8 Ecology

8.1 Introduction

URS has been commissioned to prepare an ecological assessment as part of the Environmental Assessment (EA) for the Project.

This ecological assessment describes the existing ecological setting for the Project and relevant footprint areas within the Kurnell Refinery and Banksmeadow Terminal, and assesses the potential impacts of the construction and operation of the Project in reference to the ecological values of the area. A particular emphasis is placed on threatened species, populations and ecological communities within this assessment. The assessment has been based on desktop investigation, undertaken as part of the Preliminary Environment Assessment (PEA) and a rapid field survey of the proposed work footprint areas and key ecological features within and adjacent to the Project.

A full description of the proposed work activities are provided in **Chapter 3 Project Description** of the EA. Details of geology, soils and hydrology can be found in **Chapter 6 Soils and Contamination** and **Chapter 7 Groundwater and Surface Water**.

8.2 Legislative and Planning Context

8.2.1 Commonwealth Legislation

Environmental Protection and Biodiversity Conservation Act 1999

The Administrative Guidelines for the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) set out criteria intended to assist in assessing whether an action, under Part 3A EP&A Act requires approval. In particular, the Guidelines contain criteria for assessing whether a proposed action is likely to have a 'significant impact' on a matter of National Environmental Significance (NES) and hence called 'Significant Impact Criteria' (SIC) assessment guidelines. Should the proponent deem the Project to have a significant potential impact on a matter of NES, a referral to the Director General of Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) would be undertaken to obtain a confirmation as to whether the Commonwealth's Director General considers the Project a "controlled action".

The conclusions of this assessment show that for those matters of NES relating to ecology (wetlands, migratory birds etc.), no significant impact is likely.

8.2.2 State Legislation

Threatened Species Conservation Act 1995

The Threatened Species Conservation Act 1995 (TSC Act) provides legal status for biota of conservation significance in NSW. The Act aims, inter alia, to '*conserve biological diversity and promote ecologically sustainable development*'. The TSC Act covers the following:

- protection of '*threatened species, populations and ecological communities*', with endangered species, populations and communities listed under Schedule 1, '*critically endangered*' species and communities listed under Schedule 1A, vulnerable species and communities listed under Schedule 2;
- listing of 'Key Threatening Processes' (under Schedule 3);
- preparation and implementation of Recovery Plans and Threat Abatement Plans;

- guidelines for the preparation of Species Impact Statements; and
- listing of identification of critical habitat for threatened species.

Part 3A of the EP&A Act requires that potential impacts relating to threatened species, populations and ecological communities are assessed for the Project. Schedules to the TSC Act provide the listings of threatened species, populations and ecological communities that would be considered in this assessment.

Fisheries Management Act 1994

The objects of the Fisheries Management Act 1994 (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

Part 7a, section 220A of the Act provides for the conservation of all biological diversity of aquatic and marine vegetation. It also ensures that the impact of any 'action' affecting threatened species, populations or ecological communities is appropriately assessed.

Part 3A of the EP&A Act requires that potential impacts of a proposal on threatened species, populations and ecological communities are assessed for the Project. Schedules to the Fisheries Management Act provide the listings of aquatic threatened species, populations and ecological communities that should be considered in this assessment.

Noxious Weeds Act 1993

Under the NSW *Noxious Weeds Act 1993* (NW Act), all councils are responsible for the control of noxious weeds within their local government area (LGA). The NW Act provides for the declaration of noxious weeds by the Minister of Agriculture. Weeds may be considered noxious on a national, state, regional or local scale. All private landowners, occupiers, public authorities and councils are required to control noxious weeds on their land under Part 3 Division 1 of the NW Act.

8.2.3 State Environmental Planning Policies (SEPPs)

Three State Environmental Planning Policies (SEPP) are relevant to proposed developments in coastal areas, these comprise:

- SEPP - Major Development;
- SEPP 14 - Coastal Wetlands; and
- SEPP 71 - Coastal Protection.

The Major Development SEPP overrides the statutory requirements listed under SEPP 14 and SEPP 71. However, there is a requirement to consider these SEPPs if an inconsistency exists between the Major Development SEPP and other SEPPs. SEPP 71 does not apply given the Project is located outside of the coastal zone protected by this policy. SEPP 14 applies to the wetlands and associated floodplain communities in Marton Park, an area adjacent to the Project. According to section 74 (1) of the SEPP14:

"*in the event of an inconsistency between this policy and another environmental planning instrument, whether made before, on, or after the date on which this policy is made, this policy shall prevail to the extent of the inconsistency*" (NSW Government 2010).

8.3 Assessment Methodology

8.3.1 Introduction

The ecological assessment methodology consists of three key components:

- desktop investigations;
- rapid field survey targeting ecological constraints identified through the desktop investigation; and
- assessment of the impact on the local ecology.

The methodologies used for each stage are discussed the following sections.

The ecological study area for the purposes of the ecological assessment consists of the Project footprint (the area impacted by all construction work related to the Project at Kurnell Refinery and Banksmeadow Terminal) and adjacent ecological values including wetlands, threatened species habitat and Threatened Ecological Communities (TECs). **Figure 8-1** shows the location of the ecological study area.

The Project footprint includes all areas where works would be undertaken.

8.3.2 Desktop Investigation

A thorough desktop investigation was undertaken in order to identify all potential ecological values with respect to State and Commonwealth listed threatened flora, fauna and ecological communities within a 10km radius of the study area. To this end, the following documentation was reviewed prior to field investigations:

- The NSW Department of Environment, Climate Change and Water (DECCW) Online Wildlife Atlas database was reviewed for all TSC Act listed species within a 10km buffer around the study area (**Appendix B-1**).
- A Geographic Information System (GIS) data request was sent to the Spatial Data Programs at the DECCW for all records of threatened species within the Port Hacking (9129) and Sydney (9130) 1:100,000 map sheets on December 2010 (refer to **Figures 8-3, 8-7 and 8-8)**.
- Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) – Protected Matters Search Tool, for all species communities and Matters of National Environmental Significance (MNES) protected under the Commonwealth EPBC Act (**Appendix B-2**).
- The NSW Department of Industry and Investment (DII) '*Threatened fish and marine vegetation – find a species by geographic region*' online search tool for the Sydney Metro Catchment Management Area (CMA) (**Appendix B-3**).
- Relevant vegetation mapping and classification for the region including:
  - Sydney Metro CMA (2009) *Vegetation Mapping* (**Figure 8-4**);
  - Sutherland Shire Council (2009) *Vegetation Mapping* (**Figure 8-5**); and
  - Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C. (2005) *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands* (SCIVI Report), Department of Environment, Climate Change and Water and Department of Natural Resources, NSW.

- Aerial and topographic maps of the site.
- Proposed design layouts for Project works as shown in URS (2010) *Preliminary Environmental Assessment*, URS Australia, Pty, Ltd, Sydney.

8.3.3 Field Survey

The ecological field survey focused on the Project footprint and key ecological constraints within and adjacent to the study area identified during the desktop investigation. Key ecological constraints were identified as threatened species, populations and ecological communities as well as suitable habitat for threatened species including wetlands and the intertidal zone along the beach berm. A full assessment of the entire study area was not considered necessary given the limited size of the Project footprint, the low degree and severity of potential impacts and limited habitat complexity.

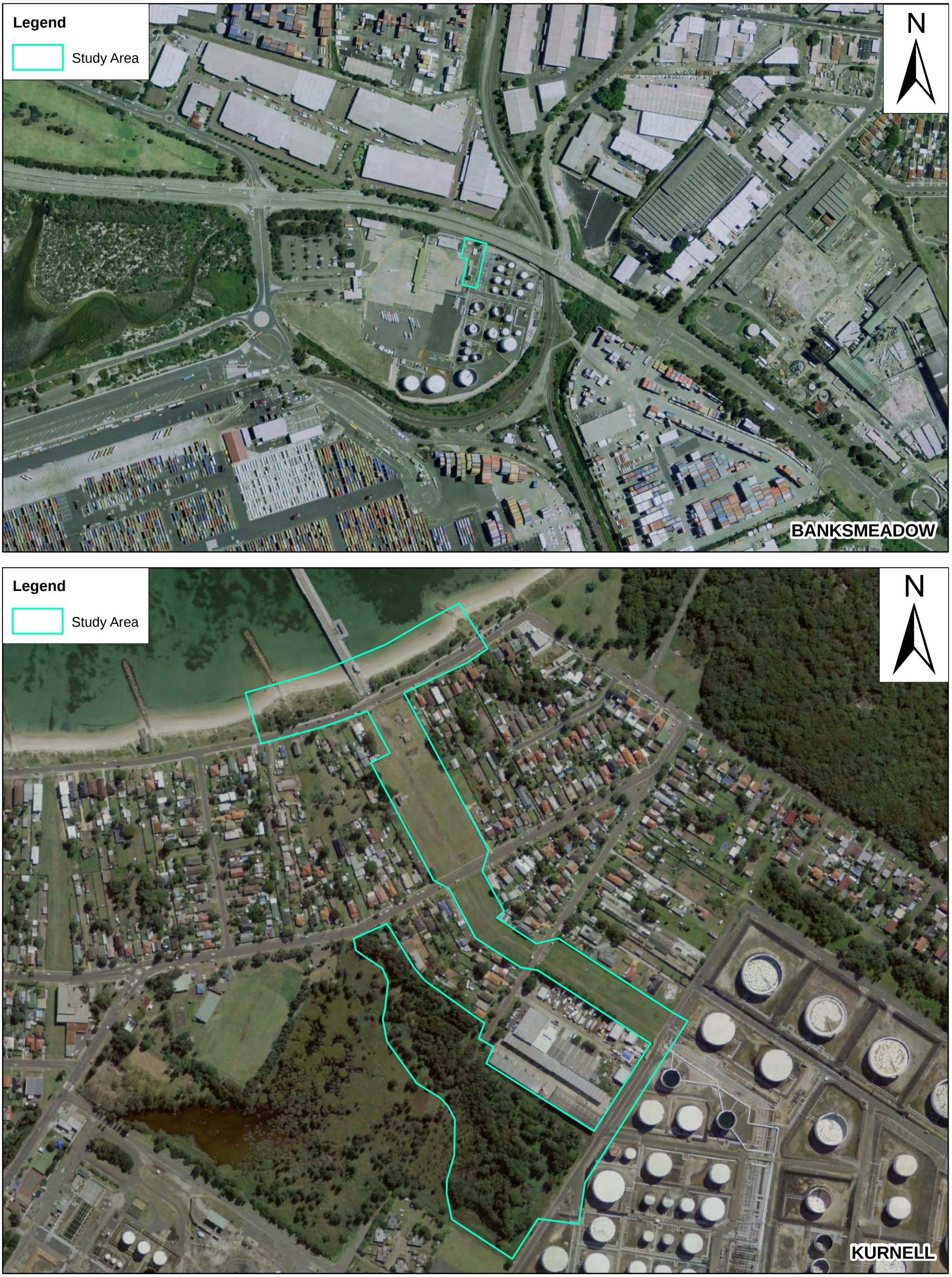
The field survey was, however, undertaken and designed in accordance with the *Threatened Biodiversity and Assessment; Guidelines for Developments and Activities Working Draft* (DEC 2004) and *Guidelines for Threatened Species Assessment* (DEC & DPI 2005). Based on the recommended survey effort in the guidelines, sensitive ecological receptors including TECs and species and their habitat were identified and targeted during the rapid one day survey.

The field survey was carried out on the 1 December 2010 for a period of 12 person hours by two ecologists: Melina Budden and William Miles.

A break down of the survey techniques and effort employed during the survey period is outlined in **Table 8-1** below. The location of each field survey technique is shown in **Figure 8-2** below.

Table 8-1 Summary of Survey Effort and Techniques

Ecological Component	Technique	Survey Effort	Comment
Flora	Large quadrats (50m x 20m). Dominant botanical species were recorded including noxious and exotic weeds	4 quadrats (2 persons)	Quadrat location consisted of Project footprint areas and sensitive ecological receptors.
Vegetation Community	Large quadrats (50mx 20m). Dominant botanical species were recorded including noxious and exotic weeds.	4 quadrats (2 persons)	Quadrat location consisted of Project footprint areas and sensitive ecological receptors.
Fauna	Diurnal bird surveys (100m x 100m for 30 minutes each). Opportunistic observations. Opportunistic observations were recorded throughout the entire field survey.	3 transects (2 persons)	Diurnal bird surveys were undertaken in sensitive ecological receptor locations. Searches were conducted across the study area at dawn. Opportunistic observations were recorded throughout the entire field survey. Species were identified visually or by call.
Suitable Habitat	Basic assessments of suitable habitat for threatened species, populations and TECs were undertaken during flora surveys.	4 quadrats (2 persons)	Habitat features noted (if any) including waterways, fringing vegetation, coarse woody debris, weed invasions etc.



0 100 200 400

Meters

Source: Aerial Imagery from ©Lands & Property Management Authority [2009]

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Client: ICD (ASIA PACIFIC) PTY LTD	Project: KURNELL B LINE UPGRADE		Title: **ECOLOGICAL STUDY AREA**
URS	Drawn: SB	Approved: MB	Date: 23/12/2010
	Job No.: **43177740**	File No.: 43177740.006.mxd	Figure: **8-1**

Legend

- Study Area
- Project Footprint

Survey Methods (URS 2010):

- Quadrat
- Bird Transect

N

Bird Transect 1

Quadrat 4

Bird Transect 2

Quadrat 3

Quadrat 1

Bird Transect 3

Quadrat 2

0 50 100 200

Meters

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Project: KURNELL B LINE UPGRADE

Title: **URS SURVEY EFFORT AND LOCATIONS**

Drawn: SB | Approved: MB | Date: 23/12/2010

Job No.: **43177740** | File No.: 43177740.012.mxd

Figure: **8-2**

Further detailed fauna surveys were not considered necessary given the limited habitat that is likely to be removed and/or disturbed as a result of the Project. Flora quadrats and habitat suitability assessments were not undertaken in areas where no ecological resources existed. This is the case with the Banksmeadow Terminal where only modified pasture and exotic flora occur within the Project footprint and this habitat is surrounded by industrial infrastructure. Equally this was the case at the Kurnell Refinery along Road 7 where only roadside edging and industrial infrastructure exists.

Weather conditions during the field survey were mild to warm, with early morning temperatures of around 16°C, to 21.5°C and light to heavy rainfall occurring over the course of the day. Over 25mm of rain was recorded at the nearby Sydney Airport weather station. The skies were overcast and strong north north east winds with gusts up to 45km/h were recorded (Bureau of Meteorology 2010).

8.3.4 Evaluation of Impact

The evaluation of the Project impacts have been based on the results of both the desktop study and field surveys. Habitat suitability assessments were undertaken (**Appendix B-5**). Any threatened biota that was likely to be present or has the 'potential to occur' based on the presence of suitable habitat within the ecological study area and the footprint of the Project has been considered and/or assessed for during the evaluation of potential impacts.

Assessments of State and Commonwealth listed threatened biota potentially impacted by this Project have been undertaken. Assessments of threatened biota listed under the FM Act and TSC Act are addressed using the criteria provided in Appendix 3 of the *Guidelines for Threatened Species Assessment* (DEC & DPI 2005). Assessments of threatened biota listed under the EPBC Act have been addressed using the criteria provided in DEWHA's (2009) '*Matters of National Environmental Significance, Significant Impact Criteria (SIC) assessment guidelines'*. These assessments are shown in full in **Appendix B-6** and **B-7** and are summarised in **Table 8-5**.

The outcome of the NSW assessments includes a determination of the magnitude and significance of any ecological impacts. Significance has been identified by answering the questions within the relevant guidelines. Magnitude has been scaled according to the following definitions:

- **None**: The results of the assessment indicate that the Project would not have an impact on the species, population or ecological community.
- **Potential**: The results of the assessment indicate that the Project has the potential to affect species or the associated habitat for the species, population or ecological communities either through direct or indirect impacts if mitigation measures are not adopted.
- **Adverse**: The results of the assessment indicate that the Project would have an adverse impact on the species or the associated habitat for the species, population or ecological community if mitigation measures are not adopted.

A range of Key Threatening Process' (KTP) were also considered during the impact evaluation process. There are eight KTPs with the potential to be affected as a result of this Project. These KTPs are discussed in **Section 8.5.2**. Ecological mitigation measures for the KTPs are also discussed.

Mitigation measures have been developed for potential or adversely impacted species in subsequent sections of this chapter.

No marine mammals or fishes were addressed as a part of this assessment as no direct or indirect marine impacts are expected as a result of the Project.

8.4 Existing Environment

8.4.1 Ecological Overview

Ecology and Catchment

Both Kurnell and Banksmeadow fall within the Sydney Metro Catchment Management Area (CMA) but within two differing sub-regions: Pittwater (part a) for the Kurnell area and Pittwater (part b) for the Botany Bay area. The study area is located within the Sydney Basin bioregion as defined in the *Interim Biogeographic Regionalisation for Australia* (Thackway & Creswell 1995).

The original vegetation has been extensively cleared on the Kurnell Peninsula and within the Botany Bay LGA. Only remnant patches remain in some the reserves, the majority of which are located on the Kurnell side of the Botany Bay. The primary reserves in the area include Towra Point Reserve, Carters Island Nature Reserve, Botany Bay National Park, Bonna Point Reserve and Marton Park Woodland and Wetlands (Marton Park). Patches of the remaining vegetation in the broader study area consist of low-open woodland, coastal scrub and open heathland (Chapman, G A and Murphy C L, 1989). Low open woodlands remain on the lower slopes and where there are patches of deeper sands. The understorey consists of dry sclerophyll shrub species. In more exposed positions, woodland is replaced by coastal scrub and healthland. In undisturbed low-lying catchment areas, coastal wetlands and floodplain forests are also present in the southern and south west portions of the Botany Bay National Park and Marton Park on the Kurnell Peninsula.

The two main sub-catchments within the Botany Bay catchment, accounting for approximately 900km^2 of the total catchment area, are the Georges River sub-catchment and the Cooks River sub-catchment. The largest inflows to the bay are then the Georges and Cooks Rivers. These Rivers discharge the major sediment and nutrient loads to the Bay, and also contribute other pollutants following rain fall. Several smaller local streams also drain directly into Botany Bay.

Kurnell Refinery and Banksmeadow Terminal are located within 5km of the Towra Point Nature Reserve, a Ramsar wetland of international significance, as well as the Kurnell Peninsula Headland which is included in the National Heritage List established under the EPBC Act.

Land-use

The two sites comprise of land which has been disturbed, and which lies within an operational refinery and a storage terminal. The general land-use within the broader study area is comprised mostly of residential and industrial development. Small reserves and parklands make up the remaining areas.

8.4.2 Flora

Approximately 44 flora species were recorded by URS ecologists during the rapid field survey across the ecological study area. The majority of flora species were exotic pasture or lawn grasses/forbs within the Project footprint. Native species were more common in the mid-storey and canopy strata in the remnant/planted communities adjacent to the Project footprint. Of the native species observed these species were common to coastal floodplain forests and littoral dune forests within the Sydney basin. **Appendix B-8** provides a list of all identified flora species and **Figure 8-3** below shows where threatened flora species have been recorded close to the study area. Occasionally the resolution of the data record is not very accurate, therefore certain species may be located in unsuitable habitats on this figure.

Legend

Site Boundary

Project Footprint

10km Search Buffer

Threatened Flora:

- *Acacia terminalis subsp. terminalis*
- *Eucalyptus nicholii*
- *Eucalyptus scoparia*
- *Pterostylis sp. Botany Bay*
- *Senecio spathulatus*
- *Syzygium paniculatum*
- *Thelymitra atronitida*

N

BANKSMEADOW

KURNELL

0 1 2 4

Kilometers

Source: Aerial Imagery from Bing Maps © 2010 Microsoft Corporation and its data suppliers.

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Project: KURNELL B LINE UPGRADE

Title: **THREATENED FLORA DECCW RECORDS**

Drawn: SB | Approved: MB | Date: 23/12/2010

Job No.: **43177740** | File No.: 43177740.008.mxd

Figure: **8-3**

8.4.3 Vegetation Communities and Fauna Habitat

The natural vegetation of the Kurnell Peninsula and Botany Bay area has been severely altered since European settlement. A number of reserves and national parks (Towra Point Nature Reserve and Botany Bay National Park) conserve remaining patches of remnant mangrove, coastal floodplain and dune forests along the headlands and estuaries of the peninsulas. The vegetation remaining within the study area consists of isolated remnant patches of disturbed native vegetation in parklands and land owned by the refinery and Sutherland Shire Council. Much of the vegetation has been cleared for industrial and residential development.

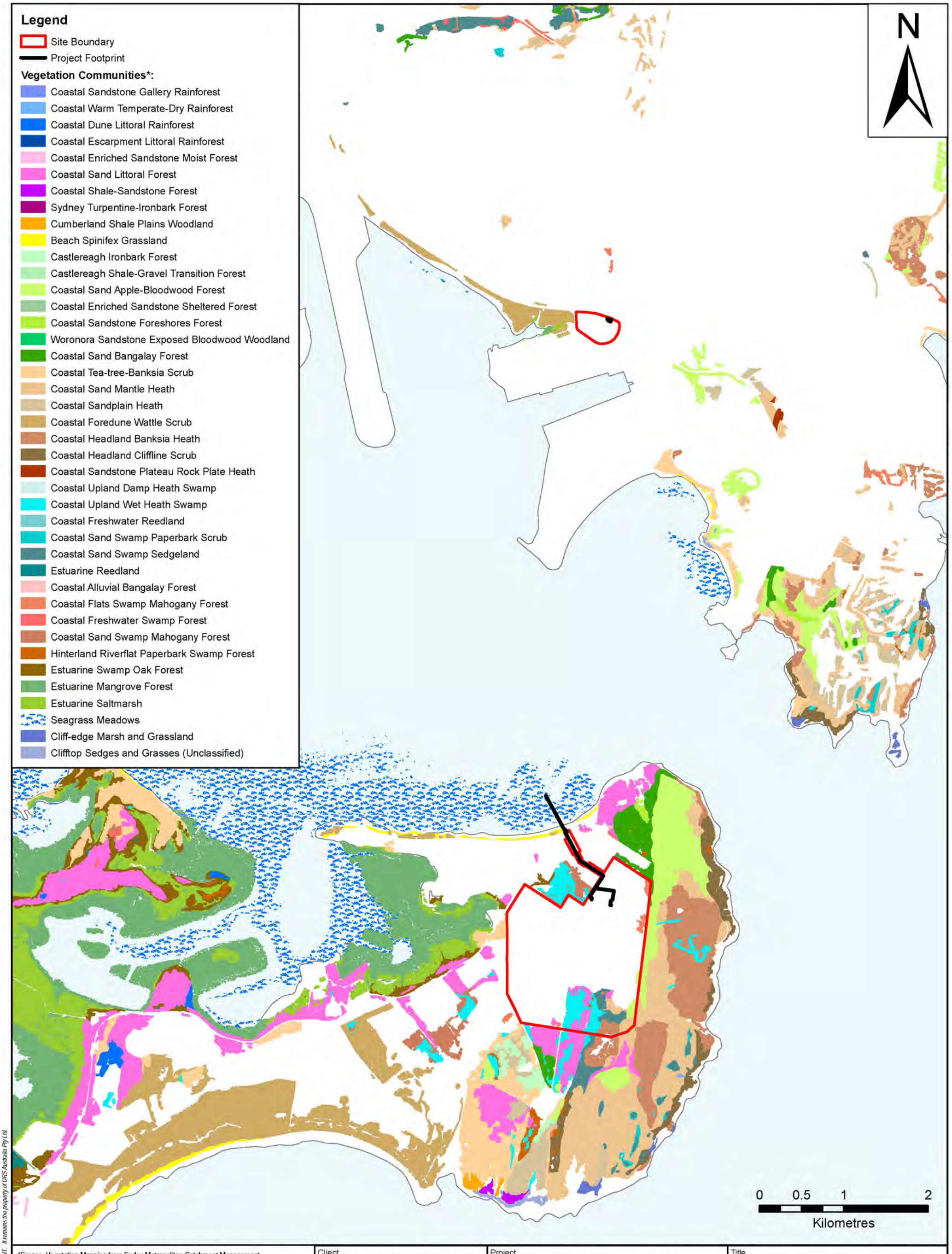
Three vegetation mapping documents were used to guide the ecological assessment for the study area. These were:

1) *Native Vegetation of Sydney (Draft)* (Sydney Metro CMA, 2009) (**Figure 8-4**);

2) *Vegetation Mapping* (Sutherland Shire Council, 2009) (**Figure 8-5**); and

3) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (SCIVII Report) (Tozer et. al., 2005).

The vegetation communities recorded by the SCIVII report were initially used for the PEA habitat suitability assessments and to guide the rapid field survey. However, the two latter documents have been utilised for this ecological assessment given they are more current and comprehensive, providing more vegetation communities to a finer scale then that provided by the SCIVII report. The Sutherland Shire Council (2010) mapping is only applicable to the Kurnell Peninsula. No vegetation mapping was gathered from the Botany Bay Council, however there is no native vegetation within the Project footprint or adjacent to the footprint area at Banksmeadow Terminal.



*Source: Vegetation Mapping from Sydey Metropolitan Catchment Management Authority ©2009 ("Native Vegetation of Sydney 2009 Draft")
Communities excluded from mapping & legend: Rock, Water, Artificial Wetland, Weeds and Exotics, Urban Exotic/Native, Beach Sand and communities present only beyond this region

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Title: **VEGETATION COMMUNITIES (SYDNEY METROPOLITAN CMA)**

Figure: **8-4**

Legend

- Site Boundary
- Project Footprint

Vegetation Communities*:

- Coastal Dune Heath
- Coastal Saltmarsh
- Kurnell Dune Forest
- Kurnell Dune Forest (degraded)
- Littoral Rainforest
- Mangrove
- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest
- Sydney Freshwater Wetland
- Sydney Sandstone Gully Forest
- Sydney Sandstone Heath
- Sydney Sandstone Ridgetop Woodland

N

0 0.25 0.5 1

Kilometers

*Data hand-digitised from vegetation mapping created by Sutherland Shire Council ©2010. As such, all boundaries are approximate only.
Source: Aerial Imagery from ©Lands & Property Management Authority [2009]

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Project: KURNELL B LINE UPGRADE

Title: **VEGETATION COMMUNITIES (SUTHERLAND SHIRE COUNCIL)**

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Figure: **8-5**