Site selection and infrastructure study for the North East Gold Coast area

September, 2008

Department of Infrastructure and Planning
Contents

Part 1 – Site selection process ..............................................................................................................................1

1. Introduction .................................................................................................................................................. 1
   1.1 Background ........................................................................................................................................... 1
      1.1.1 North East Gold Coast study ........................................................................................................... 1
      1.1.2 Study area ....................................................................................................................................... 1
      1.1.3 Strategic planning ............................................................................................................................... 4
   1.2 Report structure ...................................................................................................................................... 4
   1.3 This study overview ................................................................................................................................. 5
      1.3.1 Objectives ......................................................................................................................................... 5
      1.3.2 Site selection method ......................................................................................................................... 5
      1.3.3 Site selection criteria ......................................................................................................................... 5
      1.3.4 Mapping process ............................................................................................................................... 6
      1.3.5 Comparative site assessment ............................................................................................................ 14
      1.3.6 Other considerations ........................................................................................................................ 14

2. Site selection criteria ....................................................................................................................................... 15
   2.1 Marine industry ....................................................................................................................................... 15
      2.1.1 Industry considerations .................................................................................................................... 15
   2.2 Extractive industry ................................................................................................................................. 18
      2.2.1 Industry considerations .................................................................................................................... 18
      2.2.2 Site selection criteria ....................................................................................................................... 18
   2.3 Sport and recreation activities – motor sport ....................................................................................... 20
      2.3.1 Industry considerations .................................................................................................................... 20
      2.3.2 Site selection criteria ....................................................................................................................... 22
   2.4 Sport and recreation activities - outdoor recreation ............................................................................... 24
      2.4.1 Industry considerations .................................................................................................................... 24
      2.4.2 Site selection criteria – motorised outdoor recreation .................................................................... 25

Part 2 – Study outcomes .................................................................................................................................... 27

3. Site selection outcomes ................................................................................................................................. 27
   3.1 Marine industry ....................................................................................................................................... 27
      3.1.1 Site options ..................................................................................................................................... 27
   3.2 Extractive industry ................................................................................................................................... 35
      3.2.1 Site options ..................................................................................................................................... 35
   3.3 Sport and recreation activities ................................................................................................................ 39
      3.3.1 Motor sport facilities ....................................................................................................................... 39
      3.3.2 Outdoor recreation ........................................................................................................................... 41

4. Preferred location strategy ............................................................................................................................ 43

5. Supporting infrastructure strategy ............................................................................................................... 45
   5.1 Current infrastructure provision ............................................................................................................ 45
      5.1.1 Transport ......................................................................................................................................... 45
      5.1.2 Public transport ................................................................................................................................. 45
      5.1.3 Water supply ................................................................................................................................... 46
      5.1.4 Wastewater ..................................................................................................................................... 46
      5.1.5 Aquifer storage ................................................................................................................................. 46
      5.1.6 Electricity ........................................................................................................................................... 47
   5.2 Marine industry infrastructure requirements ........................................................................................ 47
      5.2.1 Development proposal .................................................................................................................... 47
      5.2.2 Transport ......................................................................................................................................... 47
      5.2.3 Water supply ................................................................................................................................... 48
      5.2.4 Wastewater ..................................................................................................................................... 48
   5.3 Extractive industry infrastructure requirements ..................................................................................... 50
      5.3.1 Development proposal .................................................................................................................... 50
      5.3.2 Transport ......................................................................................................................................... 50
Contents (continued)

5.3.3 Water supply
5.3.4 Wastewater
5.4 Motor sport activities
  5.4.1 Development proposal
  5.4.2 Transport
  5.4.3 Water supply
  5.4.4 Wastewater
5.5 Infrastructure delivery strategy
  5.5.1 Transport
  5.5.2 Water supply
  5.5.3 Wastewater
  5.5.4 Summary

References and Data Sources.................................................................57

List of tables
Table 2-1: Selection criteria for marine industry 16
Table 2-2: Infrastructure requirements for marine industry 17
Table 2-3: Selection criteria for extractive industry 19
Table 2-4: Infrastructure requirements for extractive industry 20
Table 2-5: Selection criteria for land-based motor sport activities 22
Table 2-6: Infrastructure requirements for motor sport activities 23
Table 2-7: Classification and types of outdoor recreation 24
Table 2-8: Selection criteria for motorised outdoor recreation 25
Table 3-1: Comparative assessment of options – marine industry 27
Table 3-2: Sand extraction from Jacobs Well (assumed sand depth 10.0 m and density 1.7 t/m³) 35
Table 3-3: Unmined reserves within KRA 65 A1, KRA 65 A2 and KRA 65 B 36
Table 5-1: Summary of infrastructure requirements to support selected land uses 54

List of figures
Figure 1-1: North East Gold Coast study area 3
Figure 1-2: ‘No go’ areas 9
Figure 1-3 Good Quality Agricultural Land and An Alternative biodiversity corridor 10
Figure 1-4 Flood levels at Defined Flood Event 11
Figure 1-5 Flood velocity vectors at Defined Flood Event 12
Figure 1-6 Topography 13
Figure 3-1: Site options: marine industry 31
Figure 3-2: Flood velocity vector for marine industry site options 32
Figure 3-3: Marine industry option A – Steiglitz precinct 33
Figure 3-4: Marine industry option B – Logan River precinct 34
Figure 3-5: Site options: extractive industry – unmined reserve areas KRA 65A1, KRA 65 A2, KRA 65 B 38
Figure 3-6: Site options: motor sport facilities 40
Figure 3-7: Site options: outdoor recreation 42
Figure 4-1: Preferred strategy for identified land uses 44
Figure 5-1: Planned transport infrastructure 49
Figure 5-2: Existing haul routes, GCCC, 2008 51
Figure 5-3 Preferred supporting infrastructure strategy 56

List of appendices
Appendix A PB interviews schedule
Appendix B The social and economic impact of proposed land uses
Appendix C Feasibility assessment of transporting Rocky Point cane to the Condong Mill in New South Wales
Part 1 – Site selection process

1. Introduction

1.1 Background

1.1.1 North East Gold Coast study

The North East Gold Coast strategic land use, economic development and infrastructure study (the North East Gold Coast study) is an initiative of the Queensland Government, Department of Infrastructure and Planning (DIP), in collaboration with Gold Coast City Council and Logan City Council. The purpose of the study is to identify and recommend a clear and deliverable land use and infrastructure strategy for a key area of predominantly rural and non-urban land that is strategically situated between the region’s two major urban centres of Brisbane and the Gold Coast. The study commenced in October 2007 and is expected for completion in December 2008. The study includes six stages.

Stage 1: Information Assessment and Gap Analysis, and Stage 2: Investigation and Analysis resulted in preparation of the Issues and Options Paper (DIP, August 2008). The paper provides a comprehensive analysis of the regional and sub-regional context of the study area and identified the key issues and opportunities.

In June 2008, Parsons Brinckerhoff Australia (PB) was commissioned by DIP to assist with Stage 3: Options and Evaluation Stage, of the study.

The objective of Stage 3 was to identify and evaluate location options for the range of potential land uses established earlier in the process (Stage 1 and Stage 2). In particular, PB tasks were to develop site selection criteria, identify potential locations and determine infrastructure requirements for the potential land uses.

The following report provides a summary of this work.

The outcomes of Stage 3 will inform the development of the draft and final North East Gold Coast Land Use and Infrastructure Strategy (Stages 4, 5, and 6 of the North East Gold Coast study).

1.1.2 Study area

The study area is largely located in the north-eastern corner of Gold Coast City (GCC), with the northern part of the study area located in Logan City. The study area comprises 17,250 hectares of largely rural land uses, with the majority of the area included in the Regional Landscape and Rural Production Area regional land use category under the SEQ Regional Plan (Queensland Government, 2006, as amended).

The study area is bounded by the Logan River to the north, the Pacific Motorway (M1) on the west, Yawalpah Road and the Urban Footprint boundary (SEQ Regional Plan, 2006, as amended) to the south, and southern Moreton Bay to the east (refer Figure 1-1 North East Gold Coast study area).
The study area contains a number of small-scale residential precincts, including:

- residential development at Eagleby and Ormeau
- residential villages of Pimpama, Cabbage Tree Point and Jacobs Well
- the Horizon Shores Marina development
- the Gainsborough Greens residential development.

Non-residential uses within the study area include:

- sugarcane production
- aquaculture
- marine industry
- extractive industry
- industrial development (adjacent to the Yatala Industrial Estate, located outside of the study area)
- motor sport activities.

Significant developments within the study area include the Rocky Point Mill, Distillery and Cogeneration Plant, the Staplyton Landfill facility, the Staplyton Business Centre and the Landmark Industrial Park, Heck Aerodrome, Pimpama Island Sports Complex and the Jacobs Well Environmental Education Centre.
1.1.3 Strategic planning

The study area contains a wide range of values and natural resources which, in combination with its location and relatively large agricultural land holdings, have meant that it has faced a variety of development pressures for many years (Issues and Options Paper, p.2).

Among current development pressures are the expansion of the marine industry, general expansion of industrial areas adjacent to the M1 transport corridor (adjoining Yatala Enterprise Area), expansion of the extractive industry, and pressure for the area to be developed for urban purposes. All of these pressures are required to be resolved through the development of a long-term strategy for the area.

The SEQ Regional Plan has determined that the majority of the study area is not intended to be developed for urban purposes.

It is expected that the recommended Land Use Economic Development and Infrastructure Strategy will be broadly consistent with the strategic directions and regional policies set out in the SEQ Regional Plan and will be based on a strong understanding of the area’s role and environmental, economic and social values (Issues and Options Paper, p.3).

Accordingly, the current study considers location opportunities for a range of possible land uses that would maintain the non-urban nature of the study area, while also supporting other strategic sub-regional objectives. These land uses include:

- marine industry
- extractive industry (sand)
- sport and recreation activities:
  - motor sport activities
  - motorised outdoor recreation.

1.2 Report structure

The following report is presented in two parts.

Part 1 — Site selection process:

- provides background information to this study and explains the site selection method (Section 1 — Introduction)
- documents site selection criteria for identified land uses (Section 2 — Site selection criteria).

Part 2 — Study outcomes:

- discusses identified site options for each land use (Section 3 — Site selection outcomes)
- outlines a preferred location strategy (Section 4 — Preferred location strategy)
- outlines a strategy for delivery of supporting infrastructure (Section 5 — Supporting infrastructure strategy)
An assessment of the social and economic impacts of establishment of the selected land uses within the study area is provided in Appendix B – The social and economic impact of proposed land uses (Foresight Partners, 2008).

Appendix C provides a feasibility assessment of the option to transport cane from the study area to Condong sugar mill in northern New South Wales (Alliance Resource Economics, 2008).

1.3 This study overview

1.3.1 Objectives

The objectives of this site selection and infrastructure study are to:

- develop site selection criteria for the above land uses
- identify site option(s) for each land use
- identify infrastructure required to support each land use
- provide evaluation of social and economic implications of the recommended land uses for the study area.

1.3.2 Site selection method

The site selection method included the following elements:

- determining site selection criteria for each land use
- identifying and mapping ‘no go’ areas and sites suitable for a particular land use based on the selection criteria
- conducting a site-level constraints evaluation
- conducting a comparative site evaluation.

1.3.3 Site selection criteria

Site selection criteria were determined based on location and essential infrastructure requirements for each proposed land use. The criteria were then graded as “primary”, “secondary” and “desirable”.

- Primary criteria were considered to be minimum site requirements for each industry. Importantly, the requirement for each land use to be located outside of areas committed to competing land uses and values (e.g. environmental corridors, existing residential development) was identified as a primary criterion for all industries.
- Secondary criteria were used for further evaluation and included less rigid requirements.
- Desirable criteria included those requirements that were not critical for establishment and operation of a particular land use, but had potential to maximise land use efficiencies.
1.3.4 Mapping process

Given the extent of various environmental constraints and competing land uses located within the study area, a four-step mapping process was employed to assist with site selection.

**Step 1 — Identifying ‘no go’ areas**

At this stage areas committed to land uses and values incompatible with the intent of the proposed land uses (i.e. ‘no go’ areas) were identified.

The following data layers were used to establish the ‘no go’ areas (refer Figure 1-2 ‘No go’ areas):

- physical constraints — identifying existing and committed physical features
  - existing and committed urban land uses (residential and business)
  - waterways and water bodies
  - major roads
- environmental constraints — identifying areas subject to protection due to their environmental values
  - tidal wetlands
  - significant coastal wetlands
  - Ramsar sites
  - Fish Habitat Areas
  - areas of biodiversity significance (State and Regional)
  - Endangered Regional Ecosystems
  - Nature Conservation Act protected areas
  - Koala Conservation Area

**Step 2 – Identifying other values and constraints**

Step 2 included identifying other significant values and constraints within the study area that were considered important consideration for locating proposed land uses. It is noted that given the extent of flood affected areas and Good Quality Agricultural Land (GQAL) within the study area, these constraints were not mapped to establish ‘no go’ areas, but were considered as overlays in site-based constraints analysis (refer Step 4, below).

The following mapping layers were used as overlays:

- **Good Quality Agricultural Land (Figure 1-3)**
  - Class A and Class B

Under the State Planning Policy 1/92 - Development and Conservation of agricultural land, GQAL has a special importance and should not be built on unless there is an overriding need for the development in terms of public benefit and no other site is suitable for the
particular purpose. Areas of GQAL within the study area include land suitable (Class A) or marginal (Class B) for sugarcane.\textsuperscript{1}

- The alternative biodiversity corridor (Figure 1-3)

The study area holds strategic significance to nature conservation on the Gold Coast. Given that development of east Coomera will sever existing bioregional ecological corridor connecting Darlington Ranges to Moreton Bay, the existing inter-urban break between Pimpama and Ormeau provides potential for an alternative biodiversity corridor servicing nature conservation function.\textsuperscript{2}

- Heck Airfield Very High Frequency Omni-directional Receiver buffer (VOR buffer) (Figure 1-3)

The VOR 1000-metre buffer identifies an area subject to specific development considerations as set out in Gold Coast City Council planning scheme constraint code for Gold Coast airport and aviation facilities. The code aims to prevent permanent or temporary physical line of sight obstructions, overhead wires exceeding 5m in height, metallic structures exceeding 8m in height, trees and open lattice towers exceeding 10m in height, and wooden structures exceeding 13m in height.

- Flooding Levels (Figure 1-4)
  - above Defined Flood Event (DFE)\textsuperscript{3}
  - less than 1m below DFE
  - 1-2m below DFE
  - 2-5m below DFE
  - more than 5m below DFE.

Under the State Planning Policy 1/03, land use strategies for flood affected areas (>1m below DFE) should give preference to future land uses that do not increase the number of people living or working in such areas. Given its nature as a flood plain, the study area is subject to significant flood constraints. All land uses to be established within the study area would require developing adequate flood mitigation measures through siting and design solutions.

- Flooding Velocity Vectors (Figure 1-5).

Flooding Velocity Vectors data is based on historical data and provides graphical representation of the intensity and direction of the flood flow. On Figure 1-5, the velocity (the speed and direction) of flood flow is represented by length and direction of arrows, the intensity of flood flows is represented by concentration of arrows in one location\textsuperscript{4}. Velocity of flood flow is an important consideration for determining location for marine industries.

\textsuperscript{1} DIP, Issues and Options mapping data, 2008. This mapping is based on updated mapping of constraints associated with salinity and acid sulphate soils. This mapping varies from that shown in the GCCC planning scheme, Overlay Map OM 2.

\textsuperscript{2} DIP, Issues and Options mapping data, 2008. At the time of production of this report, mapping of the alternative biodiversity corridor is identified as indicative only (DIP, Issues and Options Paper, Map 3.4A Major Habitat Types).

\textsuperscript{3} DIP, Issues and Options mapping data, 2008. This flooding data is more recent than that presented in GCCC, Overlay Map OM 17, Natural hazard (flood) management areas.

\textsuperscript{4} GCCC, 2006, unpublished. For this study, the GCCC flooding velocity vector data was only available as an image representation, as opposed to geographical information systems (GIS) data. Accordingly, Figure 1-5 is not to scale, and provides qualitative rather than quantitative information.
- Topography (Figure 1-6).

Site topography is taken into consideration in location of motor sport facilities, where changes in topography may act as noise impact mitigation measures. It is noted, however, that the study area has a predominantly flat topography.

**Step 3 - Identifying potential sites**

From the balance area established in Step 1, a number of potential sites were selected for location of each land use based on primary, secondary and desirable criteria.

**Step 4 – Site-based constraints analysis**

This step included a detailed constraints analysis of each selected site (e.g. constraints associated with flooding levels and velocity of flood flow, topography, and infrastructure delivery).
In subsequent figures, the following constraints are identified as Combined Environmental Constraints:

- Areas of regional & state biodiversity significance
- RAMSAR sites
- Koala Conservation Area
- Wetlands
- Nature Conservation Act protected areas
- Endangered regional ecosystems (including Eucalypts)
- Fish habitat areas

Legend:
- Study area
- Local Government Boundary
- Urban Footprint, Oct 2006
- Waterbodies & waterways
- Wetlands
- Areas of biodiversity significance (State & Regional)
- RAMSAR sites
- Endangered regional ecosystems
- Nature Conservation Act protected areas
- Fish habitat areas
- Railway line
- Railway station
- IRTC possible corridor
- Freeway or Highway
- Major road
- Existing land use
  - Low Density Residential
  - Residential
  - Business & Industry
Legend

- Study area
- Alternative wildlife corridor
- Local Government Boundary
- Cadastre, January 2008
- Waterbodies & waterways
- Railway station
- Railway line
- IRTC possible corridor
- VOR 1000m buffer
- Freeway or Highway
- Major road

Good Quality Agricultural Land

- Class A
- Class B

Source: Department of Infrastructure & Planning
Gold Coast City Council
SEQ Catchments - Satellite Imagery 2.5m SPOT (2005)
Flooding levels at Defined Flood Events (DFE)

Legend
- Study area
- Local Government Boundary
- Urban Footprint, Oct 2006
- RP_Study_area mask
- Railway line
- Railway station
- Waterbodies & waterways
- IRTC possible corridor
- Freeway or Highway
- Major road

Defined Flood Events
- more than 5m
- 2 - 5m
- 1 - 2m
- less than 1m
- above DFE

Existing land use
- Low Density Residential
- Residential
- Business & Industry

Source: Department of Infrastructure & Planning
Gold Coast City Council
SEQ Catchments - Satellite Imagery 2.5m SPOT (2005)
The GCCC flooding velocity vector data was only available as an image representation. Accordingly, this figure is not to scale and provides qualitative rather quantitative information. The velocity (the speed and direction) of flood flow is represented by length and direction of arrows, the intensity of flood flow is represented by concentration of arrows. This image is purely intended for comparative assessment of site options. Land above 25 m AHD was excluded from the flood modeling in this study area.
1.3.5 Comparative site assessment

Sites identified as potentially suitable for a particular land use were compared based on the overall primary, secondary and desirable criteria assessment. The potential of each site to achieve a criterion was rated in accordance with the following:

- **no concern** – sites that satisfy this criterion in its current state or with minor improvements
- **some concern** – sites that have potential to satisfy this criterion, but mitigation strategies would be required
- **significant concern** – sites that have significant constraints for satisfying a particular criterion.

The outcomes of the comparative site assessment were presented in a matrix form (refer section 3 of this report).

1.3.6 Other considerations

Based on the requirements of each land use as discussed in the Issues and Options Paper and supplemented through information gained through PB interviews (see Appendix A), the following considerations were noted to guide the selection process:

- given that the marine industry has the most specific site and infrastructure requirements, identifying appropriate sites for marine precincts should take precedence over other land uses
- identification of sites suitable for extractive industry is primarily based on availability of extractive resources. However, particular consideration should be given to:
  - sequencing of extractive industry precincts based on quantity of resources available, estimated future demand for these resources and the location of existing and approved extractive industry operations.
  - potential conflicts with existing and committed land uses and values
    - (e.g. where there is a conflict between the need for extractive resources and preservation of Good Quality Agricultural Land (GQAL), sequencing of extraction sites should take into consideration grade of agricultural land, with GQAL class B (poorer quality) to be developed prior to GQAL class A sites (superior quality)).
  - opportunities for subsequent land uses for each site following the cessation of the extractive operation
- importance should be given to site options that are near precincts of existing compatible activity and committed development within the study area, as these may have established infrastructure, including associated industries (e.g. supply chain in marine industry) to support new activities.
2. Site selection criteria

2.1 Marine industry

2.1.1 Industry considerations

The marine industry has been identified as a key industry sector by both the Queensland Government and Gold Coast City Council (Issues and Options Paper, p.72). Marine industry includes a range of manufacturing, maintenance and marine support services, with the majority of industries requiring access to navigable waterways.

Total additional\(^5\) land required for marine industry on the Gold Coast to year 2031 is estimated to be 144 hectares (gross land area\(^6\)) (Issues and Options Paper, p.66).

Within the study area, there is approximately 44 hectares of Marine Industry zoned and predominantly undeveloped land\(^7\) available at Steiglitz. The primary purpose of the Marine Industry domain is to protect appropriate marine industry areas as significant investment and employment opportunities for Gold Coast City.

While the study area provides access to the main navigation channel between Brisbane and the Gold Coast, this is also an environmentally sensitive area adjacent to the Moreton Bay marine park. Issues associated with flooding hazard, practicality of marine access and potential for environmental impact are some of the major constraints associated with expansion of marine industry within the study area\(^8\).

2.1.2 Site selection criteria

Primary criteria:
- 50-60 ha minimum area
- access to navigable waterways (i.e. minimum water channel depth of 1.5 m at Lowest Astronomical Tide (LAT)).

Secondary criteria:
- flood hazard management potential
- avoid or minimise impact on Good Quality Agricultural Land
- located outside of intact key resource areas
- access to existing road network via primary and secondary roads.

\(^5\) That is land additional to all land currently zoned for marine industry, both developed and un-developed, within the Gold Coast City.

\(^6\) The requirement for 144ha (gross) marine-zoned land is based on the actual demand for 72 ha (based on historic land take rates) and 72 ha contingency allowed for site constraints (based on Coomera Marine Precinct estimated development yield) (Issues and Options Paper, p.67).

\(^7\) Gold Coast Planning Scheme

\(^8\) The Southport Broadwater to Southern Moreton Bay Marine Infrastructure Master Plan (DIP, expected for completion late 2008) will determine exact land requirement to facilitate expansion of marine industry in the Steiglitz area or in other areas of the North East Gold Coast study area. The Plan will also assess the practicality of marine access and potential impacts on the local natural environmental and natural resource values.
Desirable criteria:
- potential for further expansion (up to 144 ha)
- potential for expansion of an existing marine precinct
- potential for a successive use of a site formerly used for sand extraction (to minimise land take)
- potential for site amalgamation
- proximity to potential workforce.

Supporting infrastructure requirements:
- road network capacity
- water supply
- wastewater disposal
- sewerage pump-out facilities
- power supply
- telecommunication facilities.

The following table outlines major considerations, issues and options associated with each selection criterion.

**Table 2-1: Selection criteria for marine industry**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary criteria</strong></td>
<td></td>
</tr>
<tr>
<td>Site area</td>
<td>A considerable area is required to facilitate development of an industry cluster, to support the provision of the required infrastructure and facilitate synergies between users.</td>
</tr>
<tr>
<td><strong>Access to navigable waterways</strong></td>
<td></td>
</tr>
<tr>
<td>Within the study area, infrastructure upgrades will be required to ensure a network of navigation channels is suitable for passage of a range of vessels. At present, the majority of channels within the study area have depth varying from ‘dries at low tide’ to ‘0-2m deep’ (Queensland Government, Maritime Safety, 2004). Given the limited channel depth, the marine precinct at Steiglitz is currently only targeted at smaller vessels. Marine access and dredging issues for the study area are being addressed through the Southport Broadwater to Southern Moreton Bay Marine Infrastructure Master Plan.</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary criteria</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Avoid or minimise impact on GQAL</strong></td>
<td>Preference to avoid areas identified as GQAL, with particular consideration given to protection of GQAL class A (primary quality).</td>
</tr>
<tr>
<td><strong>Mapping layers:</strong></td>
<td></td>
</tr>
<tr>
<td>— flood velocity vector</td>
<td></td>
</tr>
</tbody>
</table>