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UNSW AUSTRALIA

Water Research Laboratory

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Dear Julie,

Clyde Terminal: Draft Coastal Management SEPP – Coastal Wetlands Mapping

1. Introduction

On 11 November 2016, the NSW Department of Planning and Environment (P&E) announced a new draft Coastal Management State Environmental Planning Policy (SEPP) which included new development controls for coastal wetlands within the Sydney basin. WRL understands that the controls are intended to ensure that future development considers environmental values adequately. To support this policy, a central database of mapped wetlands in NSW has been made available at http://www.planning.nsw.gov.au/CoastalReform. Submissions on the draft Coastal Management SEPP and the accompanying draft maps can be made until 20 January 2017. This letter provides comment on the draft "Coastal Wetland" SEPP map supported by a description of the existing wetland within the Clyde Terminal to accompany a submission by Viva Energy to the NSW P&E.

A small scale map of the Clyde Terminal Wetland is shown in Figure 1-1 to place the site in context.

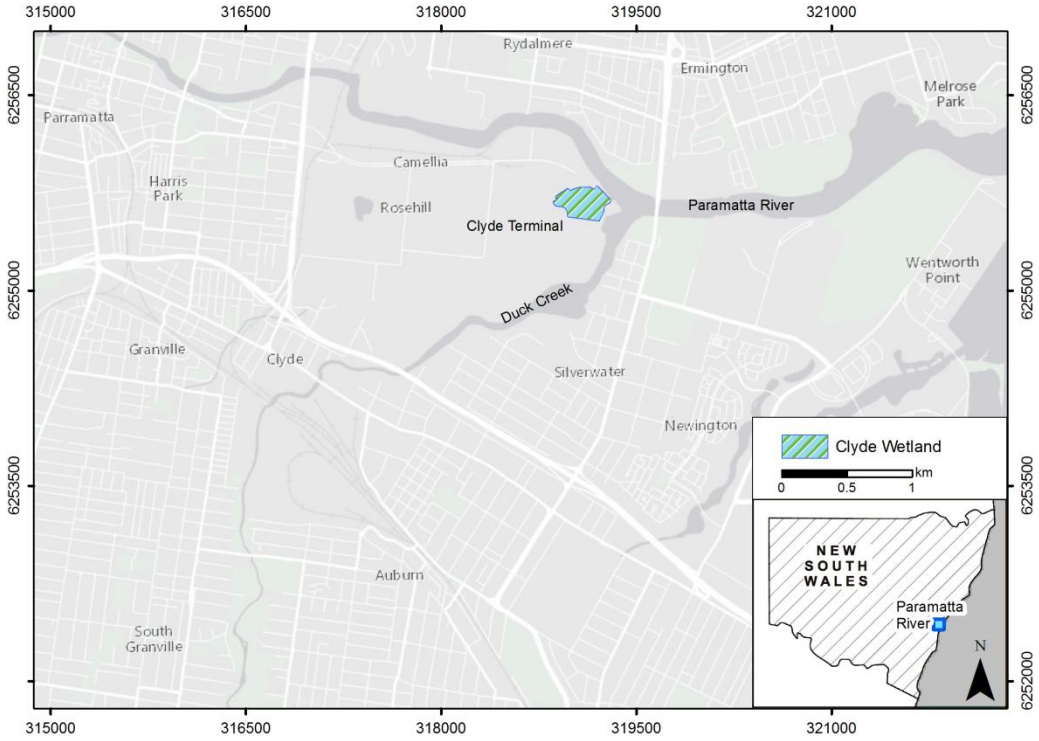

Figure 1-1: Location of the Clyde Terminal Wetland

2. SEPP Coastal Wetlands

Coastal wetlands are defined in the *Coastal Management Act 2016* (the Act) as land which displays "the hydrological and floristic characteristics of coastal wetlands … and land adjoining these features" (NSW P&E, 2016a). The maps also show a 100 m "proximity area" around coastal wetlands.

The objectives for these areas within the Act (NSW P&E, 2016a) are:

- To protect coastal wetlands in their natural state, including their biological diversity and ecosystem integrity;
- To promote the rehabilitation and restoration of degraded coastal wetlands;
- To improve the resilience of coastal wetlands to the impacts of climate change including opportunities for migration;
- To support the social and cultural values of coastal wetlands; and
- To promote the objectives of State policies and programs for coastal wetland management.

WRL understands that the draft coastal wetlands maps are based on state-level mapping and are considered a "starting point" which will be modified as further information becomes available (NSW P&E, 2016b).

3. Recommended Mapping of the Clyde Terminal Wetland

The draft SEPP map of the site, showing the "Coastal Wetlands" layer only (proximity area omitted) is reproduced in Figure 3-1.

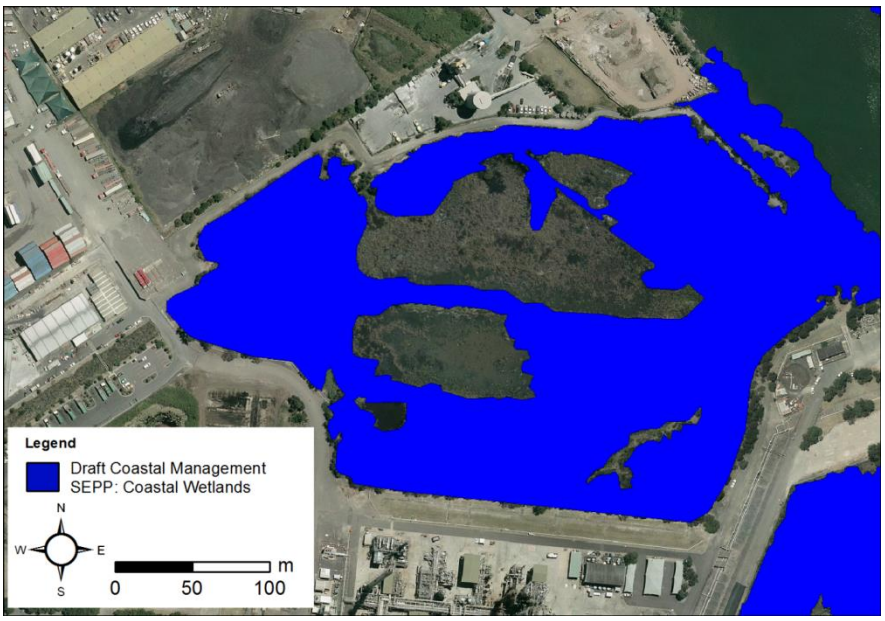

Figure 3-1: Draft Coastal Management SEPP Mapping: Coastal Wetlands

WRL notes that under the Act, "Coastal Wetlands" areas can, by inference, include dry, vegetated areas directly adjacent to inundated land, not just the water body itself. On this basis, WRL has prepared a revised map for this site for consideration in the final SEPP mapping (Figure 3-2). We would be pleased to provide a GIS shapefile of this to NSW P&E upon request. Key changes include:

- Adding wet areas in the middle of the wetland;
- Deleting the area coinciding with a stormwater maintenance easement (including channel);
- Deleting dry, elevated areas (>3.5 m AHD) on western and eastern sides of the wetland;
- Deleting dry area on the eastern side of the wetland coinciding with an unpaved access road.

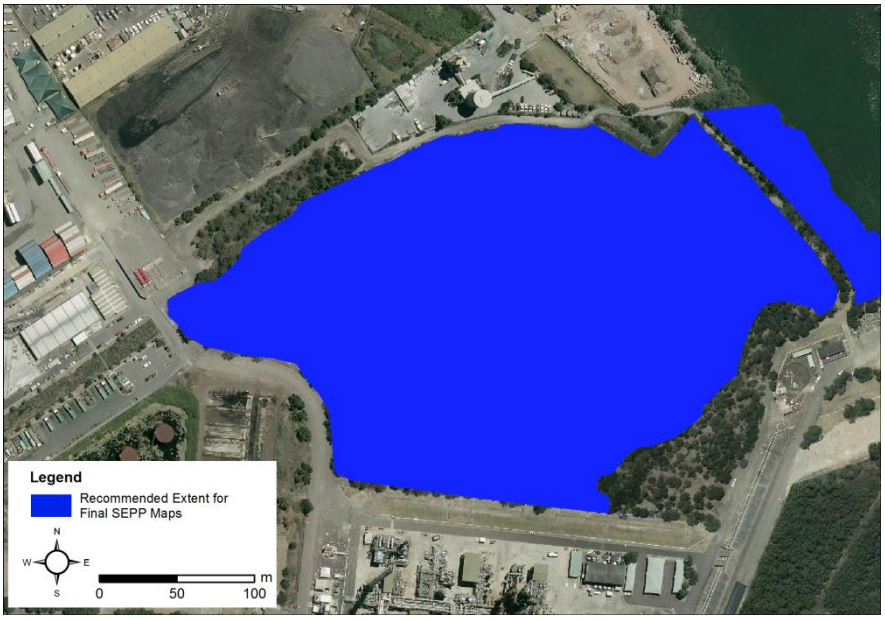

Figure 3-2: Recommended Extent for Final Coastal Management SEPP Mapping: Coastal Wetlands

4. Clyde Terminal Wetland Description

4.1 Preamble

In 2016, WRL was commissioned by Viva Energy to assess the onsite hydrology of the Clyde Terminal wetland. This study included an extensive literature review, onsite soil and water quality measurements and water balance modelling. The work was undertaken to assist in the design of improved habitat (ponds) for a small Green and Golden Bell Frog (GGBF) population at Clyde Terminal. This proposed habitat construction is a core requirement of a Commonwealth Government approval condition (Dept. of Env., 2014) to convert the Clyde Refinery (closed in late 2012) into a fuel storage terminal (process ongoing). WRL expects that this site-specific research will be able to ground-truth the draft SEPP mapping at the site and provide a more accurate understanding of the wetland to inform the final SEPP mapping.

4.2 Background

The Clyde Terminal is located on the right bank (when looking downstream) of the Parramatta River, at the confluence of Duck River, approximately 22 km upstream from the ocean entrance to Port Jackson. The Clyde Terminal covers an area of approximately 86 hectares (ha) at Rosehill in Sydney's western suburbs. The area surrounding the Clyde Terminal is characterised by small, relatively low-lying, industrial sub-catchments that drain to a wetland located within the Clyde Terminal, adjacent to the Parramatta River. The wetland (approximately 10% of the site area) within the Clyde Terminal contains both remnant and artificially constructed components and receives stormwater from the site and surrounding industrial properties.

Within the Sydney Basin, the wetland at Clyde Terminal is unique because it is not tidal (estuarine) but is an enclosed brackish system (Glamore et al, 2016), except under extreme backwater river flooding conditions. However, this is not the original condition of the wetland, which has been extensively modified with land fill, land reclamation and wetland rehabilitation works dating back to the 19th century.

The earliest photograph of the site (1928) indicates that it was likely a tidal wetland with mangroves and salt flats evident (Gunninah Consultants, 1990). Increased development around the wetland is evident in photos in 1943 and 1951, with tidal influence likely severed in 1961 (Gunninah Consultants, 1990). Photographs from 1969 and 1971 indicate that the original mangrove and salt marsh vegetation was then cleared. Most of the southern part of the original wetland area was reclaimed between 1961 and 1978 (Gunninah Consultants, 1990).

Other than a vertical (Butyl) barrier/drainage system which was installed around the wetlands in 1972-73 due to the concern about the inflow of chromates and other pollutants from adjacent contaminated land, it was not until 1990 that formal consideration was given to the future active management of the wetland due to its environmental value.

4.3 Hydrology

The water balance of the Clyde Wetland is determined by rainfall, evaporation and regional groundwater processes. Direct rainfall and stormwater runoff (received via a series drains) from the western side of Clyde Terminal are the primary water inputs to the Clyde Wetland. This catchment runoff enters the wetland via a culvert on its western side. Groundwater connectivity is less well defined but the wetland is assumed to drain freely to the groundwater table when the level in the

wetland is high, and be recharged by groundwater when the wetland water level is low. As a result of this balance, the water level can change substantially with prevailing climatic conditions.

Based on a bathymetric survey of the wetland undertaken by WRL on 26-27 May 2016, the lowest point in the wetland is approximately +0.5 m Australian Height Datum (AHD). When the water level rises to 1.5 m AHD, it spills across the crest of earthen bund at the north-eastern corner of the wetland into a small channel which then drains into the Parramatta River. As such, the maximum possible water depth in the wetland is approximately 1.0 m. A photograph taken on 26 May 2016 when the water level was measured at 1.2 m AHD is shown in Figure 4-1.

Figure 4-1: 1.2 m AHD Water Level in Clyde Terminal Wetland (26 May 2016, Facing East)

Figure 4-2 shows the extent of the wetland when full (based on WRL's field work). An unpaved access road around the perimeter of the wetland is also shown in Figure 4-2.

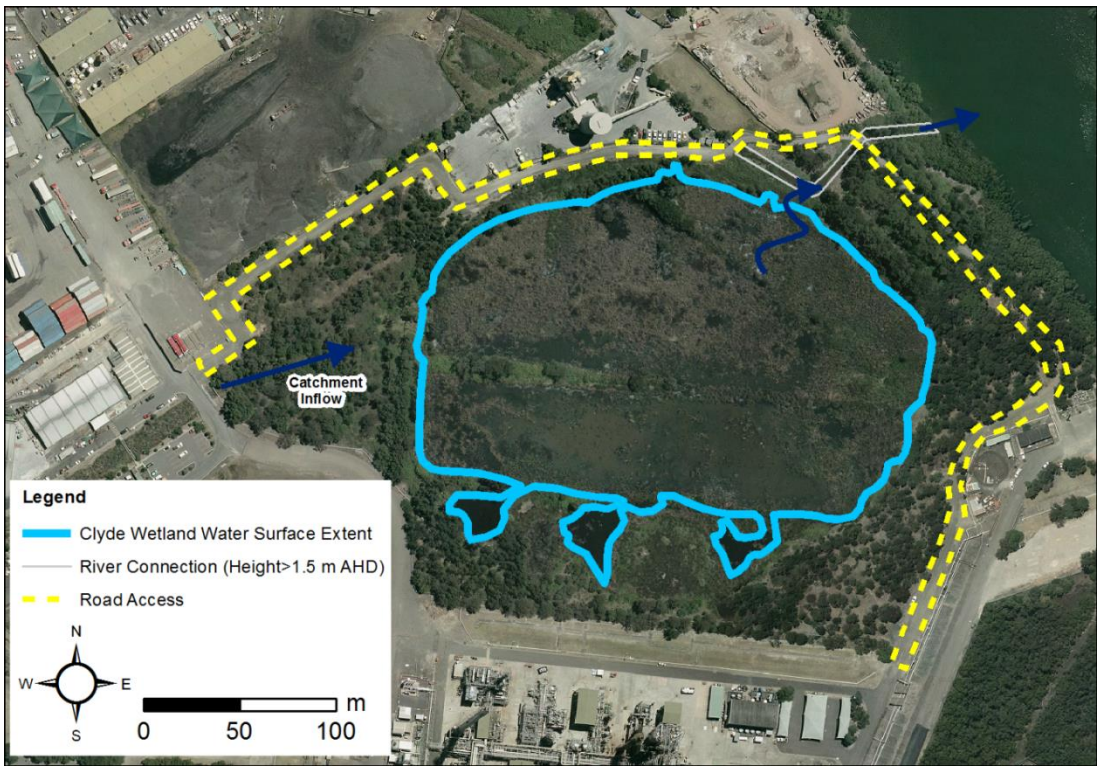

Figure 4-2: Extent of Clyde Terminal Wetland

4.4 Water Quality

The salinity of the water in the wetland is approximately 1 ppt (Glamore et al., 2016). The source of the salts responsible for this brackish nature (0.5-30 ppt salinity) is likely leeching from the original estuarine sub-soils which historically had tidal connection. Salts may also enter the wetland via groundwater connectivity (recharge) with the Parramatta River (average salinity 2 ppt at Silverwater Bridge, Rayner et al., 2011). The maintenance of a low salinity concentration in the Clyde Terminal wetland is one likely reason that a small GGBF population is supported onsite as it has been shown to be beneficial for improved survivorship of GGBFs exposed to the water-borne frog Chytrid Fungus (Stockwell, 2011).

4.5 Vegetation

Previous studies (Gunninah Consultants, 1990; Urban Bushland Management Consultants, 2007; Erskin, 2007) have identified that the area surrounding the Clyde Terminal wetland provides habitats for a number of flora species and endangered ecological communities listed under the NSW *Threatened Species Conservation Act (1995)*. These include:

- Downy Wattle (*Acacia pubescens*);
- Clamorous Reed-warbler;
- Narrow-leafed Wilsonia (*Wilsonia blackhousei*);
- Coastal Saltmarsh;
- Swamp Oak Floodplain Forest;
- Swamp Sclerophyll Forest; and
- Freshwater Wetlands.

4.6 Future Rehabilitation

The Clyde Terminal wetland is a significant and locally unique environment despite the severely disturbed nature of the site. While there are no plans to restore the wetland to its original tidal state, it currently supports two vulnerable species of fauna (GGBF and Grey-headed Flying-fox), a number of threatened flora species and provides habitat for native water birds.

5. Summary

Thank you for the opportunity to provide this description of the Clyde Terminal wetland. Please contact Ian Coghlan on 8071 9866 or A/Prof Will Glamore on 8071 9868 in the first instance should you wish to discuss the issues raised in this review further.

Yours sincerely,

G P Smith
Manager

6. References

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