technical studies;
  - Step 2 (2010 – 2011): Planning phase to consolidate the information collected in Step 1 and help determine some options for the future of Fraser Coast; and
  - Step 3 (2011): Strategy development, based on community input to identify a preferred option for the sustainable growth of Fraser Coast towards 2031.
- Component 2 – A new planning scheme for the FCRC area to be undertaken, as per the requirements of the *Sustainable Planning Act 2009* under the Queensland Planning Provisions.

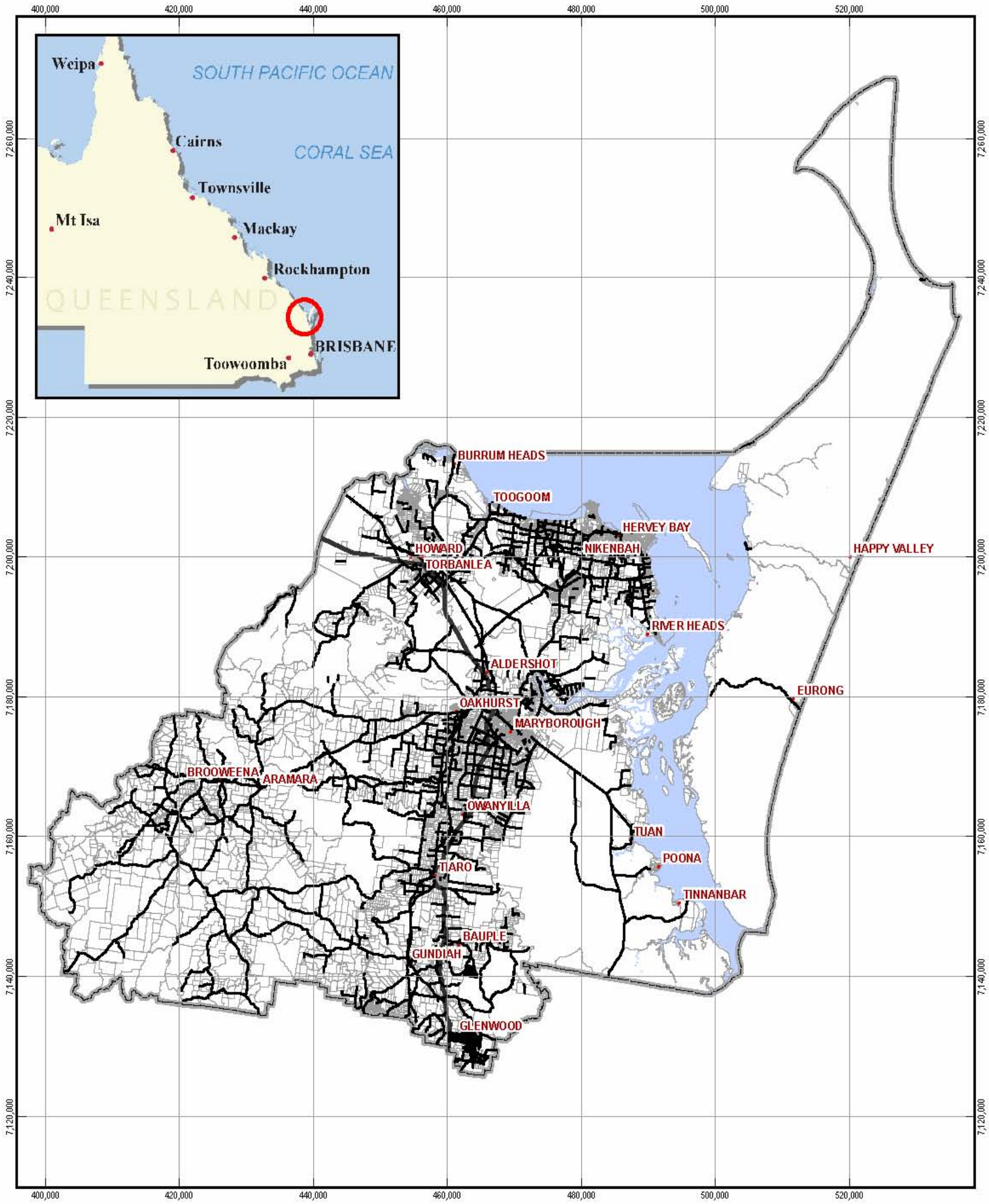
The objectives of Fraser Coast 2031 are to provide:

- A vision for Fraser Coast based on community aspirations;
- A strategic framework for the sustainable growth of the Fraser Coast to 2031; and
- The foundation for Component 2 – a Whole of Fraser Coast Regional Council Planning Scheme.

The Fraser Coast Regional Council area is shown in Figure 1.

A number of individual planning studies, including this Habitat and Biodiversity Study, will be incorporated into the consolidated planning report that will identify and test the settlement pattern options. The outcomes of this will culminate in the preparation of the Sustainable Growth strategy document, which will include a preferred settlement pattern option for the FCRC area.

Figure 1 Locality Map



1:750,000 (at A4)
0 2.5 5 10 15 20
Kilometers
Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 56

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Fraser Coast Regional Council
Biodiversity Values

Figure Description 1
LOCALITY MAP

Job Number 41-2210805
Revision A
Date 10 AUG 2010

Figure 1

X:\project\41\2210805\GIS\Maps\FinalFig01_locality.mxd

1/58 Channon St Gympie QLD 4570 Australia T 61 7 5482 9444 F 61 7 5482 9433 E gympmail@ghd.com.au W www.ghd.com.au

Data Source: DERM: Cadastre 2010, FCRC, General Purpose Map: Road centrelines, LGA Boundary

1.2 Regional Context

The natural environment of the Fraser Coast region is unique and diverse and holds significant value not only to the local communities but also on a global scale.

The FCRC area is located within the South-East Queensland Bioregion. The region falls within a broader area recognised as a centre of plant endemism and a centre of species richness. The richness of the biodiversity and natural features across this council area is partly due to the presence of a biogeographical overlap, known as the McPherson-Macleay Overlap. It is home to the worlds tallest and most complex rainforest growing on sandy substrate, contains many endemic species, includes significant populations of threatened species, is a major international transitory point for humpback whales, and contains a major feeding and roosting location for migratory wading birds (BMRG 2008).

The region covers a large geographical area of allied ecosystems and is a gateway to the World Heritage Area of Fraser Island, the Cooloola Sandmass (proposed for World Heritage Area listing), and the RAMSAR listed wetland of the Great Sandy Straits (BMRG 2008).

Part of the FCRC area is located within the recently designated Great Sandy Biosphere. A biosphere is a site recognised under UNESCO's (United Nations Educational, Scientific and Cultural Organisation) Man and the Biosphere Program, which innovates and demonstrates approaches to conservation and sustainable development. The Great Sandy Biosphere includes Fraser Island, Hervey Bay, Maryborough and Gympie, giving recognition to important conservation areas and encouraging local communities to live more sustainably.

The FCRC is the result of an amalgamation in 2008 of the former city councils of Hervey Bay and Maryborough and the former Shires of Tiaro and Woocoo. The region covers an area of 7,125 km². The region is one of Australia's fastest growing regions with a population of over 92,000 residents. The FCRC area accommodates a growing human population and expansion of land use that may threaten the region's biodiversity and ecosystem function and resilience. Major human activity and land use with the potential to adversely impact the biodiversity values in the region includes:

- Regional and rural centres (including "seachange" communities);
- Agricultural, grazing and horticultural uses;
- Industry;
- Productive forestry; and
- Tourism business (including ecotourism) and recreation in protected and significant areas.

The biodiversity and ecological characteristics of the region need to be considered in any future strategic land use plan so that important values are retained, protected and sustainably managed into the future. Unfortunately, information regarding the region's biodiversity is patchy and a greater body of information is required for future planning studies.

1.3 Scope and Objectives

The primary objective for this study is to assess the habitat, biodiversity, threatening processes and current level of protection within the FCRC area. The outcomes are:

- Identification of habitat and biodiversity values;
- Mapping of these values;
- Identification of major threatening processes; and
- Recommendations for further studies and management.

This assessment was aimed to be robust enough to inform the Land Use Strategy and Planning Scheme.

The literature review within Section 2 provides a summary of the known information for the region on habitat and biodiversity values. The identification of gaps in current knowledge will be used to make recommendations that consider the maintenance and enhancement of biodiversity values in the development of planning strategies and management approaches.

Using existing information and additional ground-truthed information, a series of maps have been produced identifying high biodiversity value areas at a regional scale in addition to local high biodiversity value maps in potential urban expansion areas.

While these maps aim to provide FCRC with a single resource for regional and local scale planning and assessment decision-making, there are currently limitations in the available information, studies and mapping at the regional and local levels. Therefore, recommendations have been made to inform further studies needed for enhanced protection of biodiversity and habitat values across the FCRC region.

2. Literature Review

2.1 Habitat Values

2.1.1 State Level

There are several State-level methodologies and mapping that can be employed for identifying areas with various levels of State significance that aid in a range of planning or decision-making processes. The *Vegetation Management Act 1999* (VMA) is adopted to regulate vegetation clearing to conserve regional ecosystems and prevent the loss of biodiversity. This legislation is used to regulate the clearing of 'endangered' or 'of concern' regional ecosystems (REs), high value regrowth, and areas where species listed as 'endangered', 'vulnerable' or 'near threatened' under the *Nature Conservation Act 1992* (NCA) are known to occur (mapped as essential habitat) (DERM 2008). The FCRC area contains a diversity of REs with 96 recorded in the GSB (BMRG 2008) and 78 REs present across the whole FCRC area covering approximately 460,220 ha (the total FCRC area is approximately 798,726 ha). Many of these REs are highly fragmented.

The Biodiversity Assessment and Mapping Methodology (BAMM) provides a consistent approach for assessing biodiversity values at a landscape scale in Queensland using the State's RE vegetation mapping as a fundamental basis (EPA 2002). DERM use the BAMM to generate Biodiversity Planning Assessments (BPA's) which may be used by State agencies, Local Government and members of the community as a non-statutory assessment tool to identify biodiversity values and inform planning and decision making processes (DERM 2010). The BPA mapping (EPA, Version 3.5, 2007) identified the following areas of biodiversity significance for FCRC:

- Local significance approximately 9,105 ha (includes local values that are assessed as not having biodiversity significance at a State or Regional scale and are therefore of significance at the local government level, such as the extent that a remnant RE remains within the Local Government Area, pre-clear extents are critically low, or the presence of minor wetlands);
- Regional significance approximately 74,028 ha (includes remnant areas with at least one 'vulnerable' or 'rare' (now 'near threatened') species, 'of concern' REs, larger tracts, and part of a bioregional corridor);
- State significance approximately 236,017 ha (includes Significant wetlands, World Heritage Area, 'endangered' REs, 'of concern' REs, remnant with 'vulnerable' or 'rare' species, larger tracts, areas that are part of bioregional corridors and special biodiversity value areas); and
- State habitat for EVR taxa approximately 137,056 ha (includes remnant with one 'endangered' or two 'vulnerable' or 'rare' species).

The Queensland Wetlands Program (QWP) undertaken in 2009 is a joint initiative of the Queensland and Australian Governments and provides wetland summary information that can be used to develop and implement measures for the long-term conservation and management of Queensland wetlands. Due to its wetland significance combined with high development pressure, the Wide Bay Burnett, including the FCRC area was one of the first areas in Queensland to become part of the QWP. The FCRC area is covered by parts of the Burrum, Mary and Noosa

drainage basins and all of the Fraser Island basin. The Wetland Mapping and Classification Inventory maps non-marine wetlands throughout the FCRC, including:

- 217 estuarine (oceanic water mixes with freshwater) wetlands covering 205.48 km^2;
- 1,312 lacustrine and/or palustrine (large, open, non-channel) wetlands covering 343.9 km^2; and
- 187 riverine (wetland and deepwater habitats within a channel) wetlands covering 57.44 km^2.

2.1.2 Regional and Local Level

The FCRC region contains four subregions or provinces that form part of the South-East Queensland Bioregion (Tiaro Plants 2008a; Australian Natural Resource Atlas 2010), being:

- Gympie Block – West of the Mary River catchment and south of Curra with relatively fertile soils associated with volcanics that support patches of hoop pine vineforest and mixed eucalypt forests (replaced by ironbark woodlands where rainfall is lower);
- Burnett-Curtis Coastal Lowlands – Areas of the lower Mary River catchment and coastal lands north of Poona with major communities of heathlands, melaleuca and eucalypt woodlands and open forests;
- Great Sandy – The Great Sandy Straits and coastal zone south of Poona with sand masses and sandstone hills supporting rainforest, mixed eucalypt open forests, banksia woodlands and melaleuca woodlands; and
- Brisbane-Barambah Volcanics – Far-western Mary River catchment with ironbark woodlands, araucarian microphyll rainforest and eucalyptus woodlands.

Studies on a more localised scale undertaken within the FCRC area support the diversity of habitats and species, and some have focused on habitat for individual species, that occur within the region. For the FCRC area, habitat studies have been undertaken for shorebirds (Milton & Harding 2007), koalas (van Kampen & Connell 2004; Chenoweth 2005; White *et al.* 2005) and the Illidge's ant-blue butterfly (Beale 1995). Below is a brief summary of studies undertaken to date.

The GSB area extends the length of the eastern half of the FCRC area (and beyond) and includes Fraser Island and marine areas in between. The nomination document for the GSB (BMRG 2008) indicates the region as being of high value due to:

- Containing two critically endangered 'ecoregions' as classified by the World Wildlife Fund and National Geographic (the Eastern Australia Rivers and Streams and the Eastern Australia Temperate Forests);
- Containing part of a critical/endangered endemic bird area (183 – Eastern Australia), which includes Fraser Island to Inskip Point and west to the Bunya Mountains, and is classified as an area where the restricted ranges of two or more endemic bird species overlap by BirdLife International. The endemic bird area 183 is regarded as having 'urgent' priority due to its current threat level on restricted-range and threatened species (particularly from habitat clearance) (BirdLife International 2010);
- A range of land zones and regional ecosystems, as mapped by the Queensland Herbarium and including 'endangered', 'of concern' and 'least concern' communities;

- Being within the McPherson – Macleay Overlap, which is an area of high species and habitat diversity (between Bundaberg and Grafton, New South Wales and reaching west to the Great Dividing Range) where a number of species are in the limits of their geographic distributions; and
- Containing an abundance of internationally, nationally and state protected flora and fauna species.

It is proposed within this nomination document that the GSB be managed as per the objectives for the 'core', 'buffer' and 'transitional' zones identified as follows:

- The 'core' zone of 322,609 ha covers mainly Fraser Island, Cooloola Sandmass and the Hervey Bay marine area and is aimed to be managed in accordance with the principles under the Queensland *Nature Conservation Act 1992* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*;
- The 'buffer' zone includes 148,775 ha of privately and publicly owned land currently managed for conservation outcomes (only terrestrial areas mapped as remnant REs), as well as some Commonwealth marine areas. These areas are aimed at providing ecological maintenance and support to the 'core' areas identified; and
- The 'transition' zone covers approximately 321,232 ha that is used for a wide range of purposes, including agriculture, infrastructure, industry and residential uses, which would be aimed at improving land management practices, education and community involvement (amongst others).

The former Hervey Bay City Council Planning Scheme overlay mapping identifies natural areas for Local Government protection, including Biodiversity Planning Assessment areas, protected estate areas, remnant vegetation, areas of high nature conservation value and buffers of koala sightings.

The former Maryborough City Council Planning Scheme overlay map of Ecological Values and Features identifies:

- Critical nature conservation areas (including Fish Habitat Areas) (mostly around Poona National Park and the Great Sandy Strait);
- Broad nature conservation areas (including Wongi State Forest and other smaller patches of protected areas);
- 'Of concern' regional ecosystems;
- Corridors linking habitat areas (e.g. along the Mary River, Saltwater Creek, Tinana Creek and between remnant vegetation areas); and
- Ramsar site.

The former Tiaro Shire Council Biodiversity Planning overlay mapping shows remnant vegetation (using regional ecosystem status) and conservation parks as areas for local protection and includes provisions for development near waterways, REs and conservation estates. Woocoo Shire Council mapping is limited to identification of bushfire risk and park areas.

Low (1996) undertook a vegetation assessment project at 10 sites within the previous Hervey Bay City Council area (including Burrum Heads, Toogoom and Howard). Sites were rated for ecological significance and given a priority status for protection under Council's local law. Six habitat classes

were identified within these sites, being eucalypt forest, rainforest, coastal forest, paperbark forest, wallum heathland and mangrove shrubland. Casual observation of fauna activity supported these areas as habitat for fauna species.

The entire extent of high-tide shorebird habitat was assessed and mapped between Point Vernon and Tannum Sands in 2007 by Milton & Harding (within the Queensland Wader Study Group). The Fraser Coast contains one of the most diverse shorelines in Australia (EPA 2007) and provides habitat for nationally and internationally significant populations of shorebirds (Milton & Harding 2007). Milton & Harding (2007) supported their habitat studies with observations and counts of shorebird species and high-tide roost areas were subsequently mapped. Roosts were identified along the Burrum River, Toogoom Creek, and in Hervey Bay at Point Vernon, Eli Creek and O'Reagans Creek. Shorebird habitat in the Wide Bay area has also been extensively mapped in other studies, which have been identified in the draft Wide Bay Coast Regional Coastal Management Plan (EPA 2007) (to be replaced by the Queensland Coastal Plan).

Koala habitat has been mapped for a 29,400 ha area between the city of Maryborough and the town of Tiaro, which included the suburb of Tinana and the Police Paddock Conservation Park (van Kampen & Connell 2004; Chenoweth 2005) and a 450 ha area within the previous Hervey Bay City Council area (White *et al.* 2005). These studies also identified primary and secondary habitat types according to vegetation and either faecal pellet presence or actual sightings.

The Fay Smith Wetlands Park is located in St Helens, Maryborough, and is a community parkland with multiple uses. The patch of vegetation contains remnant eucalypt woodland and melaleuca forest wetland areas with walking tracks and a boardwalk and cleared areas for community use. Part of the wetland area has experienced dieback of melaleuca trees, potentially from changes in hydrology or water quality of the stormwater inputs (Currie, 2009).

In a study assessing the effects on biting midge mitigation on the significant Illidge's ant-blue butterfly (*Acrodipsas illidgei*), Beale (1995) mapped mangrove habitat around River Heads where the butterfly is known to occur. Although mapping of the habitat for this species is hindered by its suffusively rare status – meaning that it is rare everywhere within its range – the distribution of the butterfly was found to be restricted to particular host ant colonies in certain host grey mangrove (*Avicennia marina*) trees.

In 2009, GHD derived a coastal biodiversity model for the Fraser Coast Region by using a multi-criteria analysis (MCA) approach which was based on a set of measurable criteria reflecting current legislation policies. The study area was defined as all FCRC land (or trustee to) in the Fraser Coast that was within the standard Coastal Management District Zone. This project was the first stage of a long term forward planning assessment of FCRC coastal areas, with respect to biodiversity, threats and management. The study identified areas of high biodiversity and potential threats to biodiversity along the coast which helped determine which biodiverse sites are under the most threat.

2.2 Wildlife Corridors

Wildlife corridors can play an important part in maintaining wildlife diversity and ecosystem function by allowing ongoing access to resources and increasing genetic exchange between wildlife populations (Bennett 1990; van Kampen & Wedlock 2002). It is therefore critical that

effective networks of habitats are maintained in FCRC to provide connectivity across the landscape.

The Fraser Coast Green Corridors Project undertaken by Tiaro Plants in 2008 for Hervey Bay City Council identified green corridors within the Fraser Coast region for the purpose of biodiversity conservation and their potential for recreation (e.g. walking tracks) and amenity (e.g. parklands). Green corridors were identified where flora and fauna movement could occur between conservation areas. This report provides details and maps of the location, extent and values of 'green corridors', including local, State, national, riparian, koala and recreational corridors, within the region (Tiaro Plants 2008a). The following corridors were identified:

- State:
  - Burrum Coast National Park to Tin Can Bay Military Reserve;
  - Seaview Range to Mary River;
  - River Heads to Fraser Island;
  - Fraser Island to Rainbow Beach; and
  - Mt Walsh National Park to Marodian Forest Reserve.
- Regional:
  - Wongi State Forest to Marodian Forest Reserve;
  - Glenbar State Forest to Poona Creek.
- Riparian corridors along the Mary, Cherwell, Isis, Susan and Burrum Rivers and larger tributaries; and
- Koala corridors between the south of the FCRC through Tiaro and Maryborough to Hervey Bay.

The recommendations for managing these corridors were based on maintaining corridor habitat, revegetation activities and local government actions, such as landholder assistance and development provisions. Tiaro Plants also produced a report for the FCRC in 2008 that lists the corridors and their values (Tiaro Plants 2008b).

Van Kampen & Wedlock (2002) identified important corridors within the Tinana Creek Catchment area linking the upper and lower catchment area, which contain a diverse range of native flora and fauna, including significant species. This project involved revegetation of the site to improve the links across the catchment area.

Vegetation tracts within two sites proposed for development have been recognised for their importance as stepping stones and corridors for the region. The proposed Walkers Road Recreation Reserve (BAC 2004a) and the 15 ha development plot in Urraween (Jaegen-Moran 2003) both contain vegetation of poor condition that may play an important role in biodiversity conservation at a landscape role through providing corridors for native species.

Extensive corridors for koala movement linking State Forests, Reserves and Conservation Parks were identified and mapped by van Kampen & Connell (2004) between Tinana, Maryborough and Tiaro. Corridors are important for koalas as they move between patches in search of suitable food trees because they protect individuals from dangers associated with urban living (e.g. traffic, domestic pets).

2.3 Biodiversity Values

2.3.1 Recorded Species

The FCRC area is an area of outstanding natural landscapes, and contains high species endemism, biodiversity values and includes significant populations of significant species (BMRG 2008). The Department of Environment and Resource Management (DERM) provides a search tool (WetlandInfo) to identify significant areas and species within a defined area. Table 1 shows the output for the wildlife search function available on WetlandInfo (flora and fauna species numbers are derived from the DERM's WildNet database).

Table 1 Wildlife Recorded from Fraser Coast Regional Council

Wildlife	Native	Introduced	Wetland Indicator Species	Rare or Threatened Species	All
TOTAL	**2614**	**256**	**254**	**75**	**2936**
Fauna	**705**	**24**	**122**	**51**	**748**
Amphibians	37	1	17	5	38
Birds	389	9	84	27	417
Bony fish	44	2	0	4	46
Cartilaginous fishes	1	0	0	0	1
Insects	38	0	0	2	38
Mammals	90	11	6	9	101
Reptiles	105	1	15	4	106
Uncertain	1	0	0	0	1
Fungi	**63**	**0**	**0**	**0**	**63**
Flora	**1722**	**232**	**130**	**24**	**2001**
Protists	**124**	**0**	**2**	**0**	**124**

Source: http://www.epa.qld.gov.au/wetlandinfo/site/MappingFandD/WetlandMapsAndData/SummaryInfo/LGA-RCFRCO.jsp

The GSB nomination study reports similar statistics for some taxon to those provided by Wetlandinfo. However, the GSB report has gathered the data from the entire Burnett Mary Region, which extends beyond the FCRC boundary so there are some differences in figures (for instance, the GSB study reported markedly higher numbers of fish species and a lower number of mammals than Wetlandinfo).

Other sources of species data for native, introduced and significant species for the region include the following reports:

- Coastal and Marine Biodiversity Technical Paper by Kirkwood and Hooper (2004), which provides marine and coastal species and their abundances within the Burnett-Mary Region, and the pressures on and risks to these environments. The report notes that activities impacting upon terrestrial and freshwater environments can also impact on downstream estuarine and marine environments (including land clearing, use of fertilisers or pesticides, water impoundment, excavation exposing acid sulfate soils, development that increases impervious areas, increased population creating additional wastes and other pressures, and dredging);
- The BPA SEQ North Flora Expert Panel Report (EPA 2006) identified a number of regionally significant flora species (as deemed by the expert panel) and priority fauna species for the south-east Queensland bioregion. Regionally significant flora species that have high potential to be found in the FCRC include:
  - *Actephila bella*;
  - *Backhousia oligantha*;
  - *Clausena smyrelliana* (recommended State significance) (this species has now been identified in the region);
  - *Dinosperma melanophloia*;
  - *Dissiliaria muelleri* (Mueller's redheart);
  - *Phaleria chermsideana* (recommended State significance);
  - *Phebalium nottii* (pink phebalium); and
  - *Rhodamnia acuminata* (Cooloola ironwood);
- Draft BMRG 'Back on Track' Biodiversity Action Plan (April 2008), which identified 131 priority species for the Burnett Mary region (including 59 plants, six spiders, five insects, four sharks and rays, three freshwater fish, five marine fish, three frogs, 18 reptiles, 18 birds and 10 mammals). The major threats to these species were also identified from prior knowledge of the species and the region; and
- Tiaro Plants (2008b) identified 51 significant flora species and 55 significant fauna species (27 birds, including one presumed extinct, eight reptiles, two fish, nine mammals, two insects and seven amphibians) listed under the NCA or the EPBC Act and located within the FCRC area.

The region's high species diversity and concentration of endemic and significant species is an important and unique feature of the FCRC and one of the drivers for recognising the area as a biosphere. The outstanding natural landscapes and geomorphological features are unique to the region and support populations of species that have declined elsewhere in Australia (BMRG 2008). The region features areas of note that do not occur within the adjacent Noosa Biosphere, including the World Heritage Area of Fraser Island, the proposed World Heritage Area of the Cooloola Sandmass, the Great Sandy Straits Ramsar wetland, as well as unique geological features and iconic endemic species, such as the Mary River turtle and Australian lungfish (BMRG 2008).

Populations of the threatened rainforest plant, *Samadera bidwillii (*formerly *Quassia bidwillii)*, were located for the FCRC region, however populations were found to be in poor quality with only one true remnant remaining (Smyrell 2007).

Studies by Van Kampen (2002) and van Kampen & Wedlock (2002) also identified several threatened flora species in the rainforest areas of the Teddington Weir Water Reserve and Tinana Creek Catchment, including *Samadera bidwillii*, *Macrozamia pauli-guilielmi* and others. Some of these species were in very limited numbers. Two protected bird species were also detected in the study area (black breasted button-quail *Turnix melanogaster* and the yellow-tufted honeyeater *Lichenostomus melanops*). One of Australia's most critically endangered species, Coxen's fig-parrot (*Cyclopsitta diophthalma coxeni)*, was also found to occur in the catchment area (van Kampen & Wedlock 2002).

Low (1996) notes that some plant species reach their southern limit in the Hervey Bay region or are entirely restricted to the region (e.g. *Agathis robusta* south Queensland kauri pine and *Melaleuca cheelii*). Four significant species were known to occur in the Hervey Bay area, including *Acacia baueri subsp. baueri*, *Melaleuca cheelii* and *Quassia bidwillii*. Maryborough and surrounding areas also feature *Acacia attenuata* and *Cassinia collina*. The former *Acacia perangusta* (eprapah wattle) is no longer considered to be a distinct species since this report was published and is not currently regarded as significant. The mangroves around River Heads feature the endangered butterfly Illidge's ant blue (*Acrodipsas illidgei*). The region also features an abundance of migratory and wader birds.

The river systems and coastal regions of the council area are also host to many significant species including the endemic Mary River turtle (*Elusor macrurus*), Mary River cod (*Maccullochella peelii mariensis*), beach-stone curlew (*Esacus neglectus*), whales, marine turtles, and dugongs. In addition, many nationally and internationally significant populations of shorebirds roost along the Fraser Coast (Milton & Harding 2007), including those recognised under international agreements (e.g. JAMBA, CAMBA and KRAMBA).

Koalas have been recorded at Nikenbah in Rifle Range Reserve, Tinana, Booral, Bunya Creek, Gundiah, River Heads, Sunshine Acres, Teddington, Tiaro, Walligan, Wondunna and Young (as per opportunistic records made by residents and other parties to Council).

In their report the BMRG (2005) identified 131 threatened and priority species, the threats to them, and advice on their conservation management within the Burnett River Coastal Region. Some species, like the Mary River turtle and koalas (*Phascolarctos cinereus*), have a greater community expectation for management, and the level of threat should not be the only factor considered when planning for species conservation.

2.4 Significant Areas

2.4.1 State Areas

Within the FCRC region there are numerous areas of significance. The council makes up an area of 7062.93 km², including marine areas. Within this area, the following important areas occur:

- The World Heritage Area of Fraser Island;
- The Internationally Important Ramsar Wetland of the Great Sandy Strait;

- The Nationally significant wetlands (listed on the Directory of Important Wetlands):
  - Burrum Coast;
  - Fraser Island;
  - Great Sandy Strait; and
  - Wide Bay Military Training Area.
- Sixty-four State protected areas (e.g. National Parks, Conservation Parks, State forests, etc), the largest of which include Great Sandy National Park, Great Sandy Strait, Burrum Coast National Park, Poona National Park, Mt Bauple Scientific Park and Great Sandy Marine Park (Tiaro Plants 2008b);
- Six declared Fish Habitat Areas; and
- Multiple sites of high ecological value (effectively unmodified states) under the *Environmental Protection (Water) Policy 2009* (for example, the Great Sandy Strait, all of Fraser Island, areas in Hervey Bay and along the coastline to Burrum Heads, and the Mary River estuary).

2.4.2 Regional and Local Areas

The Fraser Coast Environmental Profile (Tiaro Plants 2008b) lists the following features or areas as being iconic regional environmental assets:

- The Great Sandy Strait – contains the largest area of tidal swamps in the South East Queensland bioregion and is an important wildlife feeding ground;
- A number of local government environmental reserves (including Arkarra Lagoons, Booral, Fay Smith wetlands, Mungomery vineforest, Poona Environmental Reserve, Regional Botanical Gardens, Teddington Water Reserve and Tooan Tooan flying fox colony) (Tiaro Plants 2008b);
- Migratory shorebird roosts – the Great Sandy Strait is recognised as the second most important region in Queensland for shorebirds;
- Fraser Island – contains distinct wildlife and habitat;
- Koalas – a koala corridor has been identified from the central south of the FCRC area to Hervey Bay;
- Rivers and their estuaries (including the Mary, Burrum and Susan Rivers);
- Wallum heath – the FCRC region is the northern limit for the wallum heath habitat;
- Hervey Bay foreshore – consists of a range of habitats including marine turtle nesting sites; and
- Threatened species – numerous threatened flora and fauna species listed under Commonwealth and State legislation are found in the region, including the iconic Mary River turtle, *Macadamia integrifolia* (bopple nut) and the Tooan Tooan flying fox colony containing three species including the *Pteropus poliocephalus* (grey-headed flying fox).

A high proportion of Queensland's coastal biodiversity occurs within the FCRC area (EPA 2007) as well as a high diversity of terrestrial species and ecosystems. Statutory designations such as World Heritage Areas help protect areas or significance. However, biodiversity must also be managed outside these statutory areas if it is to be successfully protected and ecosystem function maintained. It is important that planning schemes are consistent or at least have an understanding

of the management intent of State agencies involved with the management of these protected areas. Planning schemes are also required to consider areas of State significance and adequately reflect State Planning Policies (such as for koala conservation). Cooperation between agencies in their management and planning schemes to produce complimentary objectives is likely to enhance the outcomes of conservation management plans.

2.5 Threat and Management Issues

2.5.1 Habitat

Management of habitat quality, size and connectivity is important in order to maintain ecosystem function and viable species populations. Although much of the intact vegetation within the FCRC area occurs within protected areas such as National Parks (BMRG 2008), habitat areas outside the protected area estate are exposed to a diversity of threats including habitat fragmentation, weed and pest invasion, and fire which threaten to reduce the integrity of habitats. Management of these threats can help assist in reducing the impacts on species habitat.

Little work has been undertaken within the FCRC area that focuses on the management of specific threats. However, in many studies, potential threats to natural areas have been highlighted and possible management techniques proposed (e.g. Vann 2001; van Kampen 2002; van Kampen & Connell 2004; Chenoweth 2005).

The Fraser Coast Environmental Profile report (Tiaro Plants 2008b) identifies the following significant threats to the region's environment:

- Population increase;
- Increased water extraction;
- Rapid coastal development;
- Changing demographic;
- Increasing urbanisation;
- Point source water pollution caused by stormwater, sediments (e.g. new developments), industrial pollutants;
- Diffuse sources of water pollution caused by sediments, nutrients, pesticide, litter;
- Reduction in size of properties;
- Climate change;
- Lack of consistent policy, planning and implementation measures across the region; and
- Lack of protection of significant environmental assets and habitat (e.g. koala).

A number of actions are recommended in this current study for Fraser Coast Regional Council to implement, including strategic planning, establishing a clear environmental policy, recognition as a biosphere reserve, providing support for conservation on freehold properties and improving internal operations and management functions.

Weed and feral animal invasions can have detrimental effects on habitat structure and complexity, as well as direct effects associated with predation and competition on native fauna. In their study

of the biodiversity of the Teddington Weir Water Reserve, van Kampen (2002) recognised and separated several management areas according to the vegetation communities and conditions. Many of these areas were identified as having low to heavy weed infestations. Weed species included lantana (*Lantana camara*), ochna (*Ochna serrulata*), camphor laurel (*Cinnamomum camphora*) and broad-leaved pepper tree (*Schinus terebinthifolius*). A variety of other studies identified existing and potential problems associated with weed invasion (e.g. Vann 2001; van Kampen, 2002; van Kampen & Connell, 2004; Chenoweth 2005). The draft Pest Management Plan for Fraser Coast Regional Council 2010-2014 categorises the regional significance of declared and environmental pests and establishes management strategies for each species. This Plan has taken into consideration other regional and State pest management plans. Fraser Coast Regional Council is also currently undertaking a survey program over 2010-2011 in order to develop an integrated system of pest management and community awareness.

Different natural areas of native vegetation should be protected and conserved for multiple and varying reasons. Some areas are managed according to the desired outcomes of multiple use, as well as ecosystem restoration. The Fay Smith Wetland area in Maryborough has been divided into sections according to the current landscape arrangement and each section is proposed to be managed to achieve separate goals (Currie 2008). In this way, specific sections of high quality and integrity will be managed for biodiversity function, while others will be managed as parkland with native vegetation pockets for enhanced character. Although some portions of this wetland will not be managed for biodiversity, it is important to recognise that these patches of native vegetation may still play an important role in biodiversity conservation through their potential as stepping stones or corridors between patches of greater biodiversity value. In a planning sense, vegetation retained or enhanced for character may indeed play a role in biodiversity conservation within the urban matrix. Land for Wildlife surveys have demonstrated that many areas of native vegetation, no matter how small, may have value for biodiversity protection (van Kampen & Wedlock 2002).

In the FCRC area, other sites are proposed for recreational use, such as Dundowran Park Estate (HBCC 2002) and Raward Road Recreation Reserve (BAC Group 2004), which aim to conserve patches of vegetation for amenity and aesthetic values. Both areas have the potential for providing corridors for native species, such as koalas, which were found to be indiscriminate in their choice of food trees based on integrity (Chenoweth 2005).

Fire management as a tool for habitat maintenance has been proposed for management plans in many studies from the FCRC area (van Kampen 2002; Spencer & Baxter 2006; Currie 2009). Prescribed fire is a powerful management tool to shape habitat structure and complexity (Spencer & Baxter 2006). Inappropriate fire regimes have been identified as a major threat to a number of priority species and ecosystems (EPA 2008). Frequent burning has been found to decrease relative diversity of vegetation communities through the dominance of some species in open eucalypt forests on Fraser Island (Spencer & Baxter 2006) and on the mainland in the Teddington Weir Water Reserve (van Kampen 2002). Fire can also be used to control weed infestations (van Kampen 2002). Unfortunately, there is a scarcity of studies that have implemented fire management strategies within the FCRC and there is a significant knowledge gap with regard to appropriate fire regimes for many priority species and ecosystems. Consequently, there is much to learn regarding the suitability of this management tool for the region.

As a management tool for Council reserves/land, a bushfire risk mitigation and hazard management document has been developed (Rob Friend and Associates & Tiaro Plants 2009).

This plan provides guidelines for bushfire monitoring with respect to prescribed burning and hazard mitigation, and addresses the need to balance the use of fire for conservation with life and property protection, particularly on the urban fringe.

2.5.2 Biodiversity

It was noted in the Koala Habitat Linkage Report (van Kampen & Connell, 2004) that the retention of koala habitat, revegetation of major and minor corridors and the adoption of koala friendly town planning strategies was critically important to the conservation of the species. It is recommended that koala habitat and critical corridor linkages be identified in planning instruments.

A study of koala presence and activity in the Hervey Bay area in 2005 (White *et al* 2005) considered the causes of low abundances of the species to potentially include disease, past culling for the fur trade (unknown for this area), urban development and unfavourable land practices (e.g. habitat destruction through agricultural activities). Management priorities for the study area included limiting vegetation clearing, restoring and revegetating habitat, forming corridors between remaining patches to facilitate movement and develop incentive-based measures to induce land owners to conserve habitat on private land (e.g. rate rebates or provision of labour/tools to rehabilitate sites).

The Hervey Bay City Council Koala Action Plan (Hervey Bay City Council 2008) used the key threats identified for a small study area by White *et al* (2005) as a basis for responding at a more regional scale. The key threats include:

- Loss of habitat;
- Habitat fragmentation;
- Increased vehicular traffic;
- Domestic and wild dogs;
- Disease;
- High intensity or too-frequent fires; and
- Lack of community awareness.

A number of responses for Hervey Bay City Council to consider and implement were suggested to reduce the risks to koalas from the above key threats.

The major threats to biodiversity for the BMRG 'Back on Track' priority species were identified as follows (also provided is the number of priority species known to be affected):

- Cane toads (3);
- Cats (4);
- Clearing of vegetation leading to habitat loss and degradation, loss of food resources, removal of individuals or competition (32);
- Fragmentation from clearing of vegetation (12);
- Collectors of terrestrial species (7);
- Disease (2);

- Fire regime (45);
- Foxes (9);
- Goannas (2);
- Grazing (22);
- Infrastructure development (3);
- Killed by people when encountered (1);
- Lack of regional information (3);
- Pesticide spraying (2);
- Pigs (1);
- Recreation (3);
- Road maintenance (14);
- Small population size (4);
- Urban development (29);
- Weeds (27); and
- Domestic and wild dogs (1) (BMRG 2008).

A number of actions were also provided for these priority species and the identified threats.

3. Methodology

This component of the Land Use Study is part of Phase 1 of the project, and aims to provide information on habitat and biodiversity values of the Fraser Coast region for the development of future planning strategies, with a focus on the urban footprint and surrounds.

The approach for the Habitat and Biodiversity Study was to:

- Synthesise existing information acquired from a number of sources to form a base data layer;
- Undertake spatial analysis of data, including aerial photographs;
- Undertake ground truthing in areas identified as potential expansion areas; and
- Provide recommendations that consider the maintenance and enhancement of biodiversity values in the development of planning strategies and management approaches.

3.1 Existing Information

A literature review of habitat and biodiversity values within the Fraser Coast region was conducted for this project in March 2010 (refer to Section 2).

A number of existing studies have been undertaken and were available for this component of the project. Available information included (but was not limited to) local Council studies (predominately for Hervey Bay and Maryborough areas), Burnett Mary Regional Group (BMRG) studies (and other non-government organisations), consultancy studies and State information sources and datasets.

This information was reviewed and knowledge gaps identified in terms of locally significant values. The focus of the gap analysis considered important habitats (both from a biodiversity conservation point of view, as well as community interest), particularly within future urban growth areas. In addition, the role of local corridor networks within the urban matrix, either remnant vegetation or character vegetation, was considered for its role in maintenance of biodiversity.

3.2 Spatial Analysis

3.2.1 State and Regional Mapping

Spatial analysis of the available data and ground-truthing results has been undertaken in order to produce maps of the FCRC and specific potential Urban Expansion Areas that show areas of biodiversity significance.

Maps of Habitat and Biodiversity Values have been developed at State, Regional and Local levels where information existed and was available for this study. State and Regional areas include areas outside of the urban footprint that are not highly threatened by urban encroachment.

The existing protected area estates are shown in Figure 2 and the regional ecosystem mapping is shown in Figure 3.

Figure 2 Protected Area Estates and Nature Refuges

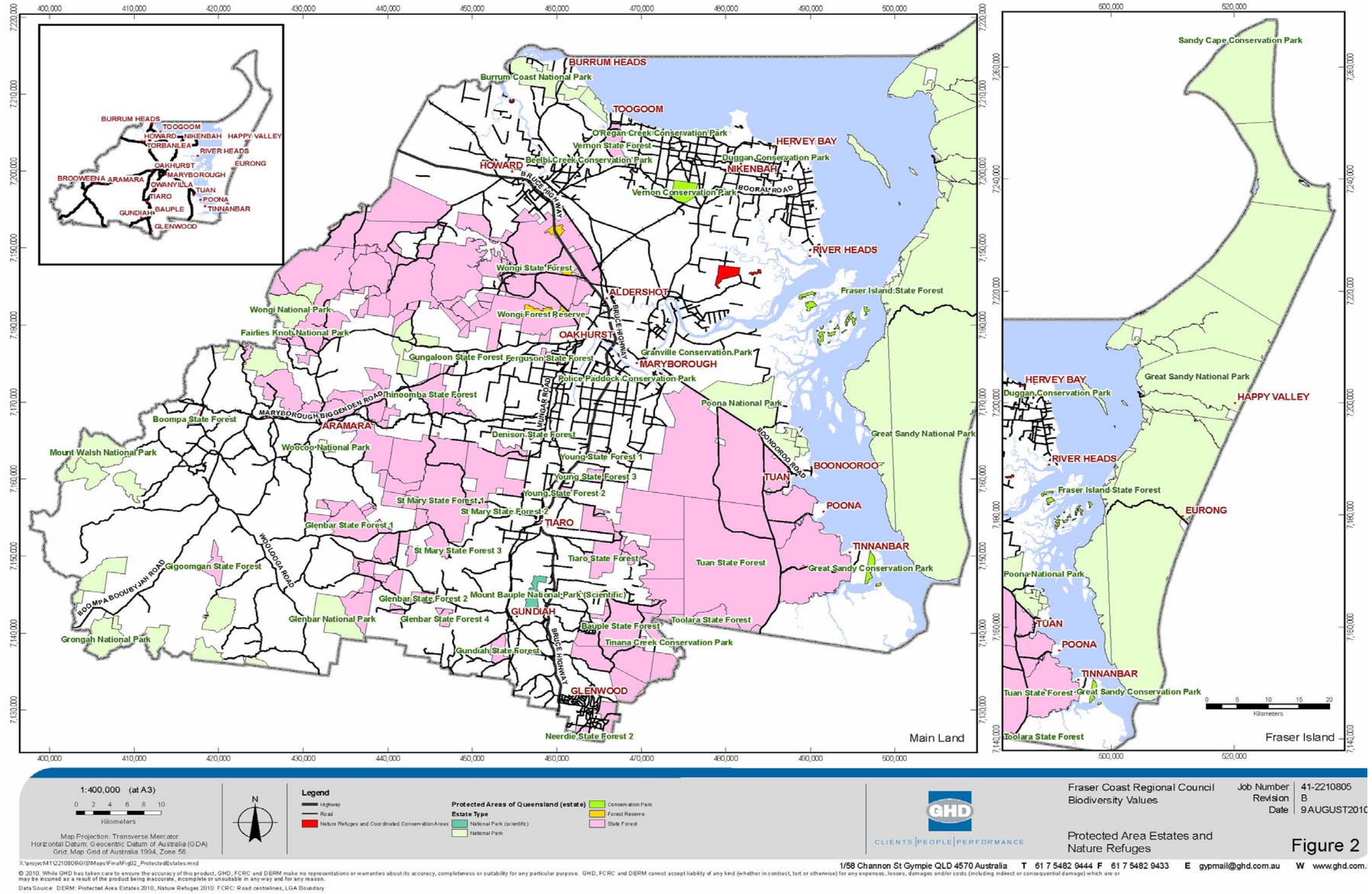
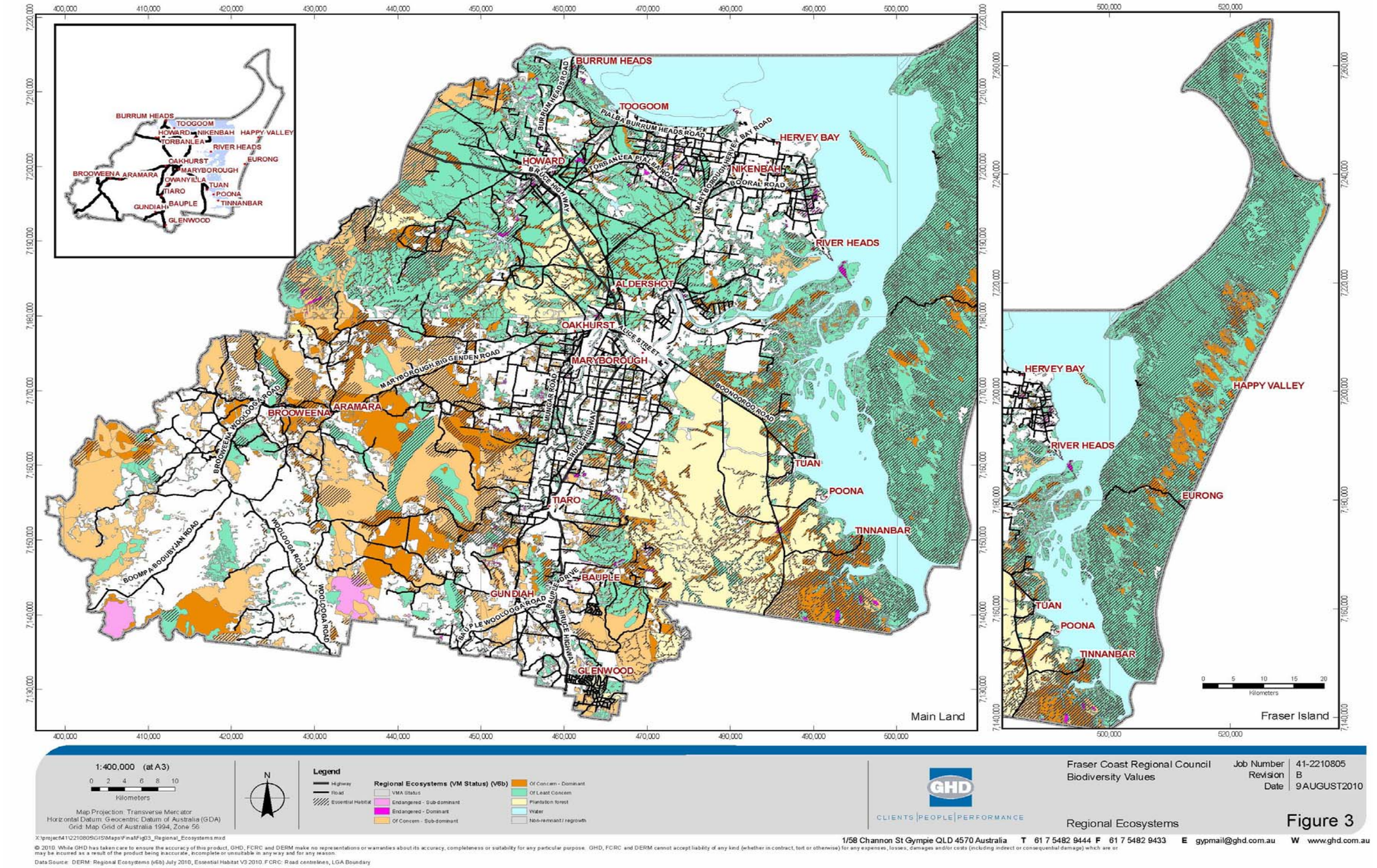


Figure 3 Regional Ecosystems



A new dataset developed by DERM showing 'areas of ecological significance' (AES), such as habitats, wildlife corridors, buffer zones or areas supporting biodiversity or resilience, has recently been completed for the entire State. The mapping consists of areas of 'high ecological significance' (HES) and 'general ecological significance' (GES). Following a State Agency stakeholder workshop held on the 3rd March 2010, it was agreed between Council and GHD that the AES layer was sufficient for representing biodiversity values on a regional context.

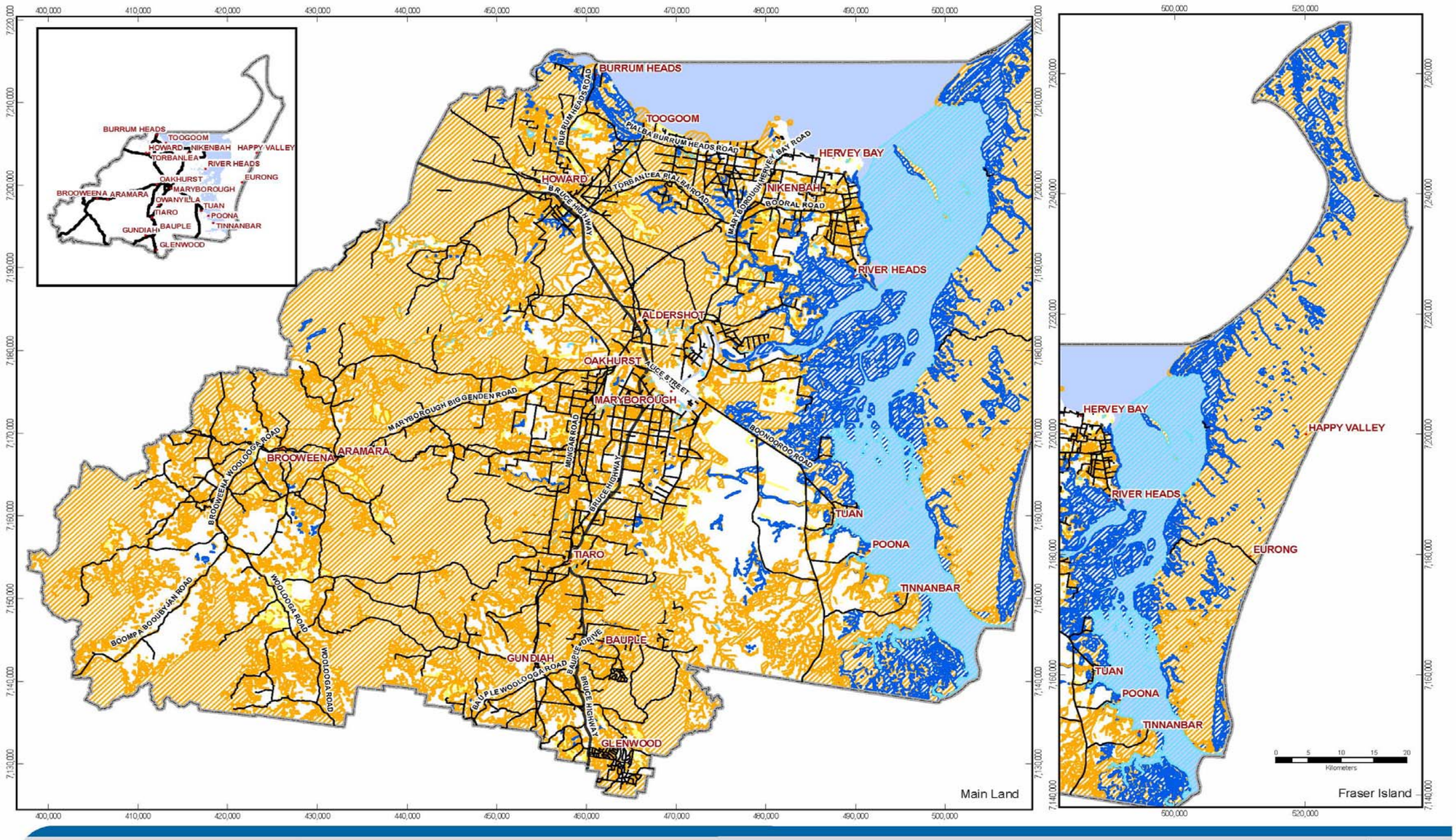
It is expected that the HES and GES mapping will be incorporated in the State and local planning instruments including regional plans and planning schemes, and that the instruments will provide appropriate policies for HES and GES areas as well as other relevant criteria. HES areas represent the most important State interests which may be subject to higher level policies and protection. GES areas represent other areas of interest to the State that should also be addressed in planning (e.g. through development assessment codes and assessments administered by local government) (EPA, 2008). Hence, the HES and GES data was considered suitable for identifying State significant biodiversity values across the FCRC region, as shown in Figure 4.

Areas of HES include protected area estates, world heritage areas, high conservation value wetlands, potential or known habitat for threatened species (under the *Nature Conservation Act 1992* or the *Environment Protection and Biodiversity Conservation Act 1999*), additional threatened Back on Track species, 'endangered' or 'of concern' regional ecosystems (or other significant ecosystems), nationally threatened ecological communities, significant coastal dunes, large tracts of remnant vegetation, biodiversity corridors, riparian corridors, and other special biodiversity areas identified by experts.

Areas of GES include State Forests and Timber Reserves, private conservation reserves and coordinated conservation areas (e.g. nature refuges), other wetlands, non-core habitat for threatened species, 'priority' species (identified through expert panels or Back on Track), remaining remnant regional ecosystems (REs).

As well as using the AES data, a focus was put on developing a new spatial dataset identifying areas of biodiversity values in potential Urban Expansion Areas at a more refined scale. The methodology in creating this biodiversity layer is explained in more detail below.

Figure 4 Areas of Ecological Significance



Data Source: DERM: AES V1 Preliminary, FCRC: Road centrelines, LGA Boundary

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3.2.2 Urban Expansion Area Mapping

Seven potential Urban Expansion Areas were identified by Council, which account to approximately 4,440 hectares of land. They included:

- Burrum Heads;
- Toogoom;
- Nikenbah;
- Howard;
- Tinana;
- Granville; and
- St Helens.

An overview of the potential Urban Expansion Area locations is provided in Figure 5.

Digitising

To create fine scale maps of native vegetation communities present within the FCRC potential Urban Expansion Areas, interpretation of available satellite imagery (SPOT 5 images) was conducted to delineate the current extent and condition of native vegetation. The spatial data capture was at a scale commensurate with local government planning needs and was dependant on the resolution of existing aerial photography. This varied between 1:2500 to 1:5000.

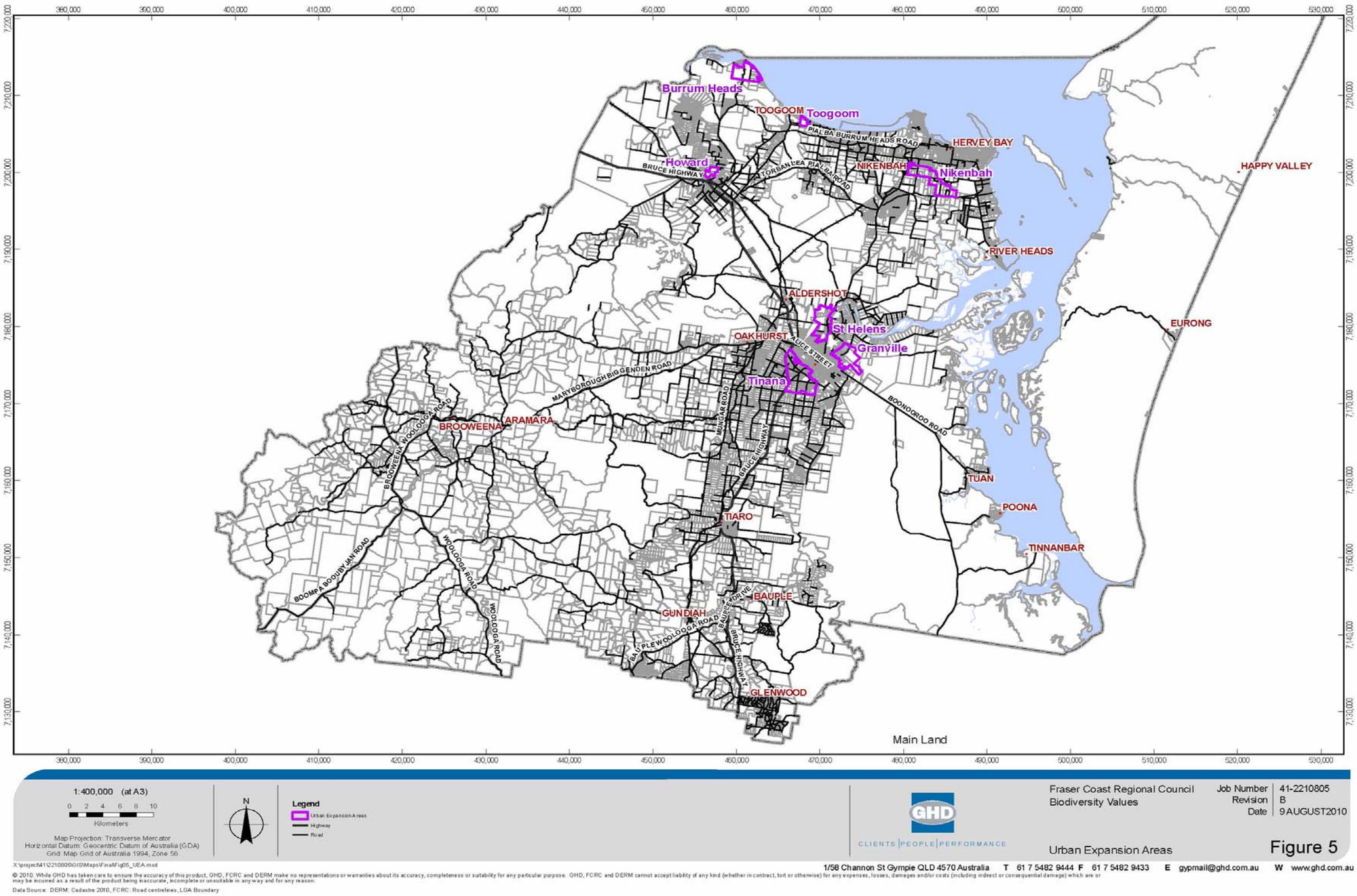
Ground-truthing

Vegetation patches identified from imagery that were not already mapped as AES, remnant vegetation or high value regrowth were ground-truthed by GHD over 4 days in July 2010 using a Nomad and Differential GPS unit. These areas currently have no protection under State or local government legislation and are highly threatened by potential urban expansion. Hence, formal quaternary and habitat surveys were conducted on these areas where accessible, in addition to a brief condition assessment of existing mapped vegetation throughout the area as time permitted.

Prior to commencing field work, permission from property owners was obtained through a letter from FCRC notifying them of possible flora and fauna surveys being undertaken on their land; and a follow-up phone call from GHD confirming staff access to their property to undertake a flora and fauna survey. Where permission was declined or the property owner was not contactable, GHD staff assessed the vegetation from the roadside. There were several properties, however, in which vegetation could not be assessed from the side of the road and these were noted as areas possibly requiring further investigation.

Patches of vegetation that were found to be present and had a level of biodiversity value or connectivity function were classified and mapped as locally significant. The majority of this vegetation was found to be also mapped as 'high value regrowth' under the *Vegetation Management Act 1999*.

Figure 5 Urban Expansion Areas



1:400,000 (at A3)

0 2 4 6 8 10

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

Legend
- Urban Expansion Areas
- Highway
- Road

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Urban Expansion Areas

Figure 5

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Data Source: DERM: Cadastre 2010, FCRC: Road centrelines, LGA Boundary

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Data Creation

The AES and locally significant datasets for each potential Urban Expansion Area were merged together to form an overall biodiversity layer. Thematic maps were generated based on the attribute field ECO_SIG, which identifies whether the patch of vegetation is State or locally significant. Biodiversity maps for the Urban Expansion Areas are represented in Figures 6-12.

Critical attribute information in the AES layer was retained in the merged dataset so that the significant factors could still be identified (i.e. whether it be remnant vegetation, high value regrowth, essential habitat etc). Fields in the AES data that were retained included:

- RE – Regional ecosystem;
- AES DETAIL – Terrestrial HES/GES or Wetland HES/GES; and
- AES_VSMI – Reason for being mapped AES (i.e. essential habitat, HVR etc).

Information gathered from the field surveys was imported into the dataset. This included:

- RecNo – Unique identifier for the patch;
- UEA – Urban Expansion Area that the patch lies within;
- ECO_SIG – Local, AES (HES/GES) or Remnant;
- GHD Survey – Detail (quaternary and habitat survey forms filled out), Basic (brief roadside inspection only), Unable (access issues);
- SITE – Site number;
- DATE – Date surveyed;
- ACCESS – Property (surveyed on-site), From roadside, Not possible (due to access issues);
- ACCESS_COM – Comments on whether owner declined or permitted access, as well as those that could not be contacted;
- EXISTS – Yes/Partially (whether vegetation still exists following interpretation areas from SPOT 5 imagery);
- PHOTO – Photo number;
- AREA_ha – Area of patch in hectares;
- BRIEF_DES – Brief description;
- COMMENTS – Additional comments;
- DISTURBANCE – Amount and type of disturbance;
- THREAT – Obvious threats to the biodiversity values of the patch; and
- RECOMM – Specific recommendations relating to management of the patch.

Information captured as part of the quaternary vegetation and habitat surveys included:

- Dominant flora species for the different strata present, including emergent, canopy, subcanopy, shrub and ground layers;
- Percentage densities and heights for dominant species in each strata;
- Landform and indicative landzone type;

- Disturbances (e.g. weeds, clearings, grazing, infrastructure);
- Complexity of habitat strata (ground, shrub, understorey and canopy);
- Evidence of fauna habitat (e.g. tree hollows, nests, burrows, scratches, scat);
- Opportunistic fauna species records;
- Potential habitat characteristics for species of conservation significance; and
- Disturbance ratings for weeds and noise, and listed land uses within and adjacent the site.

In addition to attribute information gathered from field surveys, a spatial analysis was undertaken on locally significant areas to identify its importance or relative proximity to other biodiversity areas and hence its importance in terms of corridor function. This included its proximity to existing mapped layers including:

- AES data;
- Remnant vegetation;
- High value regrowth;
- Essential habitat and essential regrowth habitat;
- Probable flora and fauna habitats (Back on Track data);
- Wildnet records of ‘endangered’, ‘vulnerable or ‘near-threatened’ species; and
- Watercourses.

A count of the number of times an area is within close range of existing mapped data was also performed to give an indication of its relative importance as a corridor. If the locally significant patch is within a certain proximity of the listed layers above, then it received a value of one. Values were recorded in the fields named “layer”_Rate. These were tallied up to give an overall rating in a field called L_Rate, which provides an indication of its proximity and likelihood of having biodiversity value and corridor function (with six being the maximum and meaning that the patch of vegetation is in close proximity to all of the layers above). A field called L_Prox identifies what the locally significant vegetation patch is close to (i.e essential habitat, watercourse etc).

Other information captured through desktop analysis included:

- Preclear vegetation;
- Existing FCRC High Nature Conservation Area mapping; and
- Category X areas from an approved Property Map of Assessable Vegetation (PMAV).

Figure 6 Biodiversity Value Burrum Heads

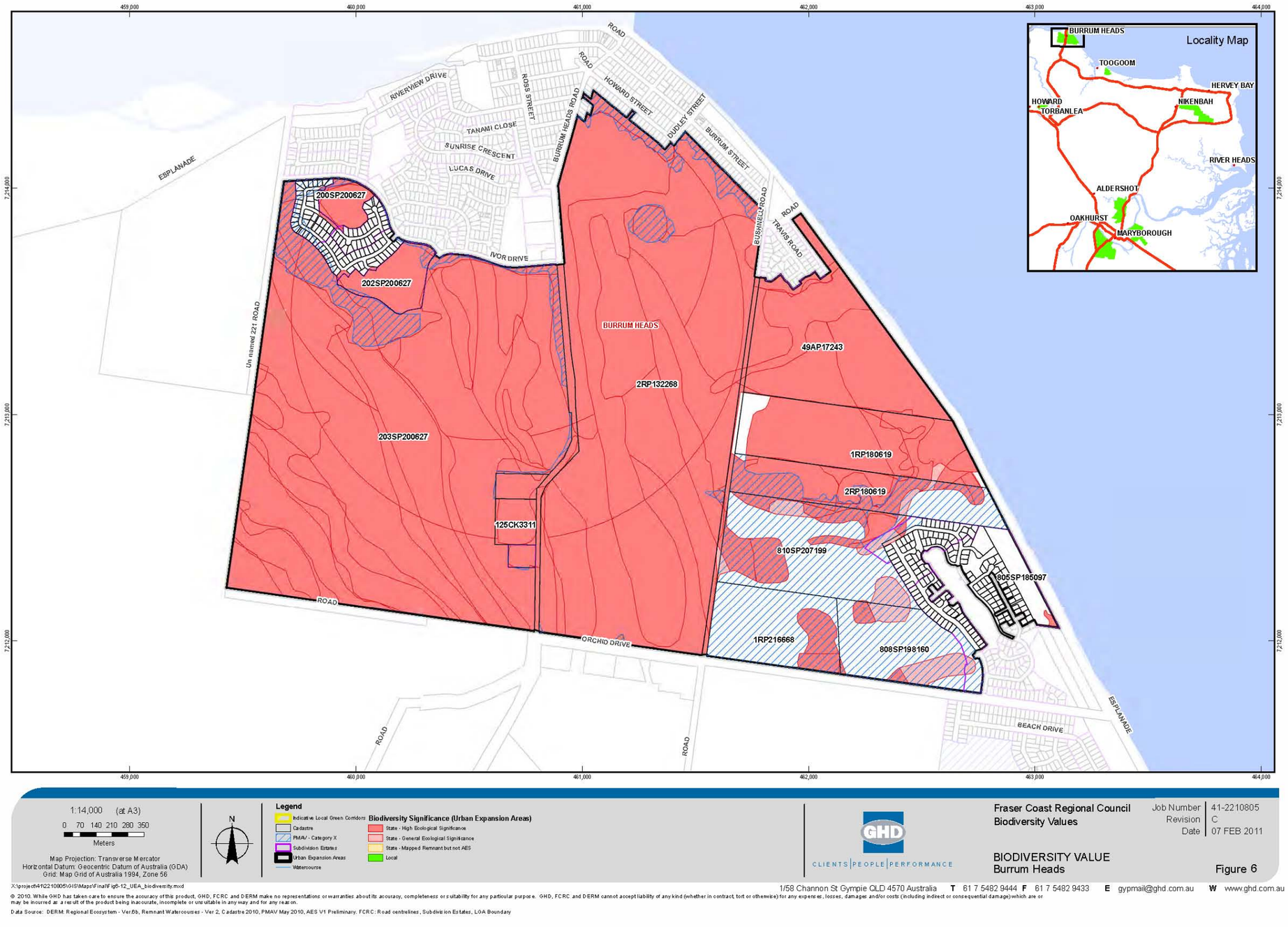
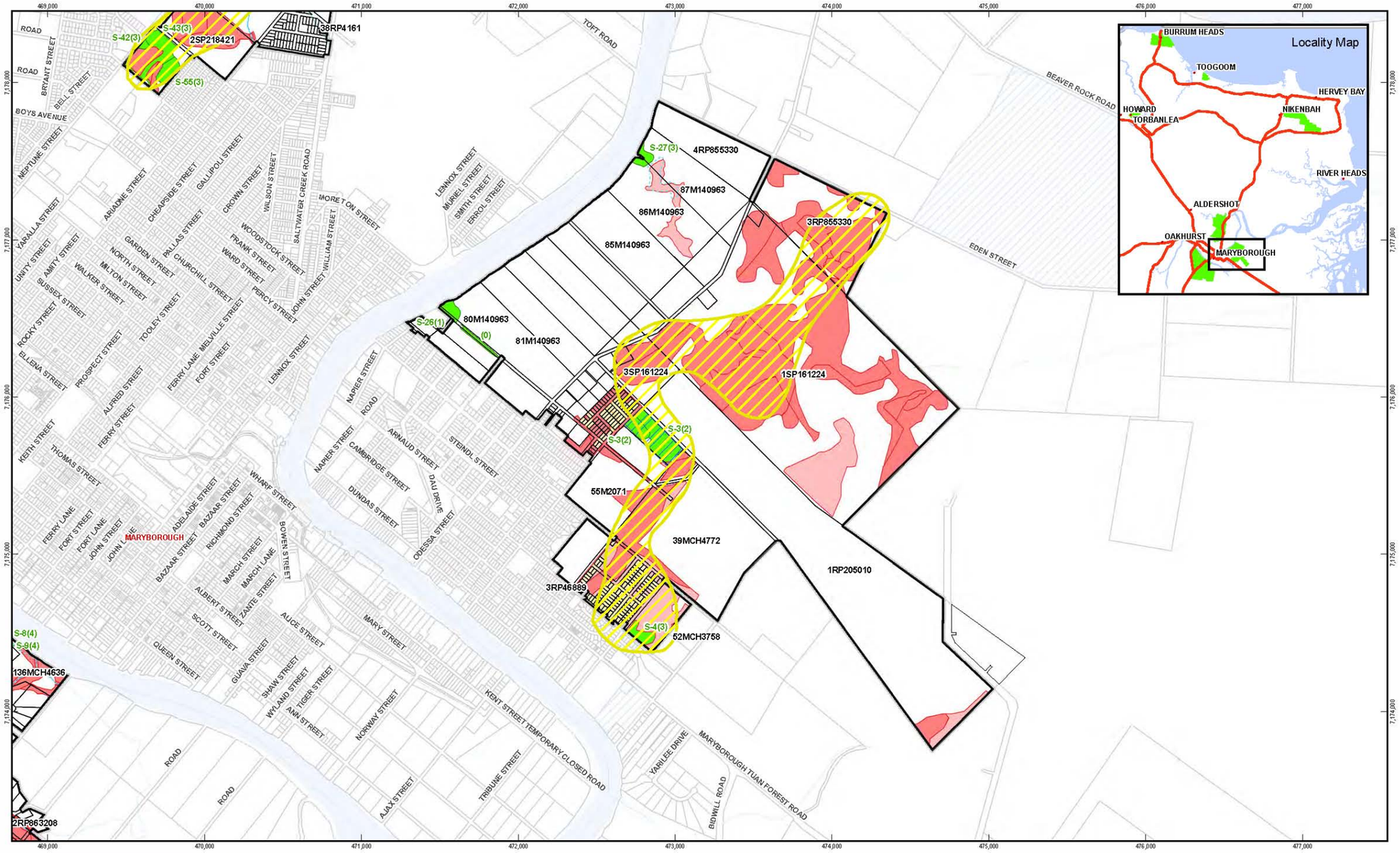


Figure 7 Biodiversity Value Granville



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Data Source: DERM: Regional Ecosystem - Ver5b, Remnant Watercourses - Ver 2, Cadastre 2010, PMAV May 2010, AES V1 Preliminary. FCRC: Road centrelines, Subdivision Estates, LGA Boundary

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Granville

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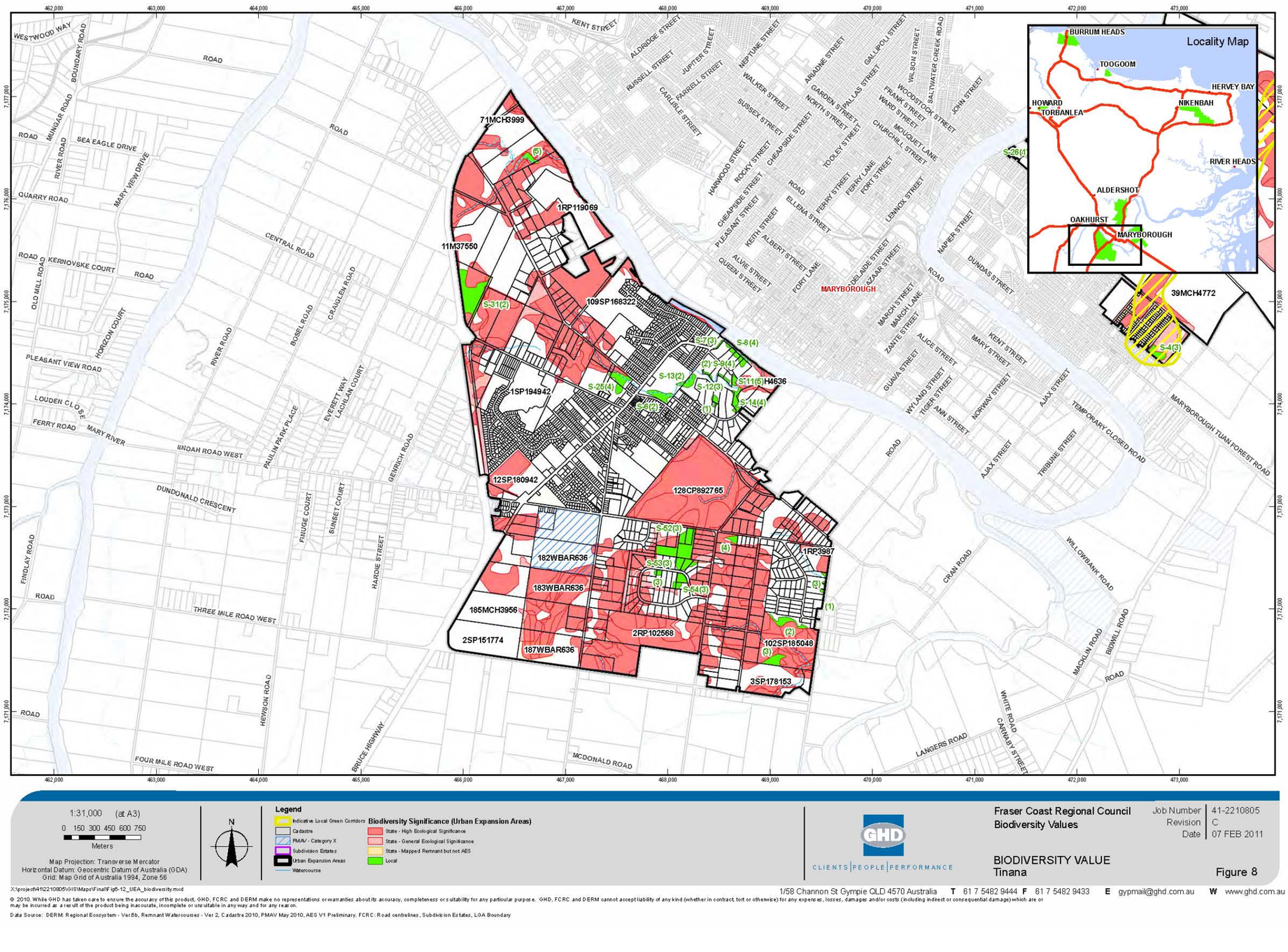
Figure 7

Figure 8 Biodiversity Value Tinana



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Data Source: DERM: Regional Ecosystem - Ver5b, Remnant Watercourses - Ver 2, Cadastre 2010, PMAV May 2010, AES V1 Preliminary. FCRC: Road centrelines, Subdivision Estates, LGA Boundary

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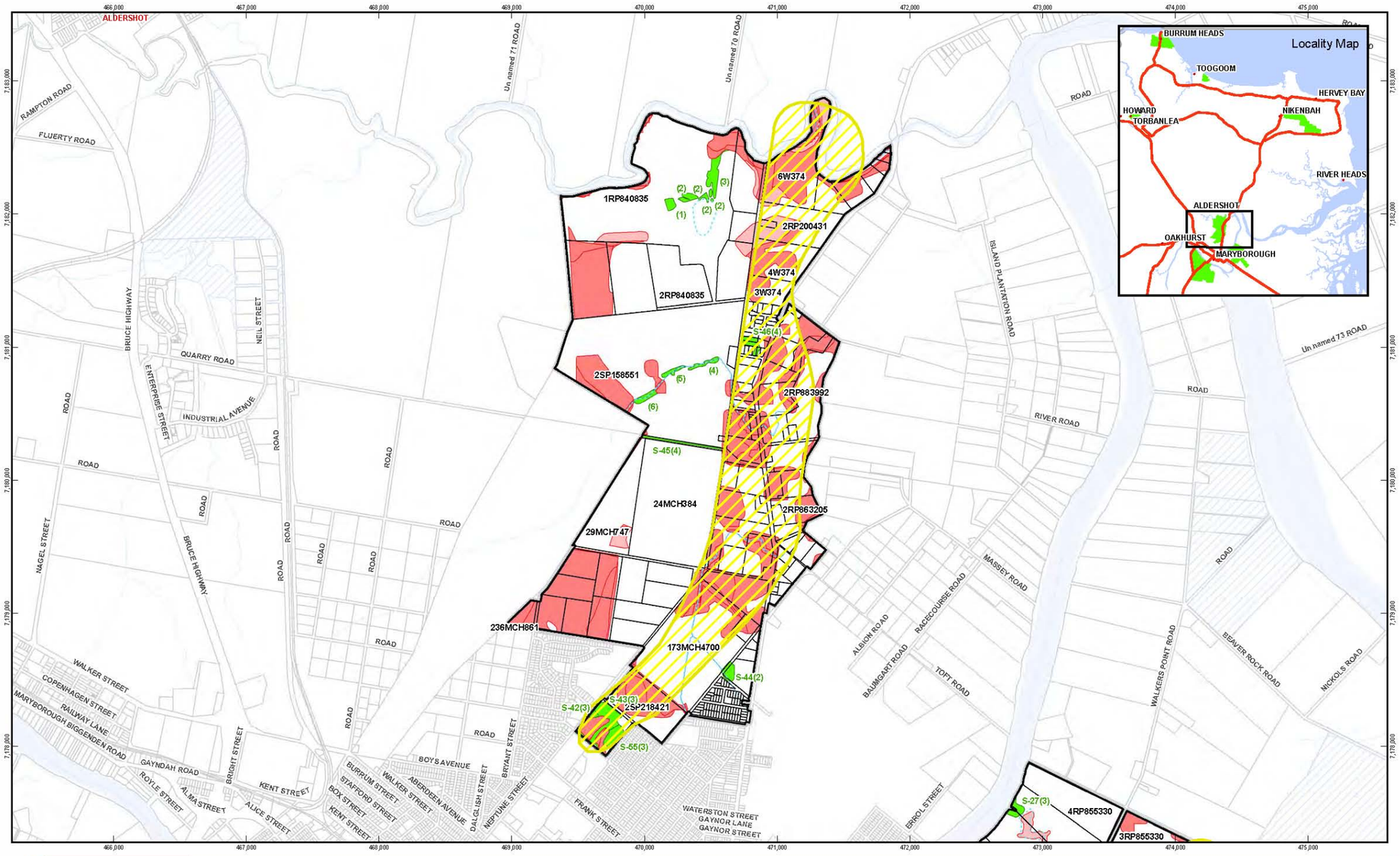
Figure 9 Biodiversity Values St Helens



1:26,000 (at A3)
0 130 260 390 520 650
Meters

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

Legend

Indicative Local Green Corridors
Cadastre
PMAV - Category X
Subdivision Estates
Urban Expansion Areas
Watercourse

Biodiversity Significance (Urban Expansion Areas)

State - High Ecological Significance
State - General Ecological Significance
State - Mapped Remnant but not AES
Local

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BIODIVERSITY VALUE
St Helens

Figure 9

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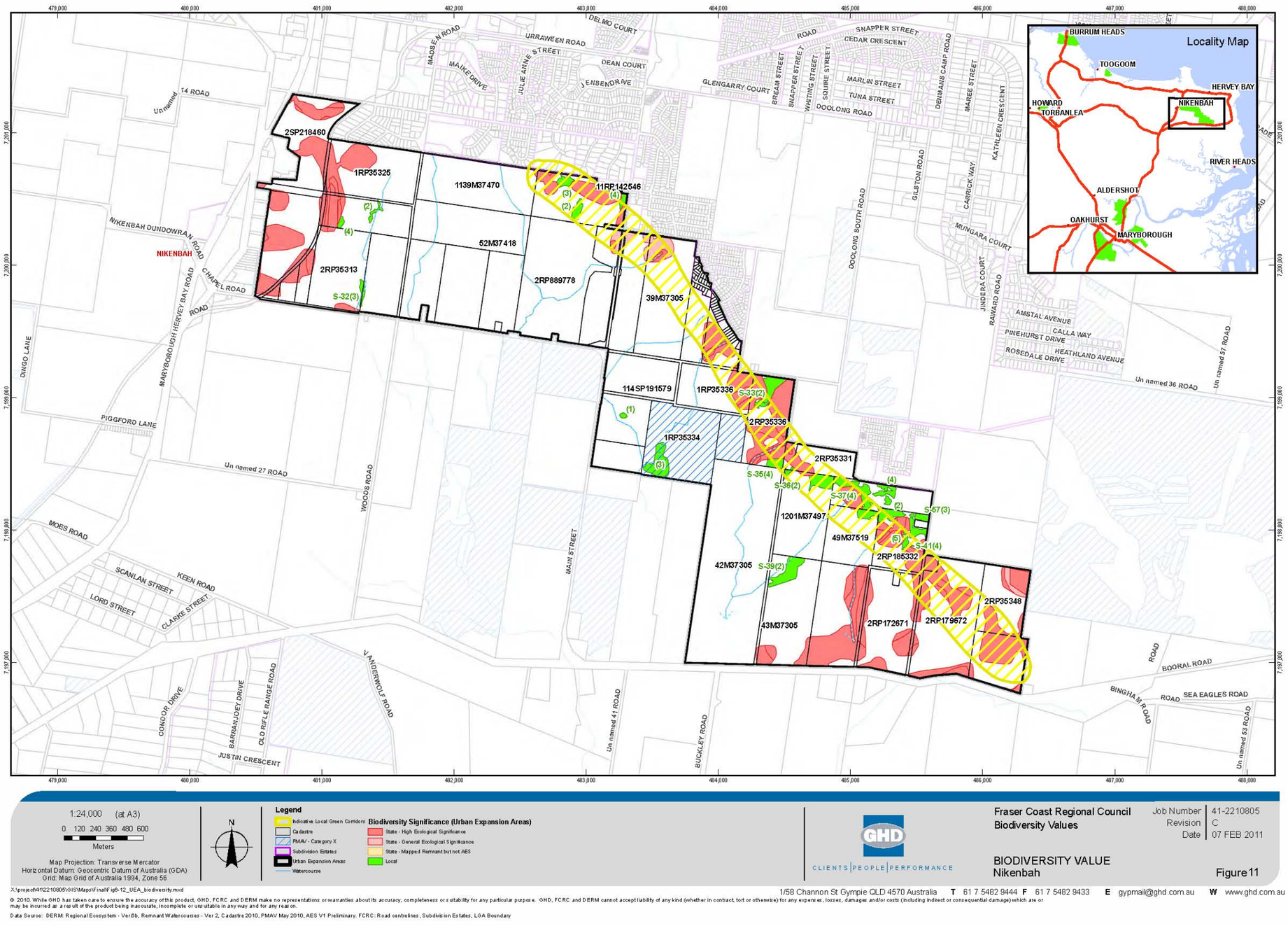
Data Source: DERM: Regional Ecosystem - Ver5b, Remnant Watercourses - Ver 2, Cadastre 2010, PMAV May 2010, AES V1 Preliminary. FCRC: Road centrelines, Subdivision Estates, LGA Boundary

Figure 10 Biodiversity Values Toogoom

Figure 11 Biodiversity Values Nikenbah



1:24,000 (at A3)
0 120 240 360 480 600
Meters

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

Legend

Indicative Local Green Corridors
Cadastre
PMAV - Category X
Subdivision Estates
Urban Expansion Areas
Watercourse

Biodiversity Significance (Urban Expansion Areas)

State - High Ecological Significance
State - General Ecological Significance
State - Mapped Remnant but not AES
Local

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BIODIVERSITY VALUE
Nikenbah

Figure 11

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Data Source: DERM: Regional Ecosystem - Ver5b, Remnant Watercourses - Ver 2, Cadastre 2010, PMAV May 2010, AES V1 Preliminary. FCRC: Road centrelines, Subdivision Estates, LGA Boundary

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Figure 12 Biodiversity Values Howard

1:7,000 (at A3)
0 30 60 90 120 150
Meters

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

Legend

- Indicative Local Green Corridors
- Cadastre
- PMAV - Category X
- Subdivision Estates
- Urban Expansion Areas
- Watercourse

Biodiversity Significance (Urban Expansion Areas)

- State - High Ecological Significance
- State - General Ecological Significance
- State - Mapped Remnant but not AES
- Local

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BIODIVERSITY VALUE
Howard

Figure 12

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Data Source: DERM: Regional Ecosystem - Ver8b, Remnant Watercourses - Ver 2, Cadastre 2010, PMAV May 2010, AES V1 Preliminary. FCRC: Road centrelines, Subdivision Estates, LGA Boundary

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4. Urban Expansion Area Results

4.1 Summary of Existing Information

This section provides a summary of the relevant biodiversity characteristics of the identified Urban Expansion Areas, and the threats and management implications for these areas (detailed further in the literature review in Section 3). Recommendations for further studies and data are also provided in this section.

4.1.1 Habitat and Biodiversity Values

The following habitat and biodiversity values have been identified in the potential Urban Expansion Areas in particular:

- There are significant protected area estates in the region, particularly associated with Fraser Island World Heritage Area and the Great Sandy Straits Ramsar wetland. Numerous other protected conservation areas are present throughout the region, and part of the area is included in the recently designated Great Sandy Biosphere;
- Regional ecosystems (REs), essential habitat and high value regrowth are mapped across the FCRC region. There are 78 REs across the FCRC region covering a total area of approximately 460,220 ha. Refer to Figure 3 for the extent of REs and essential habitat across the region;
- A number of wetlands have been mapped across the Burrum, Mary, Noosa and Fraser Island drainage basins, including estuarine, lacustrine, palustrine and riverine wetlands;
- A number of regionally significant and iconic environmental assets have been identified for Fraser Coast, including Fraser Island, Great Sandy Strait, migratory shorebird roosts, koalas, rivers and their estuaries, wallum heath habitat, the Hervey Bay foreshore and the numerous threatened flora and fauna species;
- Six habitat classes were identified in the former Hervey Bay City Council area (containing the potential Urban Expansion Areas of Burrum Heads, Toogoom and Howard), including eucalypt forest, rainforest, coastal forest, paperbark forest, wallum heathland and mangrove shrubland;
- The extent of high-tide shorebird habitats has been partially mapped in the former Hervey Bay City Council area and identified roosts along the Burrum River, Toogoom Creek and several locations in Hervey Bay;
- Koala habitat has been identified between Maryborough and Tiaro (including Tinana and the Police Paddock Conservation Park) and in an area within the former Hervey Bay Council area. Extensive corridors for koala movement link State Forests, Reserves and Conservation Parks within the FCRC area;
- The Fay Smith Wetlands reserve is a community area featuring remnant and regrowth melaleuca forest wetland and eucalypt woodland in St Helens, Maryborough;
- Mangrove habitat around the Mary River mouth is identified as important habitat for the significant Illidge's ant-blue butterfly (*Acrodipsas illidgei*);

- A number of State, regional, koala and riparian corridors were identified through the Green Corridors Project undertaken by Tiaro Plants in 2008. These corridors are regional links between conservation areas that could enable the movement of flora and fauna species;
- There are important wildlife corridors within the Tinana Creek catchment that link the upper and lower catchment areas for a diverse range of native and significant flora and fauna. Revegetation of these has been undertaken to improve these links;
- An estimate of the numbers of species within the FCRC area was obtained through the WildNet database, which indicated a total of 2001 plant species, 63 fungi, 124 protists, and 747 fauna species (including 38 frog species, 417 birds, 47 fish, 38 insects, 101 mammals and 106 reptiles);
- Listed significant species with potential to occur in the potential Urban Expansion Areas include:
  - *Acacia baueri subsp. baueri*;
  - *Acacia attenuata*;
  - *Cassinia collina*;
  - *Macrozamia pauli-guilielmi*;
  - *Melaleuca cheelii*;
  - *Clausena smyrelliana*
  - *Samadera bidwillii (*formerly *Quassia bidwillii)*;
  - *Cyclopsitta diophthalma coxeni* (Coxen's fig parrot);
  - *Lichenostomus melanops* (yellow-tufted honeyeater);
  - *Turnix melanogaster* (black-breasted button quail);
  - *Phascolarctos cinereus* (koala);
  - *Acrodipsas illidgei* (Illidge's ant blue butterfly);
  - *Elusor macrurus* (Mary River turtle); and
  - *Maccullochella peelii mariensis* (Mary River cod);
- Also significant are the abundances of migratory birds, mammals, sharks and rays that are present along the coastline; and
- A number of regionally significant species have also been identified in various local and regional studies in parts of the FCRC, including the 'Back on Track' priority species.

4.1.2 Threats and Management Implications

The following management issues have been identified from a review of existing information for the Urban Expansion Areas:

- Although much of the intact vegetation within the FCRC area occurs in protected areas, habitats outside of the protected area estate are exposed to a range of threats including fragmentation, pest invasion and fire;
- Little work has been undertaken within the FCRC area that focuses on the management of specific threats to the regional or local values;

- The following significant threats have been identified for the FCRC area:
  - Population increases, coastal residential development, increasing urbanisation, reduced property sizes (larger properties are more likely to be able to accommodate suitable habitat (size, shape, connectivity) to maintain biodiversity) and changing demographics;
  - Increased water extraction, and point and diffuse sources of water pollution;
  - Climate change;
  - Lack of consistent policy, planning and implementation measures; and
  - Lack of protection of environmental assets and habitat.
- Activities impacting upon terrestrial and freshwater environments can also impact on downstream estuarine and marine environments (including land clearing, use of fertilisers or pesticides, water impoundment, excavation exposing acid sulfate soils, development that increases impervious areas, increased population creating additional wastes and other pressures, and dredging).
- Actions recommended for FCRC to implement include strategic planning, establishing a clear environmental policy, providing support for conservation on freehold properties and improving internal operations and management functions;
- The UNESCO designated Great Sandy Biosphere provides a platform to sustainably develop and use the region in a way that supports ecologically viable industries and the population pressures beginning to be experienced. It gives recognition to important conservation areas whilst encouraging local communities to live more sustainably;
- Some species have a greater community expectation for management (like the Mary River turtle and koala), therefore the level of threat should not be the only deciding factor when planning for species conservation;
- It is critical that effective networks of habitats are maintained in the FCRC area to provide connectivity across the landscape;
- Conservation areas, whether managed for biodiversity or recreational use, have been found to provide important corridors for wildlife between patches and throughout the urban matrix, therefore vegetation retained or enhanced for character may play a role in biodiversity conservation;
- Management of wildlife corridors may require the maintenance of corridor habitat, revegetation activities and local government actions, such as landholder assistance and planning provisions for development;
- Corridors are important for koalas in their movements between patches of suitable food trees because they protect individuals from dangers associated with urban living (e.g. traffic, domestic pets);
- Key threats to koalas include loss of habitat, habitat fragmentation, vehicular traffic, domestic and wild dogs, disease, fires and lack of community awareness. Koala management needs to include retention of koala habitat, revegetation of major and minor corridors and the adoption of koala sensitive planning strategies (e.g. incentives for land owners to conserve habitat on private land);

- There is a scarcity of studies that have implemented fire management strategies within the FCRC area and there is a significant knowledge gap with regard to appropriate fire regimes for many priority species and ecosystems. Consequently, there is much to learn regarding the suitability of this management tool for the region;
- Further allocation of resources and strategy mechanisms are required to effectively manage weeds in this region, particularly on private property and in protected areas; and
- Statutory designations such as World Heritage Areas help protect areas of significance. However, biodiversity must also be managed outside these statutory areas if it is to be successfully protected and ecosystem function maintained. It is important that planning schemes are consistent or at least have an understanding of the management intent of State agencies involved with the management of these protected areas. Cooperation between agencies in their management and planning schemes to produce complimentary objectives is likely to enhance the outcomes of conservation management plans.

4.1.3 Recommendations for Further Data

The former planning schemes for the FCRC region have varying degrees of detail in their mapping of ecosystem values and areas identified for local government protection. It is recommended that the data for the whole region be updated to a level of detail that enables effective identification and management of habitat and biodiversity values. This may require expanding some of the local studies (e.g. for Hervey Bay or Maryborough regions) to the whole FCRC area.

There are limited species-level studies that have attempted to map habitat and distribution of populations. In particular, there is little known of the condition and distribution of the region's many threatened species. Much inference has been made about habitat distribution but little on-ground surveys and reliable mapping has been undertaken. More detailed surveys and mapping studies are required as a number of current studies relied on data from previous studies. This could be carried out on a development-specific basis by applicants in accordance with ecological assessment requirements provisioned within the planning scheme. Additionally, assessment of flora and fauna species of regional and local significance is needed (rather than being limited to State and Commonwealth listed species).

There is both regional and localised data on wildlife corridors, however these need to be further studied and mapped at a relevant scale so that specific and effective management strategies are able to be devised and implemented.

Field verification of current and future studies and mapping is recommended in order to provide a solid basis for protection and management strategies.

A number of studies and mapping data are currently being updated and are soon to be released. Once available, it is recommended that these studies be reviewed for their potential to be incorporated into the mapping of regional and local significance for habitat and biodiversity values. These include:

- Updated pre-clear vegetation 2010 (DERM);
- Biodiversity Probable Habitat (BMRG);
- The Great Sandy Biosphere Links Spatial Dataset (BMRG);

- ENRAS (BMRG); and
- Shorebird Roosting Sites (BMRG).

Many of the documents reviewed made mention of potential management techniques that could be applied to particular sites. However, there were no reports on the actual effectiveness of these techniques in the region. It will be important to understand how different management techniques affect the region's natural environment in order to include these in future planning for conservation management. Monitoring and maintenance requirements on a development-specific basis could be incorporated into codes within the planning scheme.

4.2 Regional Spatial Analysis

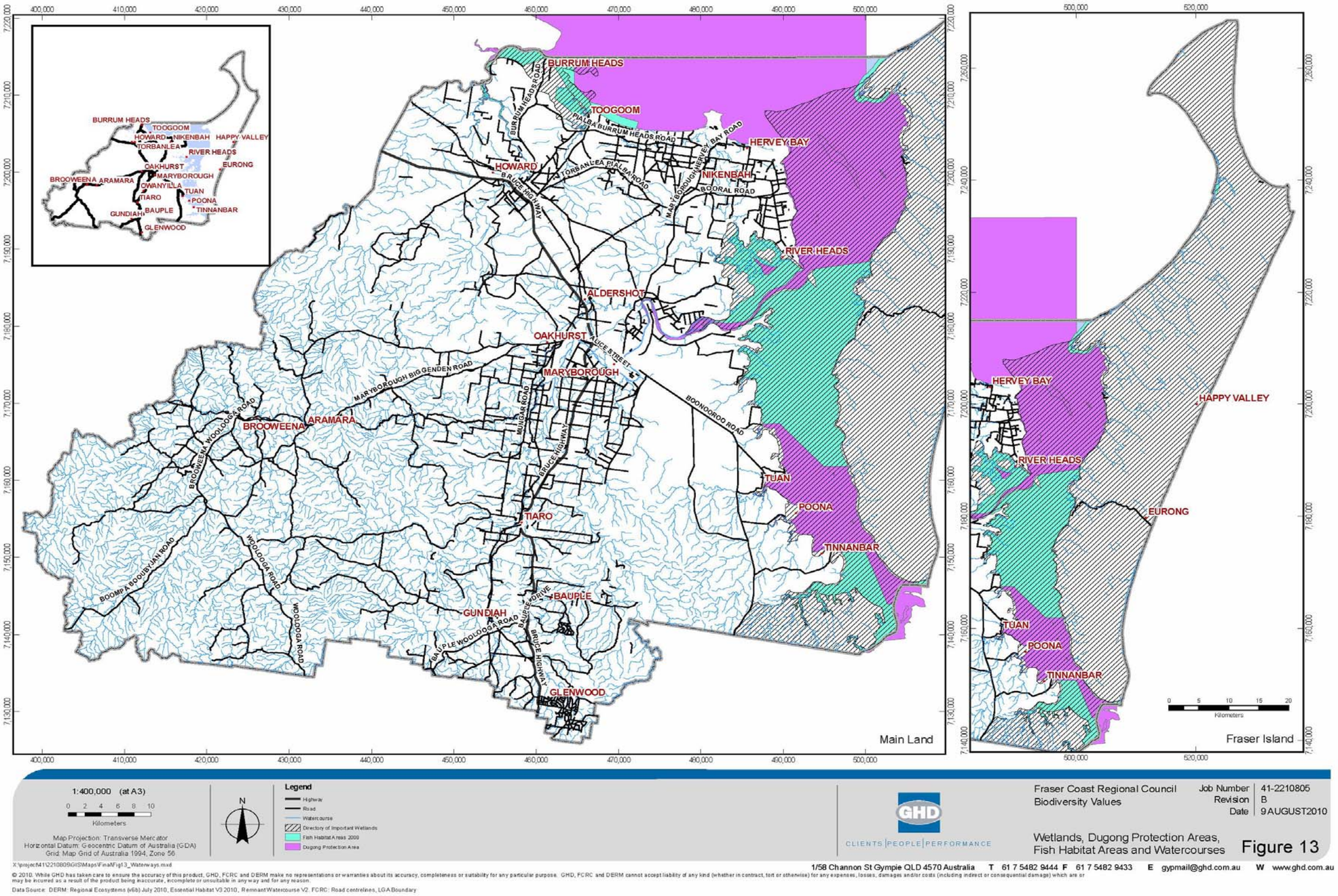
The identification of areas of State significance for habitat and biodiversity values in the FCRC region was based on the State AES dataset. The areas of HES and GES across the region are shown in Figure 4. These amounted to the following approximate areas for the FCRC region:

- Terrestrial HES 458,165 ha;
- Terrestrial GES 18,029 ha;
- Wetland HES 49,003 ha; and
- Wetland GES 54,510 ha.

Areas of regional significance for habitat and biodiversity values in the FCRC region were limited to remnant vegetation not included in the AES data (shown on the specific Urban Expansion Area maps). This is due to a lack of relevant regional studies and mapping datasets that have adequate detail and scale and cover areas not already protected through the State-level AES mapping.

The values of the waterways and wetlands and associated corridor linkages and riparian habitats have not been included in this study. Some of the available waterways and wetlands data are shown on Figure 13. It is recommended that a detailed analysis of the waterways and wetlands values be undertaken and mapping produced of areas to be protected to be incorporated into specific FCRC planning codes for waterways and wetlands.

Figure 13 Wetlands, Dugong Protection Areas, Fish Habitat Areas and Watercourses



4.3 Local Spatial Analysis

The results of the spatial analysis and ground-truthing for each of the potential Urban Expansion Areas is summarised in this section. Refer to the biodiversity values maps for the study areas and habitat and biodiversity significance within them.

4.3.1 Granville

The potential Urban Expansion Area within Granville features some patches of vegetation that have been identified as having high biodiversity value and will require additional protecting and managing. These areas consist of either regrowth vegetation amongst agricultural areas or adjacent residential and industrial areas, or small riparian corridors in close proximity or connected to the Mary River. These were allocated a Local significance, as they have not been identified on State or Regional mapping of biodiversity or habitat values. Some of these locally significant areas are connected to remnant or otherwise State significant areas, which enhances their value as buffer areas to urban expansion and other impacts.

Management of these locally significant areas should focus on the restoration of vegetation community structures and the rehabilitation of riparian corridors, particularly connecting with the Mary River riparian habitat.

There are some larger agricultural properties that contain areas mapped on the AES data as HES and GES, as well as some patches of remnant vegetation that are not included in the AES data.

4.3.2 Tinana

The Tinana area features some relatively large patches of vegetation and habitat mapped on the AES data as either HES or GES.

There are numerous small and several larger patches of habitat of local significance that are worth protecting and managing. The Pioneer Country Park contained a number of small vegetated areas, some associated with creeks and the Mary River and some modified into park vegetation. These patches allow a degree of connectivity for wildlife, with several incidental koala sightings were recorded by park users. Significant management issues for this park include weed infestation and disturbances along the creek banks and the public walking their dogs (often unleashed) amongst resident koalas.

Parts of this area are protected as reserves or parks available for public use, such as Pioneer Country Park and Policy Paddock Conservation Park. These should be managed with the aim of continuing public use with preservation of potential or known significant species and habitat as well as the enhancement of connectivity between habitats. Protective measures might include prohibiting dogs entirely or fines for dogs not on a leash and fauna fencing of riparian areas or other corridors.

4.3.3 St Helens

The area of St Helens in the north of Maryborough features smaller, disconnected areas of natural vegetation and habitat. Most of this is mapped on the State AES data, however, there are also some patches of local significance where value has been identified in regrowth, riparian or wetland

areas. The State interest areas mapped as HES or GES appear disturbed in parts and would benefit from management and protection provisions. The FCRC planning codes could include protective measures for State-mapped areas in the Urban Expansion Areas, such as Regional Ecosystems, as there are exemptions for clearing 'least concern' and 'of concern' remnant communities in urban areas.

The Fay Smith Wetlands Park is partially mapped as a State significant area, however the regrowth vegetation present is considered to have Local significance as a buffer area between the remnant and wetland habitat and adjacent land uses. A large area of the melaleuca wetland in this park is suffering dieback of canopy trees, potentially from changes in hydrology or water quality from surrounding urban uses.

4.3.4 Toogoom

Toogoom's natural features centre on a large property with areas of apparently high value regrowth. Access was denied to this property and there is potential for redevelopment of the site, therefore the habitat and biodiversity values may require further investigation. This area has potential habitat for significant flora and fauna species.

4.3.5 Burrum Heads

Most of the areas with biodiversity and habitat value within the Burrum Heads study area are mapped as being of State interest through the AES data for remnant vegetation, essential habitat and wetland areas.

A large patch of vegetation in Stage 4 development of Dolphin Waters, which has not yet been approved, is in good condition and has high biodiversity values. Worth noting is that it is currently mapped as HES but not as remnant vegetation or high value regrowth. This large area provides a significant wildlife corridor featuring variations in habitat and protection from adjacent land uses and associated impacts such as changes to hydrology.

Protecting the heath, coastal eucalypt and coastal wetland vegetation in this area is important for the maintaining of this type of habitat in the region. Where development occurs, retention of vegetated corridors should be aimed for to allow fauna movement and maintain flora diversity.

4.3.6 Nikenbah

Nikenbah has a number of locally significant vegetated areas, mainly associated with creeks and low-lying areas or hill slopes, and which connect areas of State interest shown on the AES mapping.

The hill slopes commonly feature regrowth of dry vine thicket, which is potential habitat for the significant flora species *Quassia bidwillii*. These areas assist in the formation of a wildlife corridor between remnant or other mapped habitat areas.

The riparian and low-lying wetland areas have potential significance in the provision of corridors and aquatic habitat.

4.3.7 Howard

The Howard potential Urban Expansion Area features several large properties containing habitat mapped as State significant in the AES data and some smaller areas of regrowth vegetation and disturbed habitat. The locally significant areas provide a degree of connectivity and potential wildlife corridor between the larger patches of higher significance. Access was denied to these properties, therefore it is recommended that further investigations be undertaken. Management and protection of these areas would be beneficial.

5. Conclusions and Recommendations

The State significant habitat and biodiversity values were derived from the 'areas of ecological significance' dataset developed by the DERM and incorporating numerous available datasets.

The regionally significant habitat and biodiversity values were based on limited data sources due to a lack of relevant background information and mapping.

Locally significant areas were identified for the Urban Expansion Areas and based on digitised imagery and ground-truthing. Access was limited within these local areas; therefore additional ground-truthing may be beneficial to ensure an adequate level of detail in the data.

It is recommended that the existing data for the whole region be updated to a level of detail that enables effective identification and management of habitat and biodiversity values, particularly for aspects of local and regional significance. This may require expanding some of the local studies (e.g. for Hervey Bay or Maryborough regions) to the whole FCRC area. Ground-truthing of existing and future studies is recommended to verify results and better inform management strategies.

A number of studies and mapping data are currently being updated and are soon to be released. Once available, it is recommended that these studies be reviewed for their potential to be incorporated into the mapping of regional and local significance for habitat and biodiversity values. These include:

- Updated pre-clear vegetation 2010 (DERM);
- Biodiversity Probable Habitat (BMRG);
- The Great Sandy Biosphere Links Spatial Dataset (BMRG);
- ENRAS (BMRG); and
- Shorebird Roosting Sites (BMRG).

Many of the documents reviewed made mention of potential management techniques that could be applied to particular sites. However, there were no reports on the actual effectiveness of these techniques in the region. It will be important to understand how different management techniques affect the region's natural environment in order to include these in future planning for conservation management. Monitoring and maintenance requirements on a development-specific basis could be incorporated into codes within the planning scheme.

Biocondition assessments utilising DERM's BioCondition methodology (Eyre *et al.* 2006; Eyre *et al.* 2008) could be developed to monitor the condition and management effectiveness within vegetation patches in the region. Biocondition assessments could be performed over time to:

- Assess the initial condition of the vegetation patch;
- Monitor changes in condition over time; and
- Monitor condition of the vegetation patch in response to different management regimes.

It is recommended that a detailed analysis of the waterways and wetlands values is undertaken and mapping produced of areas to be protected and incorporated into the FCRC planning

instruments. Council could impose ‘environmental protection zones’ along identified riparian zones that prohibits clearing of native vegetation and disturbance along the waterway.

Management strategies need to be devised for the whole FCRC area and should be relevant to the habitat and biodiversity values at each significance level (State, Regional and Local). However priority should be given to those values not otherwise protected through State and Commonwealth legislation, for instance, the local wildlife corridors potentially present and locally and regionally significant species.

In addition to this, FCRC planning codes could include protective measures for State-mapped areas in the Urban Expansion Areas, such as Regional Ecosystems, as there are exemptions for clearing ‘least concern’ and ‘of concern’ remnant communities in urban areas.

There are limited species-level studies that have attempted to map habitat and distribution of populations. In particular, there is little known of the condition and distribution of the region’s many threatened species. Much inference has been made about habitat distribution but little on-ground surveys and reliable mapping has been undertaken. More detailed surveys and mapping studies are required as a number of current studies relied on data from previous studies. This could be carried out on a development-specific basis by applicants in accordance with ecological assessment requirements provisioned within the planning scheme. Additionally, assessment of flora and fauna species of regional and local significance is needed (rather than being limited to State and Commonwealth listed species).

There is both regional and localised data on wildlife corridors, however these need to be further studied and mapped at a relevant scale so that specific and effective management strategies are able to be devised and implemented.

Field verification of current and future studies and mapping is recommended in order to provide a solid basis for protection and management strategies. A biannual assessment of the datasets is recommended to identify where superseded and new datasets are available.

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