1.1 Background to the Project

URS Australia Pty Ltd (URS) has been commissioned by Orica Australia Pty Ltd (hereafter referred to as 'Orica' or 'the Proponent') to prepare this Environmental Impact Statement (EIS) in relation to the construction and operation of the Botany Groundwater Cleanup Project (BGC Project) to be located at Banksmeadow, New South Wales (refer to **Figures 1.1** and **1.2**).

The BGC Project provides for hydraulic containment and treatment of the contaminated groundwater plumes identified in the Notice of Clean Up Action (NCUA) issued by the EPA on 26 September 2003. These plumes lie within the geological formation known as the Botany Sands Aquifer.

1.1.1 Groundwater Contamination History

In the early 1980s, during construction works on land between the Botany Industrial Park (BIP) and Southlands, high levels of organic contamination were found in the shallow groundwater. Subsequent tests of wells installed to the south-west of the BIP detected volatile chlorinated hydrocarbons (CHCs), leading to the Stage 1 Environmental Survey of the Botany Complex in 1989/90. Subsequent environmental investigations in the 1990s identified CHC contamination in shallow and deep groundwater in a number of areas around the BIP and in the vicinity of Southlands. Further investigation and groundwater monitoring works through the 1990s and early 2000s, as detailed in **Chapter 2**, identified several plumes of CHCs moving generally toward Botany Bay:

- the Southern Plumes (from the former Solvents Plant and former Trichloroethylene (TCE) Plant);
- the Central EDC Plume (from the former ethylene dichloride (EDC) Storage Tanks); and
- the Northern Plumes, comprising:
  - a carbon tetrachloride (CTC)/tetrachloroethene (PCE) plume (from the former CTC/PCE Storage Tanks); and
  - other plumes, containing predominantly 1,2 dichloroethane (EDC) (from wastes storage and handling activities in the northern part of the BIP).

These previous investigations also identified a number of inferred contaminant source areas around the BIP and Southlands. These source areas (small underground pools of concentrated contaminant) are referred to as Dense Non-Aqueous Phase Liquid (DNAPL). As the groundwater flows past these pools, it becomes contaminated.

The investigations and monitoring have revealed an extensive and complex distribution of contaminants derived from multiple source areas, which have developed overlapping plumes, both horizontally and vertically. In some instances, these plumes are mobile, moving at or near to the same rate as groundwater.

In February 2000, Orica entered into a Voluntary Remediation Agreement (VRA) with the NSW Environment Protection Authority (EPA), under the *Contaminated Land Management Act* 1997, which formalised Orica's existing and proposed containment and remediation activities to address the contaminant plumes. The activities under the VRA include:

- further source area investigations;
- ongoing monitoring of surface water, groundwater contamination and movement, air emissions and human health risk assessment; and
- the assessment, development and implementation of remediation approaches, including reactive iron barriers and in situ bioremediation.

Annual reports under the VRA were prepared and submitted to the EPA, with the third Annual Report issued on 27 February 2003.

High concentrations of CHCs in the Herford Street, Banksmeadow, production bore were noted in mid 2003. This, together with the EPA's concerns regarding the movement of the high concentration Central Plume and the potential discharge of contaminants to Botany Bay, led the EPA to issue an NCUA (reference number 1030236), under section 91 of the *Protection of the Environment Operations Act* 1997, on 26 September 2003, to set a framework and timescale for action to contain the contaminant plumes.

In response to the NCUA, Orica submitted its draft Groundwater Cleanup Plan (GCP) to the EPA, and commenced work implementing proposed actions. The EPA then issued Orica with a Variation to the initial NCUA (reference number 1033107), authorising and requiring the implementation of the GCP.

1.2 The Proponent

The proponent for the BGC Project is Orica Australia Pty Ltd.

Following the subdivision of the Orica owned lands in 1998/99 to form the Botany Industrial Park (BIP), Orica's only remaining wholly-owned operation on the BIP is the Chlor-Alkali Plant. Qenos Pty Ltd, which runs the Olefines Plant, the two Alkatuff and Alkathene (Polythene) Plants and the Site Utilities Plants, is a 50:50 joint venture between Orica and Exxon Mobil.

Orica also manages the site legacy issues, retained from ICI Australia when ICI plc sold its majority shareholding in ICI Australia in 1997, and retains full ownership of Block 1 and Block 2 of Southlands.

Today, Orica supplies and manufactures industrial specialty chemicals, agricultural chemicals and fertilisers, explosives and mining chemicals, and plastics and paints. As an independent company, Orica has approximately 40 major operating sites in 14 different countries. Within New South Wales, Orica operates three major sites at Botany, Padstow and Newcastle (Kooragang Island).

1.2.1 Regulatory Action

Notice of Clean Up Action

The original NCUA was issued by the EPA (now part of the Department of Environment and Conservation (DEC)) on 26 September 2003. A variation was issued on 17 February 2004, on the basis that:

The EPA expects the remediation and investigation actions currently underway or planned for Stage 4 of the Voluntary Agreement to continue, but issues this notice –

(a) to ensure additional measures are taken for the more immediate containment of the contaminant plumes prior to the implementation of the treatment measure required by this notice and under the voluntary agreement; and

(b) in the light of the results of the more recent monitoring data, to set revised targets for the reduction in the concentrations of the substances in the contaminant plumes.

These notices are collectively referred to in this document as the NCUA.

The first requirement of the NCUA was the preparation and implementation of a Groundwater Cleanup Plan (GCP), to be approved by the EPA.

The NCUA is presented in full in **Appendix A**.

Groundwater Cleanup Plan

In response to the EPA's original notice, Orica prepared the Groundwater Cleanup Plan (GCP) that was submitted to the EPA on 31 October 2003, detailing the activities and actions to be implemented to address the requirements of the EPA.

The areas identified in the NCUA and the GCP are as follows:

- Primary Containment Area (PCA): Block 2 of Orica Southlands. The main contaminant plume beneath this area is the Central EDC Plume.
- Secondary Containment Area (SCA): Located along Foreshore Road (hydraulically down-gradient of the PCA). The SCA is designed to intercept the high concentration core of the Central EDC Plume before it reaches Botany Bay or Penrhyn Estuary.
- Dense Non-Aqueous Phase Liquid (DNAPL) Contaminant Source Areas: A number of inferred areas around the BIP and Southlands.

The GCP identifies activities and actions for containment in the short term and remediation in the longer term to achieve the timeframes defined by the NCUA. These various activities and timeframes are presented in more detail in **Chapter 2**.

At the time of the preparation of the GCP (October 2003), Orica was investigating *in situ* treatment technologies, such as enhanced bioremediation and permeable reactive iron barriers, rather than *ex situ* treatment technologies. Bioremediation field trials were implemented on Southlands Block 2 to assess the potential effectiveness in delivering contaminant containment, with full-scale bioremediation works proposed along Foreshore Road and on the Botany Golf Course (within the SCA).

At the time of the preparation of this EIS, the bioremediation trials on Southlands Block 2 are continuing and will be completed as a separate exercise with a view to possible subsequent application. The project modules within the GCP for full-scale application of bioremediation have been suspended.

The BGC Project is currently the primary approach for achieving the required contaminant containment and treatment of the groundwater as specified in the NCUA.

1.2.2 The Botany Groundwater Cleanup Project

The BGC Project is an extensive project with many inter-related components, including the Activity (which is described below), and other components which have been or will be separately approved and constructed to achieve the requirements of the NCUA.

While this EIS is required only in respect of the Activity, it does consider the potential cumulative impacts of the overall BGC Project, including potential construction impacts for all those components yet to be constructed, and the potential impacts associated with the full operation of the BGC Project from groundwater extraction, through transfer, treatment and reuse/discharge.

The following elements of the BCG Project comprise an activity ('the Activity') for the purposes of Part 5 of the EP&A Act, for which approval will be supported by the assessment in this EIS:

- the extraction of groundwater from the wells installed in the three containment lines (primary, secondary and DNAPL);
- transfer of groundwater via pipelines to the Groundwater Treatment Plant (GTP);
- construction and operation of the GTP;
- transfer of treated water via pipelines to Botany Industrial Park (BIP) users or Bunnerong Canal and waste water to sewer ; and
- installation of a discharge point into Bunnerong Canal.

There are a number of determining authorities for various aspects of the Activity.

The environmental impact of the BGC Project (which includes the Activity) is assessed in this EIS.

The broad objective of the BGC Project is to achieve hydraulic containment and reduction of the contaminants in the groundwater in and around the BIP, to meet the requirements of the NCUA.

The groundwater will be extracted from the PCA, the SCA and the DNAPL containment line, and will be transferred to the GTP via three pipelines, as shown in **Figure 1.3** and described below.

- Primary Containment Area: Extraction of groundwater from wells installed in Southlands and transfer of the groundwater in the primary pipeline to the GTP located on the BIP;
- Secondary Containment Area: Extraction of groundwater from wells installed on the median strip of Foreshore Road and transfer of the groundwater in the secondary pipeline to the GTP located on the BIP;
- DNAPL Containment Line: Extraction of groundwater from wells installed along and parallel to the western boundary of the BIP toward the northern end, and transfer in the DNAPL pipeline to the GTP located on the BIP;
- Groundwater treatment, using various liquid and gaseous process technologies in the GTP located on the BIP, to achieve a treated water quality based on the ANZECC Guidelines for marine water quality (ANZECC, 2000), Australian Drinking Water Guidelines (NHMRC & ARMCANZ, 2003), and process standards for BIP reuse; and
- Transfer of treated groundwater for use in process operations across BIP, with excess discharged to Botany Bay via Brotherson Dock, through a discharge pipeline into Bunnerong Canal.

The GTP is a key part of the overall BGC Project. The potential cumulative impacts of the project are considered within this EIS. The design of the GTP is based on a total groundwater extraction rate of up to 15 ML/day across the three identified areas. The extraction rates for each area are estimated as:

- 3.38 ML/day groundwater from the Primary Containment Area;
- 2.45 ML/day groundwater from the Secondary Containment Area; and
- 9.17 ML/day groundwater from the DNAPL containment line.

These extraction rates can be varied (within the design limit) as required, to respond to changes in groundwater movements and contaminant concentrations. Such changes would be monitored through the monitoring wells installed alongside the extraction wells (discussed in **Chapter 12**).

1.2.3 Project Area

The Project Area is located on land extending generally from Botany Bay in the south to the BIP in the north (refer **Figure 1.3**).

1.2.4 Prior Element of BGC Project: Steam Stripping Unit Recommissioning

Under approvals granted earlier in 2004 by various determining authorities and land owners, and to enable Orica to meet its obligations under the NCUA, Orica has recommissioned an existing Steam Stripping Unit (SSU) to enable the interim extraction and treatment of groundwater. These interim works have also required the following:

- installation of groundwater wells in the primary and secondary containment areas;
- transfer pipelines from the wells to the SSU;
- temporary storage of recovered waste EDC liquid in an existing EDC storage tank, at Terminals Pty Ltd's licensed bulk liquids storage facility at Port Botany;
- installation of a transformer on NSW Maritime Authority land south of Foreshore Road, to provide power to the secondary containment pumps.

The EIS will provide a description of these interim works and will assess their cumulative impacts of their operation as part of the BGC Project.

The SSU treatment process will recover from the groundwater approximately 500 tonnes of chlorinated hydrocarbons (CHCs) liquid, containing predominantly EDC. It will operate for a period of around 12 months, until the GTP is operational. This recovered waste EDC liquid will be temporarily stored in Terminals Pty Ltd's existing facility at Port Botany, and will subsequently be transported to the GTP site for treatment in the process alongside the contaminated groundwater, over an extended period of time (as discussed in **Section 5.5.2**).

1.3 Environmental Impact Assessment Process

1.3.1 NSW Process

Under *State Environmental Planning Policy No. 55 – Remediation of Land* (SEPP 55), the BGC Project does not require development consent. Therefore, the various elements of the BGC Project must be assessed under Part 5 of the EP&A Act, since Part 5 of the Act provides for the assessment of proposals that do not require development consent.

Under Part 5 of the EP&A Act, section 111 provides for a duty to consider environmental impacts by the relevant determining authority(ies). Section 112 of the Act requires an environmental impact statement for an activity which is likely to significantly affect the environment or threatened species, populations or ecological communities or their habitats.

This EIS has been prepared in order to assess the potential environmental impacts of the Activity (as defined in **Section 1.2.2**), as well as the cumulative impact of the operation of the whole of the BGC Project.

1.3.2 Commonwealth Process

The *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) provides for Commonwealth jurisdiction over matters of national environmental significance, which include impacts on Ramsar wetlands, migratory bird species and threatened species. The Act requires an assessment of the potential impacts of a project on these matters of national environmental significance. If a project is likely to have a significant impact on matters of national environmental significance, it is deemed a "controlled action" and approval is required from the Commonwealth.

An assessment was conducted for this project and is discussed in detail in **Chapter 20**. A referral under the EPBC Act will be lodged with Environment Australia, seeking confirmation that the BGC Project is not a controlled action.

1.3.3 State Environmental Planning Policy (SEPP) 55 – Remediation of Land

The objective of SEPP 55 is to provide for a state-wide planning approach to the remediation of contaminated land and to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

In order to facilitate the cleanup and remediation of contaminated land under nominated cleanup notices, SEPP 55 was amended on 30 July 2004 to allow works that are required by an NCUA to proceed without development consent. The relevant clause in SEPP 55 is as follows:

*"**21. Clean Up notice remediation—special provision***

(1) This Policy does not apply to or in respect of anything done for the purpose of complying with a cleanup notice, except as provided by this clause.

(2) Any development or activity carried out for the purpose of complying with a cleanup notice:

(a) may be carried out without development consent, and

(b) to the extent that it involves carrying out any remediation work, must be carried out in accordance with clause 17 (1) (paragraph (c) excepted).

(3) In this clause, cleanup notice means:

(a) a notice given under section 91 of the Protection of the Environment Operations Act 1997 that is specified in Schedule 1, or

(b) if a notice so specified has been varied under section 110 of that Act, the notice as varied for the time being.

(4) If this clause is inconsistent with another State environmental planning policy, a regional environmental plan or a local environmental plan (whether made before or after this clause), this clause prevails, subject to section 36 (4) of the Act."

Schedule 1 lists "*Notice No 1030236 dated 26 September 2003 and addressed to Orica Australia Pty Ltd*", and hence this clause applies to the BGC Project, which can be implemented without development consent.

The amended SEPP 55 is presented in full in **Appendix B**.

1.3.4 Planning Focus Meeting

A Planning Focus Meeting (PFM) was held at Orica's offices at the BIP on 3 June 2004, and was attended by representatives of relevant NSW statutory authorities and the Council of the City of Botany Bay. The PFM provided a forum for discussion of the BGC Project and consideration of issues to be addressed by the EIS, which were to be formalised through the requirements of the Director-General of Infrastructure, Planning and Natural Resources. A request for these requirements for this EIS was made in June 2003.

The Director-General's Requirements (DGRs) were issued on 12 July 2004, and are presented in **Appendix C**.

The amendment to SEPP 55 was gazetted after the PFM and issue of the DGRs. The scope of the EIS was subsequently revised, and modifications made to the rate of groundwater extraction and the location of the GTP within the BIP.

The scope of the EIS was further clarified to DIPNR following a change in the design limits and location of the GTP. The Director-General affirmed its requirements by a letter dated 1 November 2004 (see **Appendix C**).

1.3.5 EIS Preparation and Exhibition

This EIS has been prepared in accordance with Part 5 of the EP&A Act, under the provisions of Schedule 2 of the EP&A Regulation, which lists the matters to be addressed in an EIS.

The EP&A Act requires that the EIS be placed on exhibition for public review for a minimum period of 30 days.

1.4 Related Investigations

Eight detailed investigations relevant to this EIS were completed by specialists. These investigations were used as source materials for this EIS. Separate reports have been developed and included in full as appendices to this EIS.

The investigations addressed the following issues:

- Hydraulic containment of groundwater (**Appendix D**);
- Hydraulic assessment of Bunnerong Canal (**Appendix E**);
- Acoustic assessment (**Appendix F**);
- Air quality impact assessment (**Appendix G**)
- Ecological impact assessment (**Appendix H**);
- Preliminary Hazard Assessment (**Appendix I**); and
- Human Health Risk Assessment (**Appendix J**).

1.5 Document Structure

This EIS is divided into eight parts. The content of each part is outlined below:

- *Project Background* – Part A (Chapters 1 and 2) briefly outlines the environmental impact assessment process, describes the background and context of the project, and provides an outline of the project.
- *The Project* – Part B (Chapters 3 to 5) details the project needs, objectives and alternatives and provides a detailed description of the project.
- *Statutory and Strategic Planning* – Part C (Chapter 6) contains a discussion of the relevant controlling Commonwealth and NSW legislation, and nominates the approvals required to enable the proposed BGC Project to proceed.
- *Issues Identification and Prioritisation* – Part D (Chapters 7 to 9) summarises the issues raised during consultation with statutory and other relevant authorities, and the local community. The issues raised during the consultation process are then prioritised for discussion in the following chapters of the EIS.
- *Environmental Impact Assessment* – Part E (Chapters 10 to 26) describes the existing environment, provides an assessment of the likely impacts of the project, and identifies appropriate mitigation measures to safeguard the environment. The cumulative impacts of the BGC Project are also addressed.

- *Environmental Management and Monitoring* – Part F (Chapters 27 and 28) outlines Orica's proposed environmental management measures to safeguard against any potential impacts, and describes ongoing monitoring activities.
- *Justification* – Part G (Chapters 29 and 30) addresses the principles of Ecologically Sustainable Development (ESD) and provides the justification for the BGC Project.
- *References* – Part H provides a list of materials referenced during preparation of the EIS.