NSW GOVERNMENT | Planning & Environment

STATE SIGNIFICANT DEVELOPMENT ASSESSMENT:
Shell Clyde Terminal Conversion
SSD-5147

Secretary's
Environmental Assessment Report
Section 89E of the
Environmental Planning and Assessment Act 1979

October 2014

ABBREVIATIONS

AEP	Annual Exceedance Probability
Applicant	Shell Company of Australia Limited
Council	Parramatta City Council
DA	Development Application
Department	Department of Planning and Environment
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
LGA	Local Government Area
Minister	Minister for Planning
NOW	NSW Office of Water in the Department of Primary Industries cluster
RMS	Roads and Maritime Services
RTS	Response to Submissions titled *'Clyde Terminal Conversion Project – Response to Submissions'* prepared by Shell, dated May 2014
Secretary	Secretary of the Department
SEPP	State Environmental Planning Policy
SEPP 33	*State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*
SRD SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
SSD	State Significant Development

This photo: Tankfarm and Platformer 3 (Source: EIS)
Cover photo: Shell Clyde Refinery (Source: Google Maps, accessed June 2014)

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EXECUTIVE SUMMARY

The Shell Company of Australia Limited (Shell) has owned and operated the Clyde Refinery on the Camellia Peninsula in the Parramatta local government area (LGA) since 1928. The refinery processed crude oil to produce finished petroleum products for distribution to Shell's customers in NSW, supplying approximately 40% of NSW's fuel requirements.

In late 2012, Shell ceased refining operations due to increased competition from new, large-scale refineries in the Asia-Pacific region which have considerably larger and more efficient refining capacity. Shell has continued to operate the Clyde Refinery solely as a finished petroleum products import, storage and distribution terminal, ensuring continuity of supply to its customers. Finished petroleum products are imported to the site via underground pipeline from Shell's import terminal at Gore Bay in the Lane Cove LGA, which receives fuel imports via tanker ships.

Shell has historically imported and continues to import refined or finished petroleum products. Even when refining was taking place, these products were regularly imported to balance the shortfall between what was able to be produced at Clyde and the NSW market demand or during periods of disruption such as routine maintenance.

To maintain an efficient and competitive operation in NSW, Shell now proposes to fully convert the Clyde Refinery into an import, blending, storage and distribution terminal for finished petroleum products (referred to as the Clyde Terminal). The development involves three key components:

- demolition of the redundant refinery processing equipment and storage tanks;
- construction works to improve efficiency and provide capacity to meet future growth in demand for fuel products, including:
    - conversion of existing storage tanks to store finished fuels;
    - upgrade of electrical, fire-fighting, wastewater, lighting and safety shutdown systems; and
    - repair of bunds and spill management infrastructure;
- on-going operation as a finished petroleum products terminal, to ensure continuity of fuel supply to Shell's customers.

The development would consolidate the Terminal operations onto a smaller footprint, enabling future remediation and redevelopment of the residual land (which would be subject to separate development assessment).

The proposal is classified as State Significant Development (SSD) under Part 4 of the *Environmental Planning and Assessment Act 1979* because it involves development with a capital investment value of more than $30 million for a liquid fuel depot meeting the criteria in Clause 10(2) of Schedule 1 in *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). In addition, it is development for the storage of dangerous goods in quantities exceeding the criteria for a Major Hazard Facility meeting the criteria in Clause 10(3) of the SRD SEPP. Consequently, the Minister for Planning is the consent authority for the proposed development.

The proposed development has a capital investment value of approximately $128 million and would provide 224 jobs during the construction and demolition phases and 58 jobs for the on-going operation.

The Department exhibited the Environmental Impact Statement (EIS) for the development from 21 November 2013 until 23 December 2013 and received 41 submissions including, 9 from government agencies, 5 from special interest groups and 27 from the general public. Of the 32 submissions from special interest groups and the general public, 24 submissions objected to the development, 1 supported the development and 7 neither objected nor supported the development.

Key issues raised related to concerns about the underground pipeline connecting the Gore Bay and Clyde Terminals not being included in the development application, the hazards and risks associated with the transfer of finished petroleum products through the underground pipeline and the need to consider the Clyde Terminal SSD application concurrently with the proposed SSD for conversion of Shell's Gore Bay Terminal. Submissions also requested wider community consultation to notify

residents along the underground pipeline route, raised concerns regarding surface water and flooding, noise and air quality, transport, heritage and impacts on the nearby wetlands. Shell submitted a Response to Submissions (RTS) to provide further information and clarification regarding the issues raised in submissions. Additional information was also provided to clarify aspects of the hazards and risk assessment.

The Department engaged Lloyds Register Consulting (Lloyds) to independently review the proposal in terms of its potential hazard and risk impacts. Lloyds found that the Preliminary Hazard Analysis undertaken as part of the EIS applied a thorough methodology to estimate the risks from the proposal, and that the development would comply with all relevant risk criteria adopted in NSW.

The Department's assessment of the application has fully considered all relevant matters under Section 79C of the EP&A Act, the objects of the EP&A Act and the principles of ecologically sustainable development. The assessment concluded that the proposed development would reduce the overall hazards and risks from the facility as well as reduce the overall noise and air quality impacts from operations at the site, compared to previous refining activities. However, there would be some short-term noise, vibration and dust impacts as a result of demolition and construction works. Operation of the development would have a minimal effect on the local flood regime and would result in a minor reduction in traffic volumes in the long term.

The Department has recommended a number of conditions including measures to manage hazards and risks, procedures for asbestos removal and demolition, noise and vibration limits, air quality monitoring, flood proofing and emergency response, water, waste, biodiversity and heritage management. The Department has also recommended conditions for on-going environmental management, including annual reporting and regular independent audits.

Overall, the Department concluded that the proposed development would improve the environmental performance of the site and that risks associated with the storage of finished petroleum products would be managed in line with current best practice. With the implementation of the recommended conditions of consent, it is considered that the impacts of the development can be mitigated and/or managed.

Shell's Clyde Refinery is small with ageing infrastructure which does not warrant further capital investment. Upgrading and improving the efficiency of the existing infrastructure on the site would enable Shell to ensure that its NSW operation remains viable and competitive and would help maintain Shell's contribution to fuel security for NSW, through the continued supply of 40% of the State's fuel requirements. The development would also provide adequate capacity to service growth in fuel demand arising from the growing NSW economy over the next 15 years.

Consequently, the Department considers that the proposal meets all relevant environmental and amenity criteria and that the development is in the public interest and should be approved, subject to conditions.

1. BACKGROUND

1.1. Background

Shell has owned and operated the Clyde Refinery on the Camellia Peninsula in the Parramatta local government area since 1928 (see **Figure 1**). The Clyde Refinery operated as a crude oil refinery and petroleum products storage and distribution facility for over 80 years until refining operations ceased in late 2012.

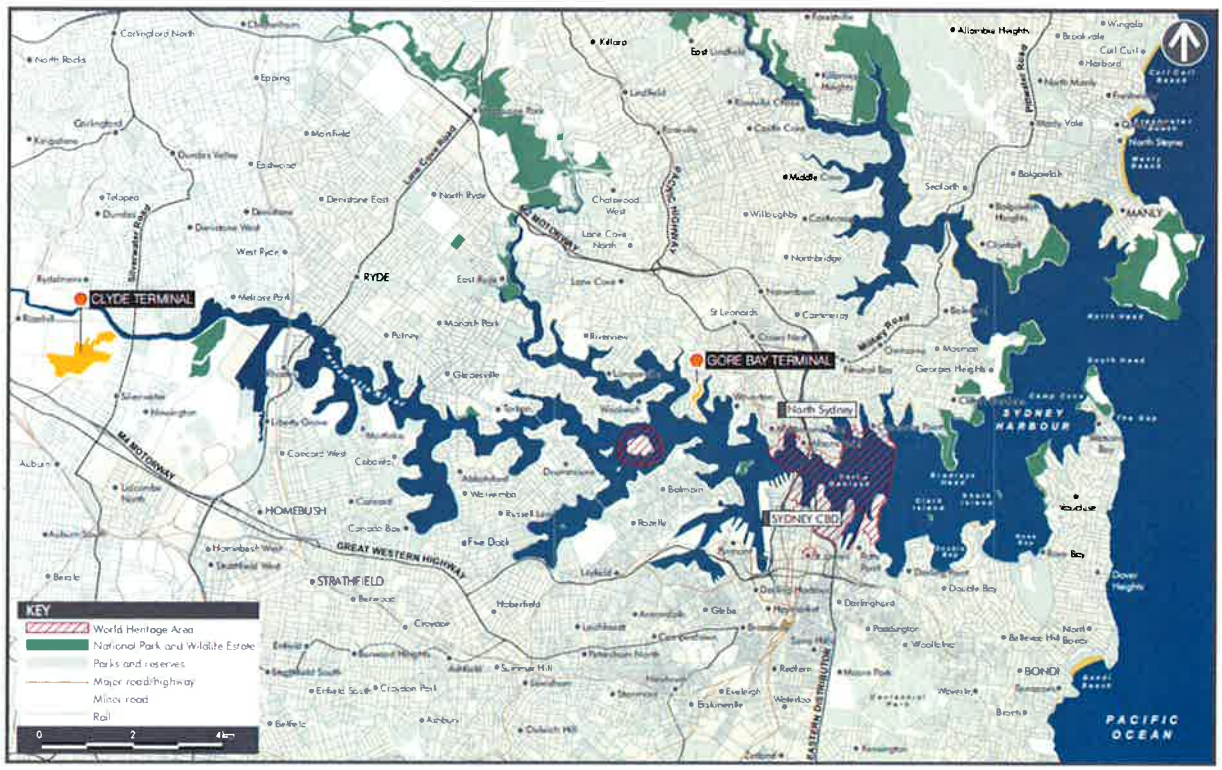

Figure 1: *Site Location*

Shell announced its decision to cease refining crude oil at the Clyde Terminal in response to increased competition from new, large-scale refineries in the Asia-Pacific region, which have considerably larger refining capacity. In late 2012, Shell ceased refining activities and since then, the facility has operated solely as an import, blending, storage and distribution facility for finished petroleum products and is referred to as the Clyde Terminal.

Shell supplies approximately 40% of NSW's fuel requirements with the Clyde Terminal one of a few key fuel supply operations in NSW. The Clyde Terminal receives finished petroleum products including gasoline, diesel and jet fuel via a 19km long underground pipeline from Shell's Gore Bay Terminal (GBT), located in the Lane Cove local government area (see **Figure 1**). The GBT receives petroleum products imported via ship, which are then pumped directly to the Clyde Terminal, or stored temporarily at the GBT and transferred to the Clyde Terminal when pipeline capacity allows.

Once received at the Clyde Terminal, petroleum products are stored, tested and blended to ensure the products meet the required specifications and are fit for their intended use. Products are then transferred via existing pipelines to:

- the road gantry at Shell's adjacent Parramatta Terminal for distribution via road to customers;
- Sydney airport, via Shell's jet fuel pipeline;
- Newcastle; and
- the nearby Caltex and Mobil Silverwater Terminal.

The Clyde Terminal currently has storage capacity for 638 megalitres (ML) of petroleum products at any one time and 10,851 cubic metres (m^3) of butane gas (which is received at the terminal via road). Total product throughput is currently 4,400 ML per annum. Existing infrastructure on site includes the refinery processing equipment, which is located predominantly in the western part of the site, and 113 storage tanks located within bunded tankfarms across the site (see **Figure 2**). Other infrastructure includes control rooms, extensive pipework and pumping stations, product loading gantries, electrical substations, water treatment and waste handling facilities, warehouses, workshops and administration buildings. The site also contains a boatshed, launching ramp and jetty on the Parramatta River. The facility operates 24 hours a day, 7 days a week with a workforce of approximately 58 personnel over several shifts.

1.2. Site Description

The Clyde Terminal is located within the Camellia Industrial Estate in Rosehill, approximately 3km west of Parrramatta and 16km west of the Sydney central business district. The Camellia Peninsula is situated between the Parramatta River to the north, Duck River to the east and south and James Ruse Drive along the western boundary. The peninsula covers an area of around 321 hectares (ha), which was consolidated by placing fill to create an industrial precinct in the 1950's. The Clyde Terminal is the largest industrial premise on the peninsula, covering 86ha. John Fell established the orginal oil refinery on the site in 1918 and continued to operate it until it was purchased by Shell in 1928. Shell subsequently undertook several expansions on the site, operating the refinery for over 80 years.

Other industry on the peninsula includes recycling and waste services, building product manufacturers, gas supplies and product transport. Shell also owns and operates the Parramatta Terminal, located immediately to the north of the Clyde Terminal, for road distribution of petroleum products (see **Figure 2**).

Rosehill Racecourse is located immediately west of the site adjoining James Ruse Drive and Grand Avenue. Other recreational facilities in the area include the Sydney Speedway, 500m to the south-west of the site and Rosehill Heliport, approximately 400m to the south-west across the Duck River.

The nearest residential areas are located in Rydalmere, 400m to the north-east and Silverwater, 600m to the south. The residential area of Rosehill is located 1km to the west and is separated from the site by Rosehill Racecourse and James Ruse Drive.

Vehicular access to the site is primarily from James Ruse Drive along Grand Avenue to the main site entrance on Durham Street (see **Figure 2**). Grand Avenue is also used to access the majority of other industrial premises on the peninsula and Rosehill Racecourse. The Clyde Terminal can also be accessed from Parramatta Road, via Wentworth Street, Kay Street and Unwin Street.

The site is relatively level, low lying land, ranging from approximately 2-5 metres (m) Australian Height Datum (AHD), with the eastern part of the site subject to flooding. The site is zoned IN3 Heavy Industrial under the *Parramatta Local Environmental Plan 2011* (LEP 2011) and comprises of mostly hardstand areas. The site contains large refinery processing equipment and 113 tanks for the storage of petroleum products (see **Figure 2**). Five chimney stacks ranging in height from 80 to 100m are also located on the site, which are visually prominent from surrounding roadways, including Silverwater Road, the M4 Motorway and James Ruse Drive.

The southern and eastern site boundary contains a strip of mangrove vegetation adjacent to the Duck River. A wetland located in the north-eastern corner of the site, utilised as part of Shell's stormwater management system, is listed as a local heritage item on LEP 2011 and is known habitat for the Green and Golden Bell Frog.

At the north-eastern corner of the site is a small jetty into the Parramatta River which is located on land owned by Roads and Maritime Services and leased by Shell. Historically, the site of the jetty was a barge unloading area but it is now used as a spill control boat launching site. The jetty and associated land parcel do not form part of this SSD application.

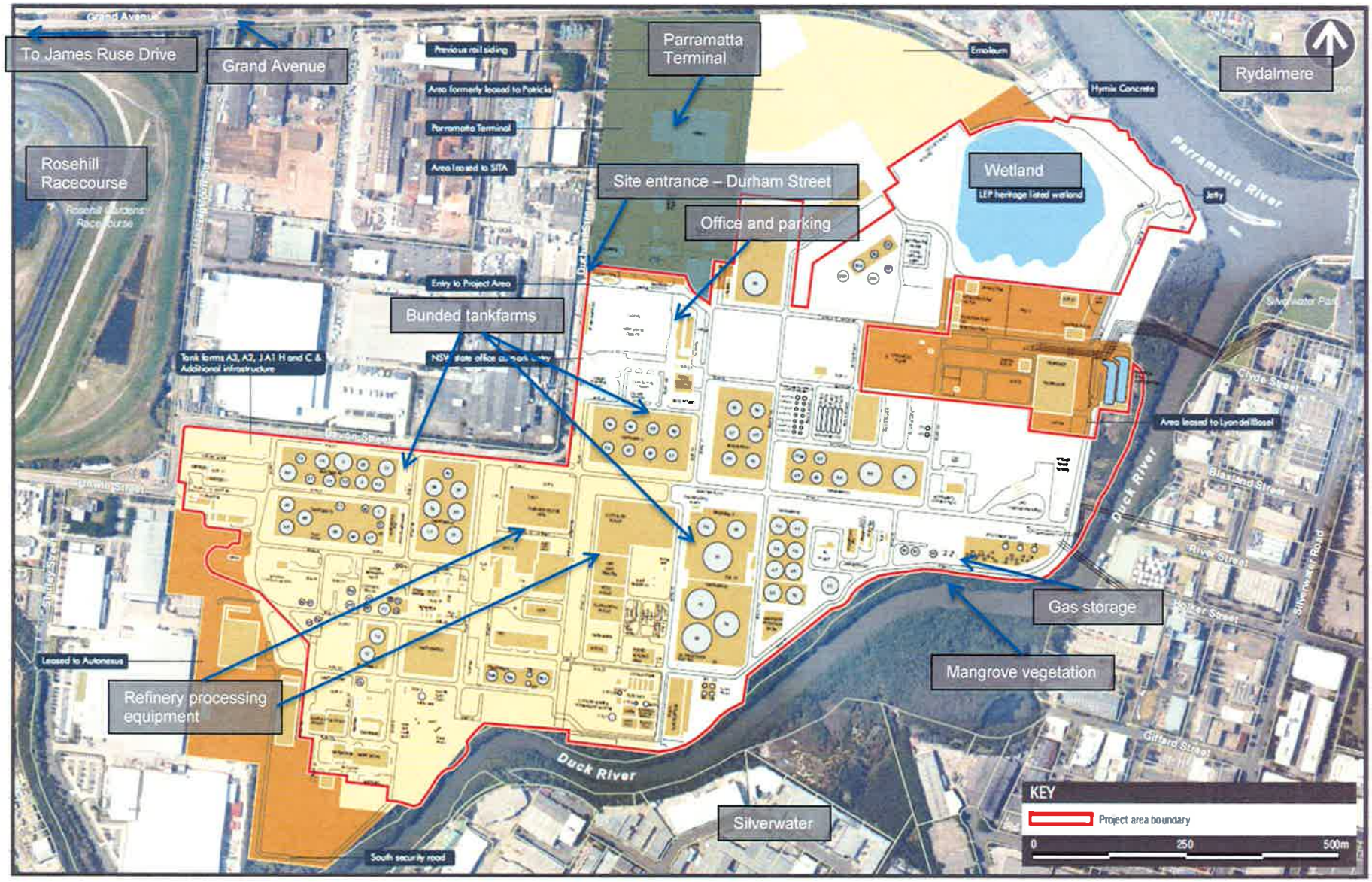

Figure 2: *Clyde Terminal - Existing Infrastructure and Surrounding Land Uses*

1.3. Existing Approvals

The Clyde Terminal has operated since 1928 under a combination of continuing use rights (under section 109(1) of the *Environmental Planning and Assessment Act 1979*) and various development consents that have been granted for the site. Since the cessation of refining in 2012, Shell has continued to operate the Terminal under these continuing use rights and development consents.

Since 1949, Shell has obtained around 215 development consents from either Parramatta City Council or the Minister for Planning. These include expansions and construction of specific items of equipment and infrastructure, including a major upgrade of the fluidised catalytic cracking unit in 2007 and the hydro-desulphurisation unit in 2008 which were both granted by the Minister for Planning. Shell proposes to replace all previous Council and Ministerial consents with a single consent covering the demolition, construction and on-going operation of the Clyde Terminal.

The site is also regulated by the Environment Protection Authority (EPA) under the *Protection of the Environment Operations Act 1997* through Environmental Protection Licence (EPL) No. 570. In October 2012, the EPL was amended to reflect the change from refining operations to the storage of finished petroleum products.

The terminal is also registered as a Major Hazards Facility (MHF) and is licensed by WorkCover NSW under the *Work Health and Safety Regulation 2011*.

1.4. Need for the Development

In 2011, Shell announced that refining of oil at the site was no longer viable, primarily due to increased competition from larger and more modern refineries in Asia. When operational, the Clyde Refinery produced around 79,000 barrels per day compared with the new refineries in Asia which produce around 1 million barrels per day. Shell's Clyde Refinery is small with ageing infrastructure that does not warrant further capital investment. This proposal therefore aims to ensure that Shell's operations within Australia remain viable.

Conversion to a product import, blending, storage and distribution terminal would improve efficiency, increase competitiveness and better support the growth of the NSW economy through the efficient distribution of finished products. The development would improve the efficiency of jet fuel supply to Sydney airport, as it is not reliant on local production from an ageing refinery. The development would also support future growth in jet fuel demand.

Shell considered several alternatives including:

- maintaining Shell imports through a smaller footprint at the existing Clyde Terminal and GBT;
- commissioning an alternative terminal facility at a new location such as Botany Bay;
- using an existing third party distribution terminal to service the west of Sydney;
- use of an existing third party receival terminal to replace the GBT; and
- doing nothing.

Upgrading the existing Clyde Terminal was considered the most viable and efficient option as it would utilise and enhance existing infrastructure on an already developed site, it would ensure that fuel supply security is maintained during conversion works and it would provide capacity to meet the continued growth of the NSW economy.

2. PROPOSED DEVELOPMENT

2.1. Development Description

Shell (the Applicant) proposes to convert the existing Clyde Refinery into a finished petroleum products import, blending, storage and distribution terminal (referred to as the Clyde Terminal).

The major components of the development are summarised in Table 1, shown in **Figure 3** and described in full in AECOM's Environmental Impact Statement (EIS), see Appendix D.

The development involves three key components:

- demolition of the redundant refinery processing equipment and storage tanks;
- construction works to improve efficiency and provide capacity to meet future growth in demand for fuel products, including:
    - conversion of existing storage tanks to store finished fuels;
    - upgrade of electrical, fire-fighting, wastewater, lighting and safety shutdown systems; and
    - repair of bunds and spill management infrastructure;
- on-going operation as a finished petroleum products terminal, to ensure continuity of fuel supply to Shell's customers.

The proposal will result in an overall reduction in the operational footprint of the Clyde Terminal. Residual land created by the demolition of refinery infrastructure would be later remediated and re-developed, subject to separate development assessment.

***Table 1**: Main Development Components*

Aspect	Description
Development Summary	**Conversion of the existing Clyde Refinery into a finished petroleum products import, blending, storage and distribution terminal.**
Demolition (14 months)	Demolition of redundant refinery infrastructure to ground level, predominantly in the western part of the site, including: • redundant refinery processing units, including the crude distillation unit, catalytic cracking unit and platformer unit 3; • 97 storage tanks and tankfarm infrastructure, including bund walls; • 5 chimney stacks; and • other redundant infrastructure including the bitumen loading gantry, pipework, columns, vessels, exchanger structures and redundant buildings.
Construction (3 years)	Conversion of Existing Storage Tanks: • repair and retention of 16 storage tanks in the eastern part of the site for the storage of gasoline (unleaded grades 91, 95 and 98), diesel and jet fuel; • installation of domes on the jet fuel storage tanks (to convert them into internal floating roof tanks); • retention of two existing butane spheres; • retention of five existing slops tanks; • construction of two new slops tanks (2,000 litre and 1,000 litre capacity); Electrical: • replacement of three existing substations above the 1 in 100 year flood level; • upgrades to electrical and instrumentation systems; Fire Fighting System: • three new firewater tanks in the contractor carpark will replace two existing firewater tanks (which will be demolished); • provision of articulated foam deployment and fire response for the converted terminal arrangement; Wastewater System: • construction of an additional phenol treatment facility for wastewater; • upgraded oily water release system for improving wastewater treatment; Bunding and Spill Management: • installation of motorised valves to allow quicker closing and remote operation; • upgrades to bund walls (as required) to ensure containment integrity; and

Aspect	Description
	Ancillary Facilities: • minor conversion works to lighting, safety shutdown systems, improved product quality segregation, control room facilities and amenities.
Operation	Import, product blending, storage and distribution of finished petroleum products, including operation of: • tankfarms and associated valving and pipework; • control rooms, pumping stations, gantries, warehouses and workshops; • administration facilities; • electrical substations; • water supply and treatment facilities, waste handling facilities; and • fire fighting infrastructure.
Product Throughput and Storage Capacity	• 4,400 ML per annum, with expected annual growth of 4%; • reduction in fuel storage capacity from 638 ML to 264 ML; and • reduction in gas storage capacity from 10,851m^3 to 1,550m^3.
Traffic (vehicles per day)	Demolition, construction and concurrent operation – 169 light & 277 heavy; and Operation – 32 light & 257 heavy.
Working hours	Demolition and construction: 7am to 6pm (Monday to Friday), 8am to 1pm (Saturday); and Operation: 24 hours, 7 days a week.
Capital investment value	$128 million.
Employees	Demolition, construction and concurrent operation – 224; and Operation – 58.

2.2. Demolition and Construction Staging

Shell commenced decontamination and decommissioning of disused tanks and infrastructure following the cessation of refining activities in late 2012, to prepare the site for demolition. The majority of demolition works would be undertaken over a 14 month period with smaller demolition projects (29 redundant tanks) undertaken at a later stage once tanks in the eastern part of the site have been converted to store finished fuels. Table 2 shows the likely staging of the demolition and construction works.

***Table 2**: Demolition and Construction Staging*

Task	Phase	Estimated Timeframe
Demolition	Phase 1: refinery processing equipment - crude distillation unit, catalytic cracking unit, platformer unit 3, tankfarms, bitumen loading gantry, utilities, biotreater and 5 chimney stacks.	• 14 months
	Phase 2: two tankfarm areas, including tanks and bund walls.	• Scheduled for 2016, taking approximately 1 month to complete.
Construction	Phase 1: modification of utilities and firewater infrastructure. Phase 2: tank inspection and refurbishment for fuels and butane storage. Phase 3: pipework reconfiguration to enable use of refurbished tanks, electrical works, safeguarding and instrumentation modifications and upgrades. Phase 4: asset commissioning and efficiency modifications.	• Completed over 36 months, concurrent with demolition

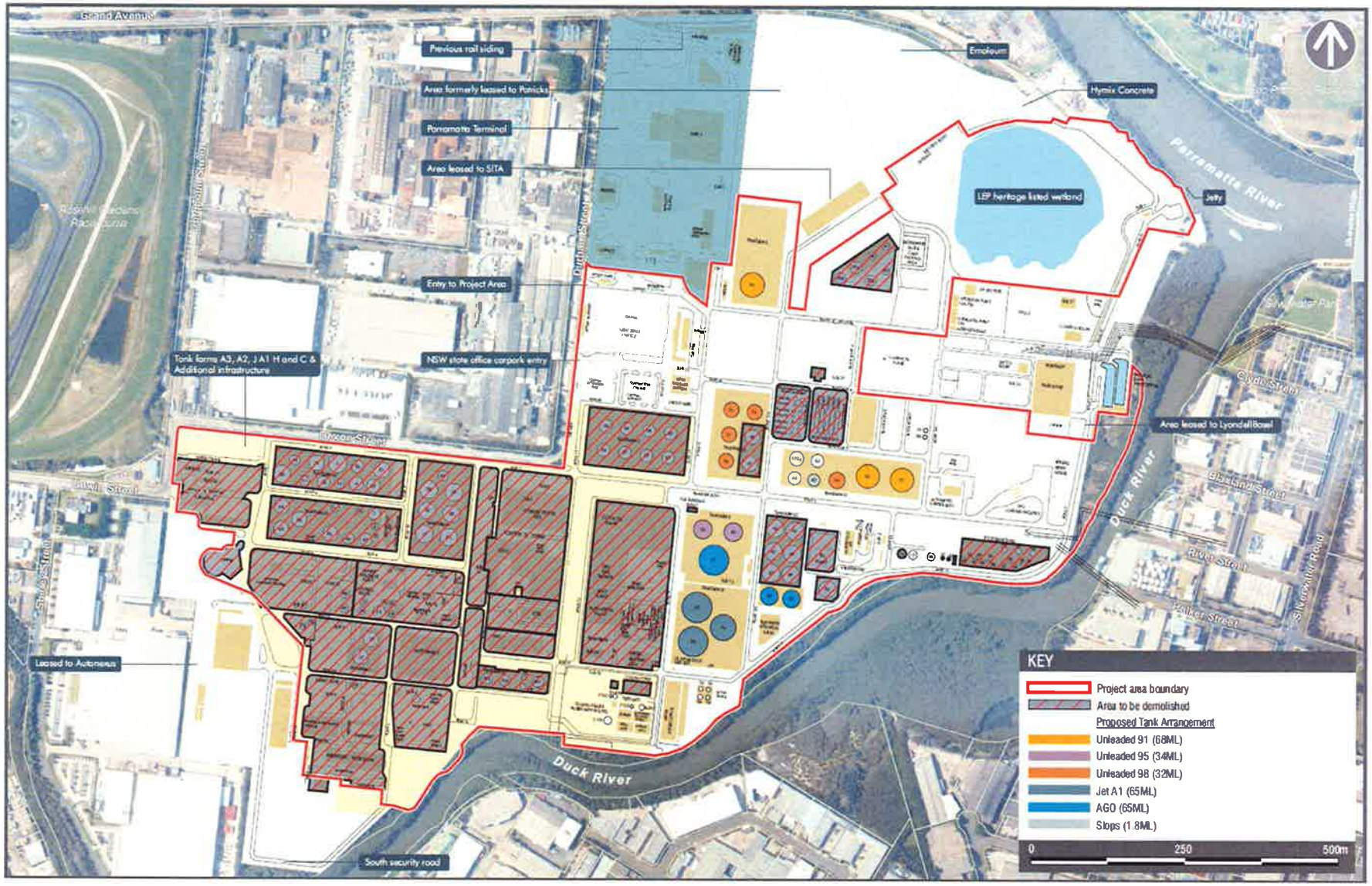

Figure 3: *Proposed Demolition and Conversion of Existing Infrastructure*

3. STRATEGIC AND STATUTORY CONTEXT

3.1. State Significant Development

The proposal is classified as State Significant Development (SSD) under Part 4 of the *Environmental Planning and Assessment Act 1979* because it involves development with a capital investment value of more than $30 million for a liquid fuel depot meeting the criteria in Clause 10(2) of Schedule 1 in *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). In addition, the proposal also includes development for the storage of dangerous goods in quantities exceeding the criteria for a Major Hazard Facility meeting the criteria in Clause 10(3) of the SRD SEPP. Consequently, the Minister for Planning is the consent authority for the proposed development.

3.2. Consent Authority

On 14 September 2011, the Minister delegated the functions to determine SSD applications to the Secretary of the Department where:

- the relevant local council has not made an objection; and
- there are less than 25 public submissions in the nature of objections; and
- a political disclosure statement has not been made.

There have been 24 public submissions objecting to the proposed development and Council has not objected to the proposed development. In addition, no political disclosure statement was made for this application or any previous related application, and no reportable political donations disclosures were made by any persons who have lodged a submission.

Accordingly, the application is able to be determined by the Secretary under delegation.

3.3. Permissibility

The site is zoned 'IN3 Heavy Industrial' under the *Parramatta Local Environmental Plan 2011* (PLEP).

The proposed development involves the storage of petroleum products. The proposal is permissible with consent on the site as a 'heavy industrial storage establishment'.

3.4. Integrated Approvals

Under Section 89K of the EP&A Act, a number of further approvals are required, but must be approved in a manner that is consistent with any Part 4 consent for the SSD under the EP&A Act.

In this case, the development requires an Environmental Protection Licence (EPL) from the EPA under the *Protection of the Environment Operations Act 1997* (POEO Act).

The Department has consulted with the EPA and considered the relevant issues relating to the issue of an EPL in the assessment of the proposal (see Section 5 of this report). The EPA has provided draft conditions for an amended EPL for the facility.

3.5. Other Approvals

A number of other separate approvals <u>may</u> also be required to be obtained by the Applicant for the proposed development, including:

- a Major Hazards Facility licence under the *Work Health and Safety Regulation 2011*;
- a controlled activity approval under Section 91E of the *Water Management Act 2000* for works within 40 metres of the Parramatta and Duck Rivers; and
- approval from the EPA for the disposal of waste containing radioactive substances under the *Radiation Control Regulation 2003.*

The Department has consulted with WorkCover NSW, the NSW Office of Water (NOW) and the EPA and considered the relevant issues relating to the issue of these licenses in the assessment of the proposal (see Section 5 of this report).

3.6. Considerations under Section 79C of the EP&A Act

Under Section 79C of the EP&A Act, in determining a development application, a consent authority is required to take a number of matters into consideration in relation to the proposed development. The Department has given due consideration to the matters prescribed by Section 79C.

The Department's detailed consideration of the proposed development against the provisions of Section 79C of the EP&A Act is contained within Appendix B of this report.

3.7. Environmental Planning Instruments

Under Section 79C of the EP&A Act, the consent authority, when determining a development application, must take into consideration the provisions of any environmental planning instrument (EPI), draft EPI (that has been subject to public consultation and notified under the EP&A Act) that apply to the proposal.

The Department has considered the development against the relevant provisions of several key environmental planning instruments including:

- *State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP);*
- *State Environmental Planning Policy (Infrastructure) 2007 (the ISEPP);*
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33);*
- *State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55);*
- *State Environmental Planning Policy No. 71 – Coastal Protection (SEPP 71); and*
- *Parramatta Local Environmental Plan 2011 (PLEP 2011).*

It is noted that as of 1 July 2009, all existing REPs became deemed State Environmental Planning Policies (SEPPs) (refer to clause 120 of Schedule 6 to the EP&A Act), including the Sydney Harbour Catchment REP 2005.

Development Control Plans (DCPs) do not apply to SSD under Clause 11 of the SRD SEPP. Notwithstanding, the Department has considered the relevant provisions of the *Parramatta DCP 2011* in its assessment of the proposal in Section 5 of this report.

The Department has assessed the proposal against the relevant provisions of several EPIs and concludes that, subject to the implementation of the recommended conditions of consent, the development is generally consistent with the aims, objectives and provisions of these instruments (see Appendix C).

3.8. Exhibition and Notification

Under Section 89F(1) of the EP&A Act, the Secretary is required to make the development application and any accompanying information of an SSD application publicly available for at least 30 days.

After accepting the EIS for the application, the Department:

- made it publicly available from **Thursday 21 November 2013** until **Monday 23 December 2013**:
  - on the Department's website;
  - at the Department's Information Centre (Bridge Street, Sydney);
  - at the Nature Conservation Council's Head Office (Sydney);
  - at Parramatta City Council; and
- notified landowners in the vicinity of the site about the exhibition period by letter;
- notified relevant State government authorities and Parramatta City Council by letter; and
- advertised the exhibition in the Parramatta Advertiser and the Parramatta Sun.

3.9. Objects of the EP&A Act

In determining the application, the consent authority should consider whether the proposal is consistent with the relevant objects of the EP&A Act. These objects are detailed in Section 5 of the Act, and include:

(a) to encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,
(ii) the promotion and co-ordination of the orderly and economic use and development of land,
(iii) the protection, provision and co-ordination of communication and utility services,
(iv) the provision of land for public purposes,
(v) the provision and co-ordination of community services and facilities, and
(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
(vii) ecologically sustainable development, and
(viii) the provision and maintenance of affordable housing, and

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

The Department has fully considered the objects of the EP&A Act, including the encouragement of Ecologically Sustainable Development (ESD), in its assessment of the application.

The Department considers that objects 5(a) (i), (ii), (iii), (vi) and (vii) are most relevant to the merit assessment of this application. The Department has given due consideration to these objects in its assessment of the proposal (see Table 3 below).

***Table 3**: Objects of the EP&A Act and relevance to the development*

Object	Consideration
5(a)(i)	The proposal would ensure the proper management and development of suitably zoned (i.e. industrial) land by allowing the on-going use of the site for industrial purposes while reducing impacts to the environment and locality. The proposal would also continue to provide employment opportunities for the local community, while also minimising risks from the facility.
5(a)(ii)	The proposal would ensure the orderly and economic use and development of the land which is identified for industrial uses. The land is currently zoned to allow development of a heavy industrial storage establishment as it is permissible in the IN3 Heavy Industrial zone under the *Parramatta Local Environmental Plan 2011*. The proposal satisfies the relevant objectives of the current and proposed land use zones.
5(a)(iii)	The proposed development would not affect the provision and supply of communication and utility services.
5(a)(vi)	The Department's assessment in Section 5 of this report demonstrates that with the implementation of recommended conditions of consent, the impacts of the development can be mitigated and/or managed to ensure an acceptable level of environmental performance.
5(a)(vii)	The Department's recommended conditions of consent would minimise impacts on a threatened species, the Green and Golden Bell Frog. With appropriate measures in place including the existing Plan of Management for the Green and Golden Bell Frog, impacts are not predicted for threatened populations, ecological communities, and their habitats and is therefore consistent with the principles of ESD (see Section 3.10).

3.10. Ecologically Sustainable Development

The EP&A Act adopts the definition of ESD found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

(a) the precautionary principle;
(b) inter-generational equity;
(c) conservation of biological diversity and ecological integrity; and
(d) improved valuation, pricing and incentive mechanisms.

The potential environmental impacts of the development have been assessed and, where potential impacts have been identified, mitigation measures and environmental safeguards have been recommended.

As demonstrated by the Department's assessment in Chapter 5 of this report, the development is not anticipated to have any adverse impacts on native flora or fauna, including threatened species, populations and ecological communities, and their habitats. Although the Green Golden Bell Frog (GGBF) is present on the site, in addition to the existing Plan of Management for the GGBF, the Department has recommended further conditions to help protect the local population of the GGBF. As such, the Department considers that the proposal would not adversely impact on the environment and is consistent with the objectives of the EP&A Act and the principles of ESD.

3.11. *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)

On 3 July 2013, the Commonwealth Government determined the development to be a "controlled action" under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as it was considered that the Project could potentially impact on a nationally listed threatened species, the Green and Golden Bell Frog.

On 17 April 2014, the Commonwealth Department of the Environment granted approval under the EPBC Act, for Shell to undertake the proposed modifications at the Clyde Terminal subject to a number of conditions to protect the GGBF population on the site.

3.12. Strategic Context

NSW 2021

The development is consistent with the goals and priorities of *NSW 2021*, particularly Chapter 1 as it would contribute to building the NSW economy by promoting economic growth in the region through the provision of a secure fuel supply to meet growing demand over the next 15 years.

The proposal has a capital investment value of $128 million and would create up to 140 jobs during the construction and demolition phases. However, once construction and demolition works are complete, there would be a reduction in the number of on-going operational jobs compared to when the refinery was operational with 58 jobs retained once the terminal is fully converted. Hence, the development would not contribute to the employment target within *NSW 2021*, but would ensure that Shell's operations remain viable within NSW, preventing further job losses.

The site would, however, continue to be used for industrial purposes and would be developed to cater for the anticipated increase in fuel demand in NSW. It is anticipated that redundant land, including the area of the site dedicated to oil refining, would be remediated and would be available for (cleaner) industrial land uses into the future. Therefore, while the development would not contribute to the employment targets of *NSW 2021*, the site will continue to provide employment, play a key role in supplying fuel products to the growing NSW economy and make additional land available for future economic use and employment purposes.

Draft Metropolitan Strategy for Sydney to 2031

The proposal is generally consistent with the goals and priorities of the draft Metropolitan Strategy for Sydney to 2031, particularly as the proposal would allow for the continuation of an existing industrial land use whilst also improving the environmental performance of the site.

As discussed, in response to *NSW 2021*, while the proposal would result in a loss of operational jobs, the development would also provide additional employment opportunities during construction and demolition and would provide for additional employment opportunities on residual land that is made available by demolition of redundant refinery infrastructure.

4. ISSUES RAISED IN SUBMISSIONS

4.1. Consultation by the Department

During the exhibition period, the Department received a total of 41 submissions on the development. Of these, nine (9) submissions were from public authorities, five (5) from special interest groups and twenty-seven (27) from the general public. A summary of the issues raised in submissions is provided below. A full copy of these submissions is included in Appendix E.

4.1.1. Public Authorities

Parramatta City Council (Council) broadly supports the development, however raised concerns about the longer-term impacts of the site as it may further exacerbate traffic impacts in Camellia. Council expressed concern regarding the capacity of the existing road network and suggested that consideration be given to an upgrade of the public road system on the Camellia peninsula, delivered either via monetary contributions (in addition to s94A development contributions) or physical works.

Council also raised a number of flood related issues, requesting more information on historic flooding, the flood impacts on existing infrastructure and proposed new works and whether flood related risks on the site can be successfully managed. Council provided recommended conditions relating to Section 94A development contributions, protection of public infrastructure, traffic management and tree removal.

Hunters Hill Council commented that the SSD application for the Clyde Terminal (or the pending SSD for the Gore Bay Terminal) should include the pipeline which connects the two sites as there has been a significant change in the product being pumped through the pipeline, increased intensification of the quantity being pumped through the pipeline and increased risk associated with the transfer of petrol rather than crude oil. Hunters Hill Council expressed concern that Council and the residents in the Lane Cove LGA had not been notified about these proposals and requested that the application be deferred whist residents are notified. The Department's consideration of this issue is provided in Section 5.7.

The **Environment Protection Authority (EPA)** identified the following issues as requiring careful management during the works: air emissions, noise and vibration during demolition activities, waste management, water quality management and site contamination. The EPA requested further clarifications on the air quality and noise assessments. These issues were satisfactorily addressed by the Applicant in its Response to Submissions (RTS) report, therefore the EPA provided recommended conditions relating to air quality, noise, vibration, waste management, water quality and site contamination.

WorkCover NSW (WorkCover) requested clarifications on aspects of the Preliminary Hazard Analysis (PHA). WorkCover subsequently advised that the matters raised were satisfactorily addressed by the Applicant in its RTS and provided recommended conditions of consent.

The **Office of Environment and Heritage (OEH)** identified flood risk management and biodiversity as aspects of the development requiring further consideration. Following review of the RTS, OEH advised that it was satisfied with the flooding aspects of the development and provided recommended conditions for the management and monitoring of the Green and Golden Bell Frog habitat on site.

A submission was received from the **Department of Primary Industries (DPI)**, which incorporates the **NSW Office of Water (NOW), Fisheries NSW** and **Crown Lands**. **NOW** commented that certain exemptions apply to the extraction of groundwater for non-consumptive purposes and stated that NOW should be consulted to determine the applicability of these exemptions for the development. **Fisheries NSW** and **Crown Lands** did not raise any issues with the proposal.

NSW Health (Western Sydney Local Health District) considered that significant hazards to health were unlikely based on the nature of the proposed works and as detailed in the assessment of issues in the EIS.

NSW Roads and Maritime Services (RMS) raised no objection to the development.

AusGrid advised the location of underground cables located within the site and that it must be contacted before planning work near those cables. It also provided advice on proposed measures to safeguard its cables.

4.1.2. Special Interest Groups and General Public

A total of 32 submissions were received from the general public and special interest groups. This included 5 submissions from the following special interest groups:

- Greenwich Community Association;
- Parramatta Climate Action Network;
- Friends of Gore Bay;

- NSW Greens; and
- Australian Turf Club.

Of the 32 submissions, 24 (75%) objected to the development, 1 (3%) supported the development and 7 (22%) neither objected nor supported the development. Issues raised included:

- that the pipeline linking the Clyde Terminal and the Gore Bay Terminal (GBT) should be included in the assessment of the SSD application;
- that the SSD for the Clyde Terminal and the proposed SSD for the GBT should be assessed concurrently;
- communities along the pipeline route and in the vicinity of the GBT should have been consulted;
- other alternatives should be considered;
- the conversion to store finished petroleum products has already occurred without assessment or approval;
- the storage capacity at Clyde should be reviewed to enable storage of all petroleum products at Clyde rather than the GBT;
- hazard and risks;
- noise and air quality issues;
- impacts on wetlands and the Green and Golden Bell Frog, surface water and flooding impacts;
- heritage, traffic and climate change impacts; and
- that the structure of the petroleum industry should be reviewed.

Table 4 provides a breakdown of how many times each issue was raised in the submissions and the corresponding percentage of submissions that raised each issue.

***Table 4**: Summary of Issues Raised in Submissions*

Issue	No. of times issue raised	Proportion of submissions %
The pipeline connecting the Clyde Terminal and the Gore Bay Terminal should be considered in the SSD assessment	23	72%
SSD for the Clyde Terminal should be considered concurrently with the proposed SSD for the Gore Bay Terminal	23	72%
Hazards, risks and safety, including human health risk	21	66%
Lack of consultation with residents at Gore Bay and along the pipeline route	17	53%
Other alternatives should be considered	7	22%
The conversion to store finished fuels has already occurred without prior assessment or approval	5	16%
The storage capacity at Clyde should be reviewed to allow all petroleum products to be stored at Clyde rather than at Gore Bay	5	16%
Impacts on wetlands and the Green and Golden Bell Frog	4	13%
Traffic, long delays at Parramatta Road, James Ruse Drive and Grand Avenue. Concerns regarding future development of the surplus land and exacerbation of traffic congestion	3	9%
Global warming and climate change from continued use of fossil fuels	3	9%

4.1.3. Response to Submissions

In May 2014, Shell provided a response to the issues raised in submissions (see Appendix F). The Response to Submissions (RTS) report was made publicly available on the Department's website. The RTS provided additional information on air quality, noise, flooding, traffic, biodiversity and hazards and risk. The RTS also provided clarification on the regulation of the pipeline that connects the Gore Bay and Clyde Terminals.

The Department had some residual queries on aspects of the Preliminary Hazard Analysis (PHA) to which Shell provided final responses in July 2014. The Department requested additional information and clarification in relation to various technical aspects of the assessment, see Section 5.1. The Department confirms that Shell responded adequately to the requests for additional information.

The Department has considered the issues raised in submissions, Shell's RTS and clarifications on the PHA in its assessment of the development.

4.2. Consultation by the Applicant

Prior to lodgement, and throughout the preparation of the EIS, Shell implemented a consultation strategy to identify key stakeholders and ensure that their concerns were addressed in the EIS assessment.

Shell consulted with local, State and Commonwealth Government authorities, service providers, community groups and affected landowners. Key methods of consultation included:

- establishing a community advisory panel and meeting with the panel in August, October and December 2012;
- conducting a project information session in September 2012 attended by neighbouring businesses and Parramatta City Council;
- conducting various pre-lodgement meetings with relevant local and State Government agencies;
- undertaking factsheet letterbox drops to 1200 residential receivers surrounding the site;
- establishing a webpage for the development; and
- letters, meetings and site inspections with representatives from Aboriginal interest groups.

Key issues raised by stakeholders were addressed in Shell's EIS (see Appendix D).

5. ASSESSMENT

The Department has considered the EIS, the issues raised in submissions and Shell's response to these issues in its assessment of the development. The Department considers the key issues to be hazards and risks, demolition and management of asbestos, noise and vibration, air quality, flooding and traffic. Other issues are considered to be minor and are considered in Table 9.

Development Phases
In the Department's assessment of the application, it has considered each phase of the development as described below, including the impacts from concurrent phases. Specifically, the construction, demolition and interim operational phases would occur concurrently over the first 1 to 2 years and this is when amenity impacts would be at their highest.

Demolition: The removal of redundant refinery processing units, tanks and other infrastructure conducted over two key phases (see **Figure 8**). Phase 1 would take approximately 14 months and would demolish the refinery processing units and infrastructure, including the 5 chimney stacks. Phase 2 would involve demolition of redundant tanks (once other tanks have been converted to store finished fuels), taking approximately 1 month and currently scheduled for 2016. Minor demolition works would continue over a period of 5 – 10 years.

Construction: Excavation, upgrades to tanks, bunds, drainage and instrumentation, replacement of electrical substations, upgrades to the fire water system and revised pumping and piping works, conducted over four phases (see **Table 2**). Construction works would take 3 years to complete.

Interim Operations: Import, blending, storage and distribution of finished petroleum products under the current configuration, prior to consolidation of operations within the eastern part of the site. Interim operations are estimated to continue until 2017 when construction works are completed.

Operation: End-state operations, once all construction activities have been completed, infrastructure has been upgraded and tanks in the eastern part of the site are converted to store finished petroleum products. Currently scheduled for 2017 once the construction period finishes and continuing on an on-going basis.

The technical assessments included in the EIS considered the impacts of concurrent demolition, construction and operation of the terminal with respect to traffic, air quality, noise, vibration, hazards and risks, waste management, contamination and water quality to provide a worst-case assessment. The Department's consideration of these issues is provided throughout Section 5 of this report.

5.1. Hazards and Risks

Issue

The import, blending, storage and distribution of finished petroleum products presents various hazards and risks. The facility is identified as a Major Hazard Facility (MHF) under the *Work Health and Safety Act 2011* and the proposed development is deemed a 'potentially hazardous industry' under the provisions of *State Environmental Planning Policy No. 33 Hazardous and Offensive Development* (SEPP 33). Therefore a detailed risk assessment was undertaken as part of the EIS.

Consideration

Methodology

Sherpa Consulting undertook a Preliminary Hazard Analysis (PHA) as part of the EIS to assess the risk to people, property and the environment as a result of the development. The PHA was carried out in accordance with the Department of Planning and Environment's *HIPAP No. 6 - Hazard Analysis.*

The purpose of the PHA is to identify potential hazards, analyse consequences and the likelihood of occurrence, then estimate resultant risks to surrounding land uses. The risks are then compared with the relevant land use safety criteria defined in the Department of Planning's *HIPAP No. 4 - Risk Criteria for Land Use Safety Planning* to determine whether the development would pose an unacceptable level of risk to those land uses.

Specifically, the PHA is required to consider the following key points:

1. identification of the nature and scale of all hazards at the facility, and the selection of representative incident scenarios;
2. analysis of the consequences of these incidents on people, property and the biophysical environment;
3. evaluation of the likelihood of such events occurring and the adequacy of safeguards;
4. calculation of the resulting risk levels of the facility; and
5. comparison of these risk levels with established risk criteria and identification of opportunities for risk reduction.

The PHA considered the hazards and risks associated with the end-state operations, once the terminal is fully converted. A comparison of the hazards and risks associated with the previous refining of crude oil was also presented. The PHA did not quantitatively assess the risks associated with concurrent construction, demolition and interim operations, however the Department has recommended specific conditions to address this component of the development (addressed later in this section).

To ensure a robust assessment process, in addition to the Department's assessment of these potential impacts by its technical hazards and risks specialists, an independent risk consultancy, Lloyds Register (Lloyd's) was engaged by the Department to provide an independent assessment of the PHA. A copy of Lloyd's independent assessment report is attached at Appendix G.

Following a review of the PHA, both the Department and Lloyd's requested further information and clarifications on the PHA, including:

- further detail on how the relevant recommendations from the Buncefield Major Incident Investigation Board would be addressed for the development;
- clarification on the total quantity of dangerous goods proposed to be stored;
- confirmation that the tank bund dimensions and capacities are compliant with Australian Standards;
- clarification on the meteorological data used, vapour generation rates and additional justification for some concentrations used in the calculations;
- inclusion of explosion overpressure consequence results, consequence analysis results for Butane pool fires, and the number of LPG tanker transfer operations per year;
- additional information on the assessment of risk to the biophysical environment; and

- identification of the major risk contributors for key locations where the relevant individual fatality risk contour was close to the site boundary.

In July 2014, Shell submitted supplementary information addressing the above matters. The Department and Lloyd's confirmed that the information provided by Shell adequately addressed the matters raised. The Department and Lloyd's also found that the methodology adopted for the risk assessment, estimation of consequences and selection of accident likelihood data for hazardous incidents is typical, appropriate and consistent with similar facilities quantitative risk assessments. In addition it was found that appropriate techniques and software tools were used for the quantification of risk as part of Shell's risk assessment.

As described above, the PHA identified the potential hazards associated with the operation of the development as a finished petroleum products import, blending, storage and distribution terminal. The key components of the development relevant to the risk assessment include:

- reallocation and refurbishment of existing tanks for the storage of flammable and combustible liquids including gasoline, diesel and jet fuel, including the installation of domed roofs on the jet fuel storage tanks;
- continued storage of butane gas;
- storage of liquefied petroleum gas (LPG), however this would be phased out once the terminal is fully converted;
- retention of existing tanks and construction of new tanks for the storage of slops (the recovered petroleum hydrocarbons which require further processing to make them suitable for use); and
- upgrades to existing infrastructure to improve safety and efficiency, including upgrades to safety shutdown systems, tank instrumentation and alarms, fire-fighting systems and electrical supply and safety systems.

In addition, the PHA considered relevant infrastructure at the adjacent Parramatta Terminal in the risk assessment, including an underground ethanol storage tank, non-LPG road tanker product loading gantry and a vapour recovery unit.

Table 5 describes each aspect of the risk assessment for the development.

***Table 5**: Preliminary Hazard Analysis*

Aspect	Description
Hazard identification	The storage of flammable and combustible liquids has the potential to cause injury or fatality to people and/or damage to property and the biophysical environment. Typical hazards associated with the storage and handling of these substances are fires and explosions following a loss of containment and ignition of product. For example, a leak from a tank or pipework, or the overfilling of a tank (which led to the Buncefield incident) and subsequent ignition may lead to: • pool or bund fires; • tank top fires; • flash fires; • vapour cloud explosions; and • boiling liquid expanding vapour explosions. The potential for escalation of fire scenarios onto adjacent equipment and structures was also considered in the PHA.
Consequence analysis	The consequences of these hazards were analysed for their effects on people and equipment, including: • fire heat radiation; • vapour cloud dispersion, including flash fire; and • explosion overpressure.
Frequency analysis	The likelihood of each incident occurring was included in the modelling, based on various reliability data and detailed analysis of the events required for certain hazards to occur.

The likelihood analysis is used in conjunction with the consequence analysis to determine the risk of an event occurring. The risks to people and property were estimated and presented in the PHA to assess compliance against the relevant criteria from HIPAP No. 4, *Risk Criteria for Land Use Safety Planning,* including:

1. Individual fatality risk;
2. Risk of injury from heat radiation and explosion overpressure;
3. Risk of property damage and accident propagation; and
4. Societal risk.

The risk to the biophysical environment was qualitatively assessed. Societal risk was not quantified in the PHA as there are no residential and sensitive land uses within the maximum distance for the worst case potentially fatal scenario, as determined in the PHA. The Department concludes that this is acceptable.

Outcomes of the PHA

In comparison to the previous refinery operations the assessment found that:

- the individual fatality risk profile of the converted terminal has been significantly reduced, as shown in **Figures 4** and **5** respectively;
- the risk profile of the converted terminal does not extend beyond the boundary of the site when compared with the risk criteria for industrial land use ($50x10^{-6}$/year) shown by the burgundy line on **Figures 4** and **5**;
- the risk contours for the residential land use criteria ($1x10^{-6}$/year) extend marginally off-site across the Duck River, covering a small area of industrial properties to the east, however the risk contours are well clear of any residential area;
- the injury risk contours, and the risk of property damage and accident propagation contours do not extend beyond the boundaries of the proposed facility, as shown in **Figures 6** and **7** respectively; and
- the injury risk contours are contained wholly within the site and comply with the relevant risk criteria for residential land use ($50x10^{-6}$ shown by the burgundy line on **Figure 6**).

WorkCover reviewed the PHA and supplementary information provided by Shell. WorkCover advised that Shell had satisfactorily addressed each of the concerns raised by WorkCover and provided recommended conditions relating to implementation of the relevant recommendations of the Buncefield investigation and details of LPG vessel failure modes and their frequency, within the Final Hazard Analysis. The Department has included WorkCover's recommendations into the conditions.

The Department notes that the PHA did not investigate the potential for the concurrent demolition and construction activities to adversely impact on the existing terminal operations. However, the Department considers that this is unlikely to pose a risk to the existing operations as demolition and construction are routine activities at these type of facilities and the majority of demolition works would be removed from the on-going operational area as they are located in the western part of the site. Therefore, the Department has recommended that Shell prepare a Construction and Demolition Safety Study prior to the commencement of any construction and demolition works. The study would investigate the potential for the demolition and construction activities to adversely impact on existing operations and would identify any necessary control measures to prevent or mitigate potential hazards. Construction and demolition works are unable to commence until the Department has approved this study.

The Department concludes that the proposed development remains compliant with the relevant criteria in the Department of Planning and Environment's *HIPAP No. 4 Risk Criteria for Land Use Safety Planning*. The Department also concludes that the proposed development would result in a reduction in off-site risks to people, property and the environment, when compared to the previous refinery operations. This is due to the reduced overall footprint of the development and the cessation of refining crude oil which has inherently greater risks than the storage and handling of finished petroleum products.

Based on the information provided by Shell in the PHA (Revision 1, dated January 2013), the supplementary information in response to the Department's queries, and assuming that all proposed changes and risk reduction measures are implemented, the Department concludes that the development would reduce risks in the local area.

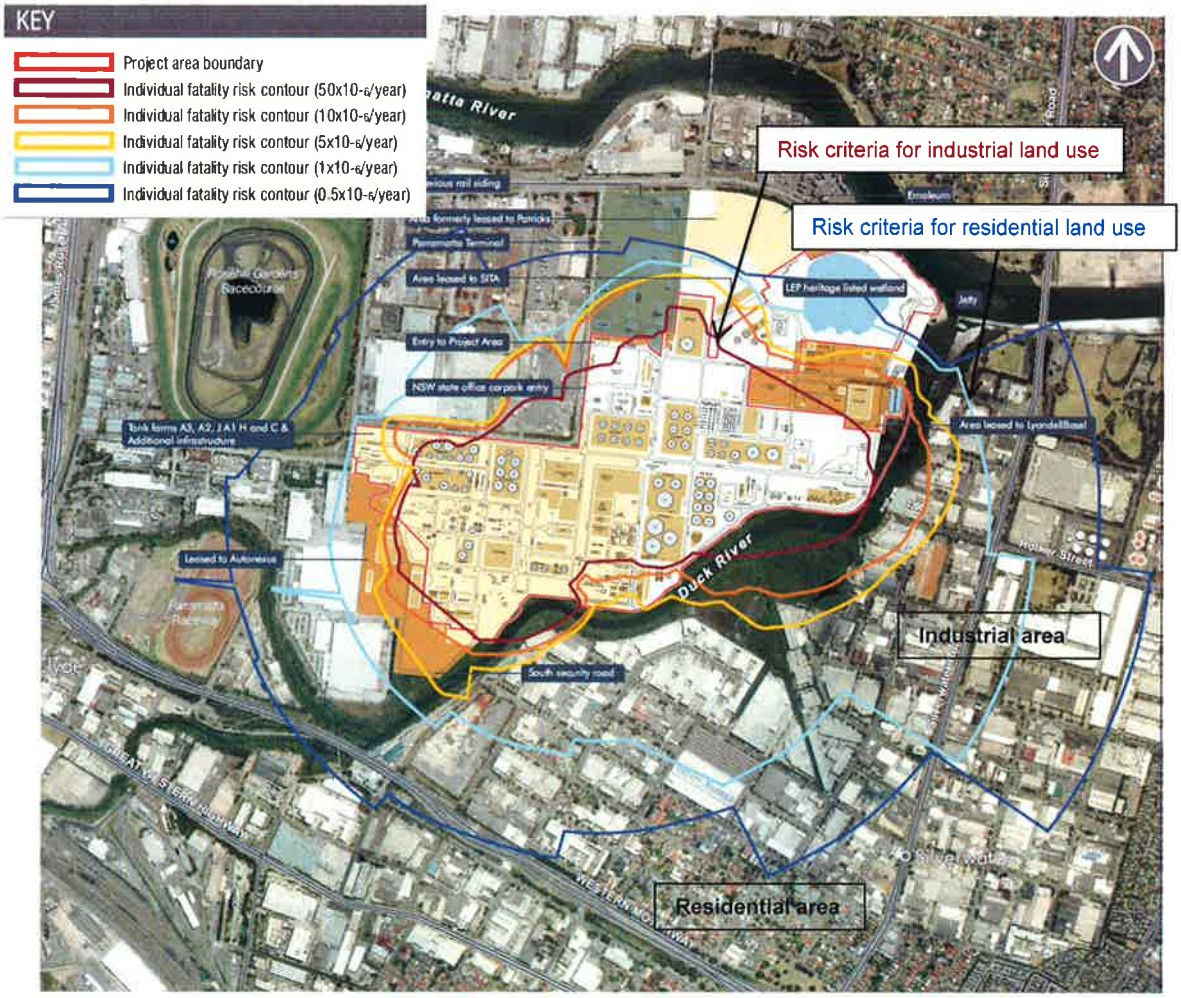

Figure 4: *Individual Fatality Risk Contour (Refinery Operations)*

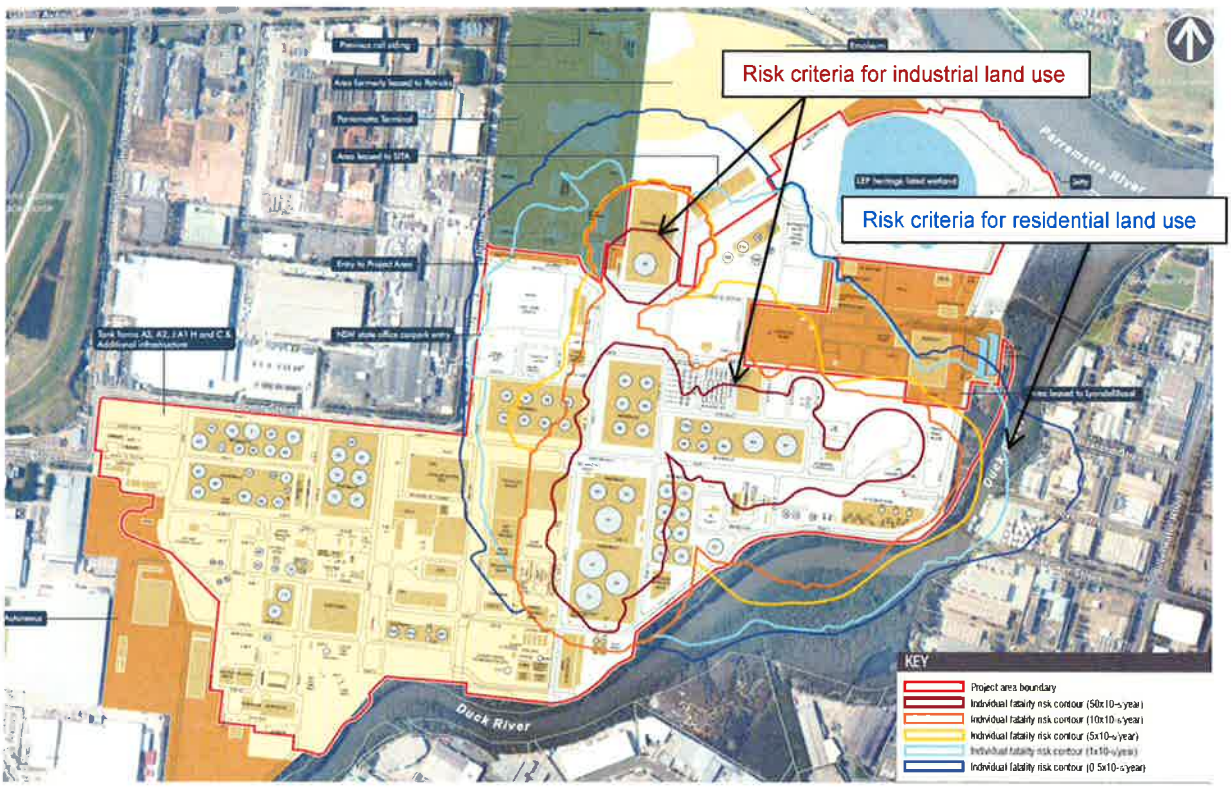

Figure 5*: Individual Fatality Risk Contour (Converted Terminal)*

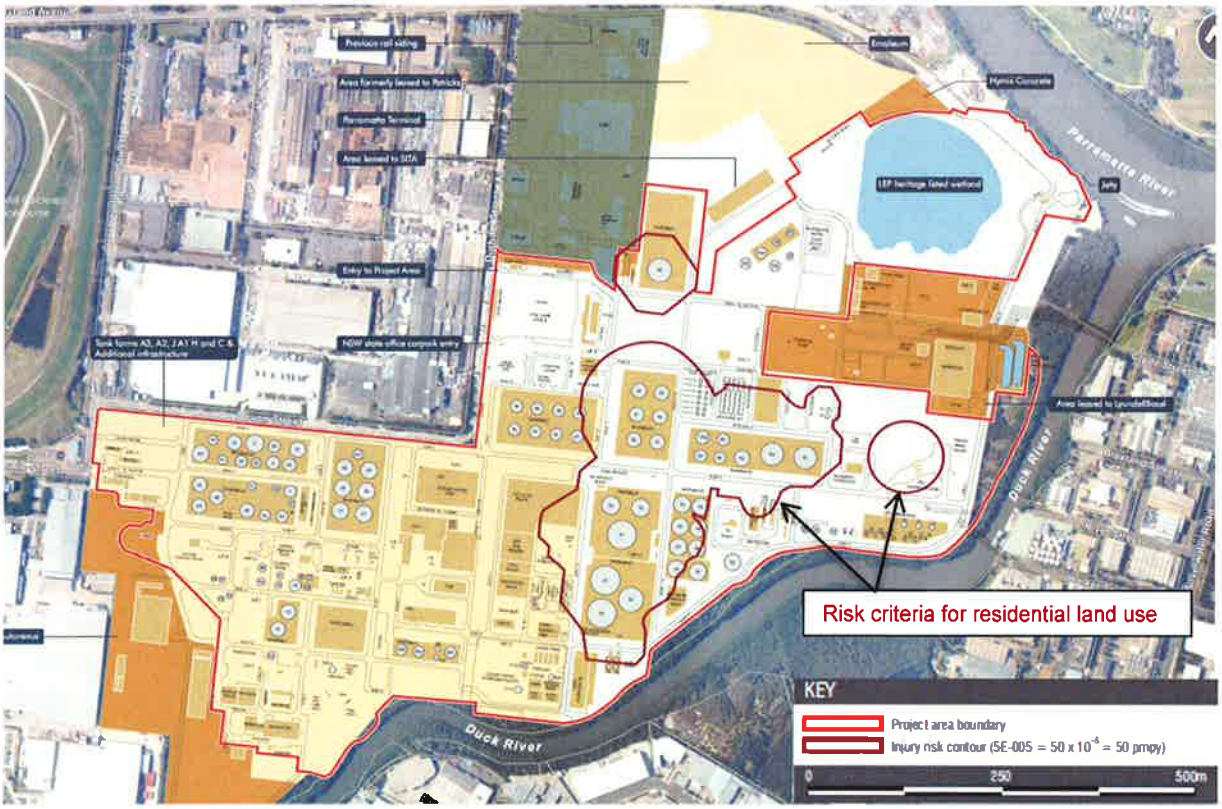

Figure 6: *Injury Risk Contour - Heat Radiation (Converted Terminal)*

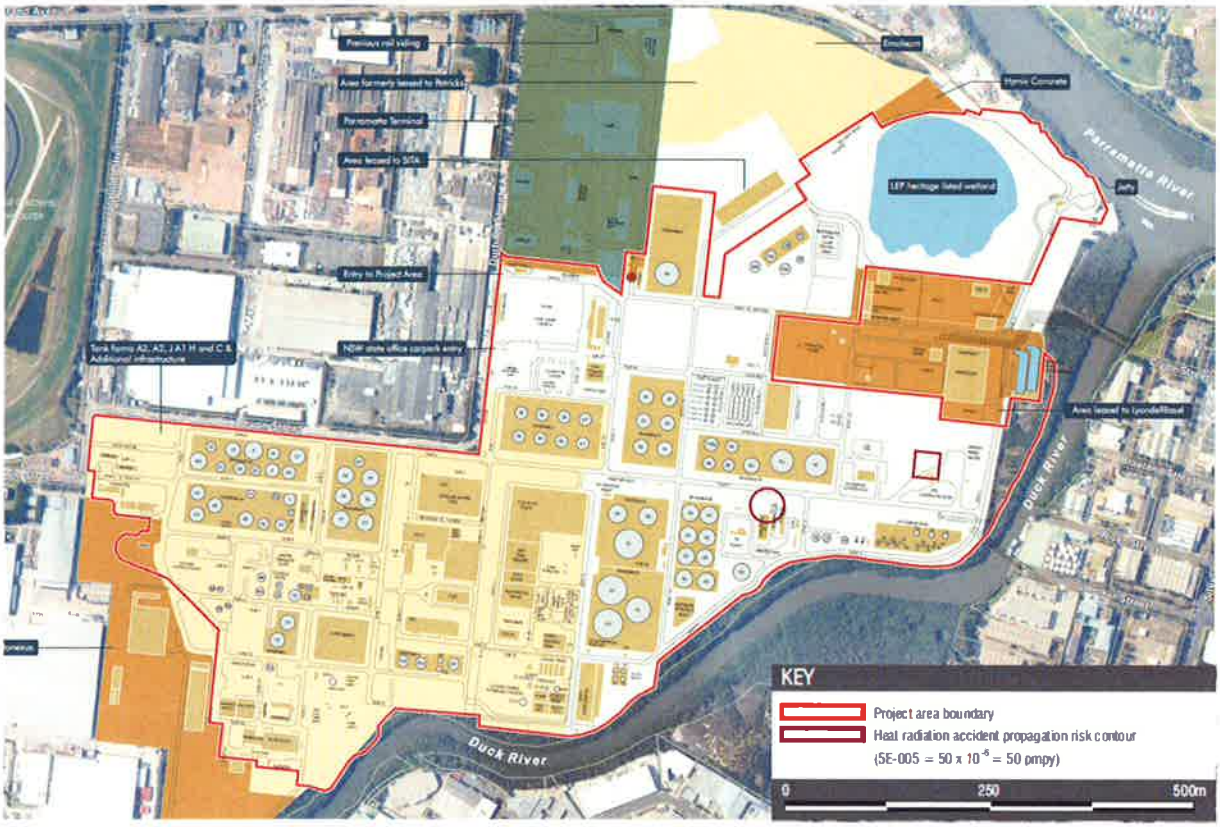

Figure 7: *Risk of Property Damage and Accident Propagation - Heat Radiation (Converted Terminal)*

Notwithstanding, to ensure safe operations throughout the life of the facility, the Department has recommended a number of key hazard related conditions of approval at certain milestones of the operation. This includes conditions at the pre-construction, pre-commissioning, pre-startup, post-

startup phases and conditions relating to the on-going operation of the site. This includes the requirement for Shell to submit the following for review and approval:

- a Fire Safety Study detailing the measures to ensure acceptable fire protection levels at the site;
- a Final Hazard Analysis in accordance with the Department's relevant guidelines;
- a Hazard and Operability Study consistent with the Department's relevant guidelines;
- a Construction and Demolition Safety Study consistent with the Department's relevant guidelines;
- an updated Emergency Plan and Safety Management System to reflect the end-state operations;
- Pre and Post-Startup Compliance Reports detailing compliance with all conditions required to be satisfied prior to and after operation has commenced; and
- on-going independent Hazard Audits to ensure safety and compliance with all statutory documents and approvals.

The Department considers that these measures would ensure that hazards and risks are continually monitored and managed to acceptable levels.

5.2. Demolition and Asbestos

Issue

The demolition activities have the potential to encounter asbestos contained within old refinery equipment, including the chimney stacks and pipework. Blasting to demolish the five chimney stacks also has the potential to cause vibration impacts, such as structural damage to properties, human discomfort, noise and short-term dust impacts.

Consideration

The development involves demolition of redundant refinery infrastructure in the western part of the site over two stages (see **Figure 8**).

In general, demolition activities would involve:

- identification and decontamination of hazardous materials such as asbestos within furnaces, boilers and stacks;
- mechanised demolition or deconstruction of furnaces and boilers;
- demolition of 5 chimney stacks by controlled explosion (blasting);
- mechanised demolition of 97 redundant storage tanks using excavators with hydraulic shears;
- mechanised demolition of redundant buildings;
- selective cutting of pipework and bringing to ground level by crane;
- collapsing of columns, vessels and exchanger structures enabling excavators with mechanical shears to cut up components for scrap and transport off-site; and
- civil works to remove some existing foundations below grade.

Some decontamination and decommissioning of surplus tanks has commenced to prepare the tanks for conversion (to storing finished fuels) or for demolition. Some of the tanks to be demolished are shown in **Figure 9**.

The majority of demolition would be undertaken to ground level, however some minor excavation to remove foundations would be required in some locations. The demolished areas would remain as a mixture of cleared ground, concrete or bitumen surface. Subsequent investigations of soil contamination and any remediation works or future development of the residual land would be subject to separate development assessment.

Approximately 30 contractors are expected on site to undertake demolition works (in addition to the 194 staff required for construction, project management and interim operations). Demolition works would be restricted to standard construction working hours.

Demolition activities have the following potential impacts:

- an additional 16 heavy vehicles (32 movements) per day to remove waste materials from the site;
- dust and dispersal of hazardous materials;
- noise and vibration;
- hazards and risks associated with simultaneous terminal operations and demolition and construction activities; and
- waste generation.

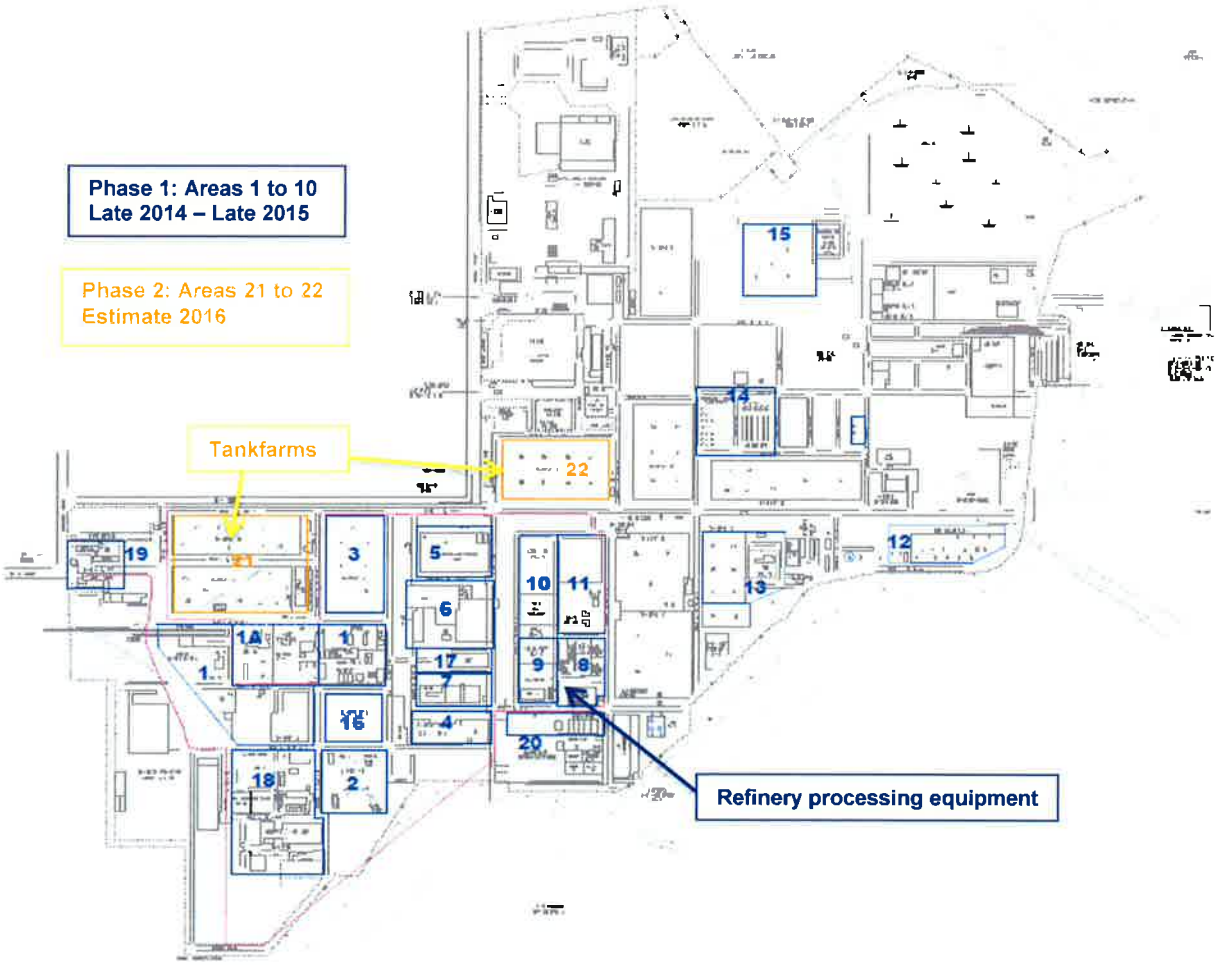

Figure 8: *Demolition Phase*

Figure 9: *Some of the tanks to be demolished*

Shell has proposed the following management measures for the demolition activities:

- removal of hazardous materials prior to commencement of demolition;
- obtaining relevant approvals for demolition, disposal of contaminated waste and transport of oversized loads;
- training of personnel and contractors in the management and handling of hazardous materials;
- preparation of a blast management plan to minimise blasting and vibration impacts off-site and ensure appropriate notification for residents and nearby businesses; and

- implementation of environmental management measures for the demolition phase via specific management plans for traffic, erosion and sediment, air quality, contamination, hazards and risks, waste, noise, blasting, heritage and ecology.

The Department considers that the key issues relevant to demolition include the management of asbestos and blasting of the chimney stacks.

Asbestos Management

Shell commissioned David Bell Consulting (DBC) to inspect and sample materials in the chimney stacks to establish whether asbestos is present. The stacks are shown on **Figure 10** and include:

- Stack 1 – catalytic cracking unit (CCU);
- Stack 2 – crude distillation unit (CDU);
- Stack 3 – utilities (Boilers 7 and 9);
- Stack 4 – high vacuum unit (HVU); and
- Stack 5 – platformer unit 3 (P3).

Figure 10: *Five chimney stacks to be demolished by blasting*

Stack 3 was not internally inspected by DBC as it was still operational at the time of the inspections in September 2013.

Stacks 1, 2, 3 and 4 were constructed in the 1960's comprising of external concrete with internal brick lining. Stack 5 was constructed in 1990 comprising of external concrete with an internal metal tube. Stack 1 was modified in 1986 to remove the internal brick lining and replace it with a gunned refractory. The internal brick lining was also replaced with a gunned refractory in Stack 4.

A review of the original engineering drawings for the stacks showed the presence of asbestos in Stacks 1 and 2. Stack 1 (CCU) contained asbestos cloth seals between the brick cheeks and shell and Stack 2 (CDU) contained aluminium asbestos cloth seals and asbestos yarn between the baffle cheeks and baffle wall. Shell advised that the asbestos was removed from Stack 1 during refurbishment works in 1986/7.

Inspection and sampling carried out by DBC in September 2013 confirmed:

- the presence of asbestos in Stack 2 (CDU);
- no asbestos detected in Stacks 1, 4 and 5; and
- Stack 3 was still operational at the time, hence later testing is proposed for this stack.

Given the presence of asbestos within Stack 2 (CDU), the Department requested that Shell provide confirmation, from a qualified expert, that the asbestos can be safely removed from the stack prior to its demolition by blasting. In response, Shell confirmed that:

- the asbestos could be removed by a licensed asbestos removal contractor, prior to demolition of the stack. Asbestos removal would be carried out in accordance with WorkCover requirements with work undertaken by National Insulation Contractors under the supervision of Liberty Industrial;
- Shell selected the asbestos removal contractor that provided the safest method of removing the asbestos from Stack 2; and
- once the asbestos is removed, a clearance certificate would be issued by a Licensed Asbestos Assessor and the stack would then be demolished by controlled explosion, similar to the other 4 stacks.

The Department concludes that sampling of the stacks was carried out by qualified and experienced contractors, and that the samples were analysed by a NATA accredited laboratory. The Department notes that Stack 3 (Boilers 7 and 9) is yet to be sampled and tested for asbestos. Notwithstanding, the Department has included a requirement in the recommended conditions, that copies of clearance certificates must be provided to the Department for each stack, prior to the commencement of demolition.

Shell also advised that some other plant and equipment to be demolished on site contains asbestos, including insulation on pipework. Shell's contractor, Liberty Industrial, confirmed that they have reviewed the full scope of asbestos removal works and it is their view that all asbestos can be safely removed prior to demolition of the relevant structure or equipment.

The Department concludes that Shell has engaged qualified and experienced contractors that are appropriately licensed to undertake the asbestos removal work. The Department also concludes that the removal of asbestos from the stacks and other equipment to be demolished would be undertaken in accordance with the requirements of WorkCover and the *Work Health and Safety Regulation, 2011* and has reflected this requirement in the recommended conditions. WorkCover and the EPA did not raise any concerns regarding the management of asbestos during demolition.

The Department has recommended conditions requiring Shell to prepare and implement a Demolition Management Plan including:

- detailed procedures for independent testing and analysis of all items to be demolished or disturbed during construction, for the presence of asbestos; and
- copies of asbestos clearance certificates for all items prior to their demolition.

The Department has also recommended that Shell prepare and implement a specific Stack Demolition Management Plan, including copies of asbestos clearance certificates. Specific conditions are also included requiring all asbestos removal activities to be undertaken in compliance with the *Work Health and Safety Regulation 2011* for the safe handling, transport and disposal of asbestos.

Blasting of the Chimney Stacks

The proposed method for demolishing the five chimney stacks is by blasting, also referred to as controlled felling. The key issues related to this activity are considered below and include:

1. ensuring the methodology for demolition is safe and is adequately managed;
2. notification of the community, adjacent business and road authorities; and
3. blasting and other amenity impacts.

1. Safe Demolition

The demolition would be carried out by an industry expert (Sean Miller of Precision Demolition) who holds the appropriate 'DE1 Demolition License' from WorkCover. Precision Demolition has previously demolished up to 15 chimney stacks at various industrial sites across NSW and Queensland, including the recently demolished Port Kembla Copper stack in February 2014.

The detailed methodology for demolishing the stacks would be prepared by Precision Demolition and is likely to include strategically drilled blast holes within the base sections of the stacks to create a wedge, enabling the stacks to fall onto a pre-prepared stack fall zone, which has been cleared of all equipment and plant. Indicative stack fall zones are shown on **Figure 11**. The final stack fall zones would be determined by Shell and Precision Demolition and would comply with *Australian Standard 2601 – Demolition of Structures, 2001*.

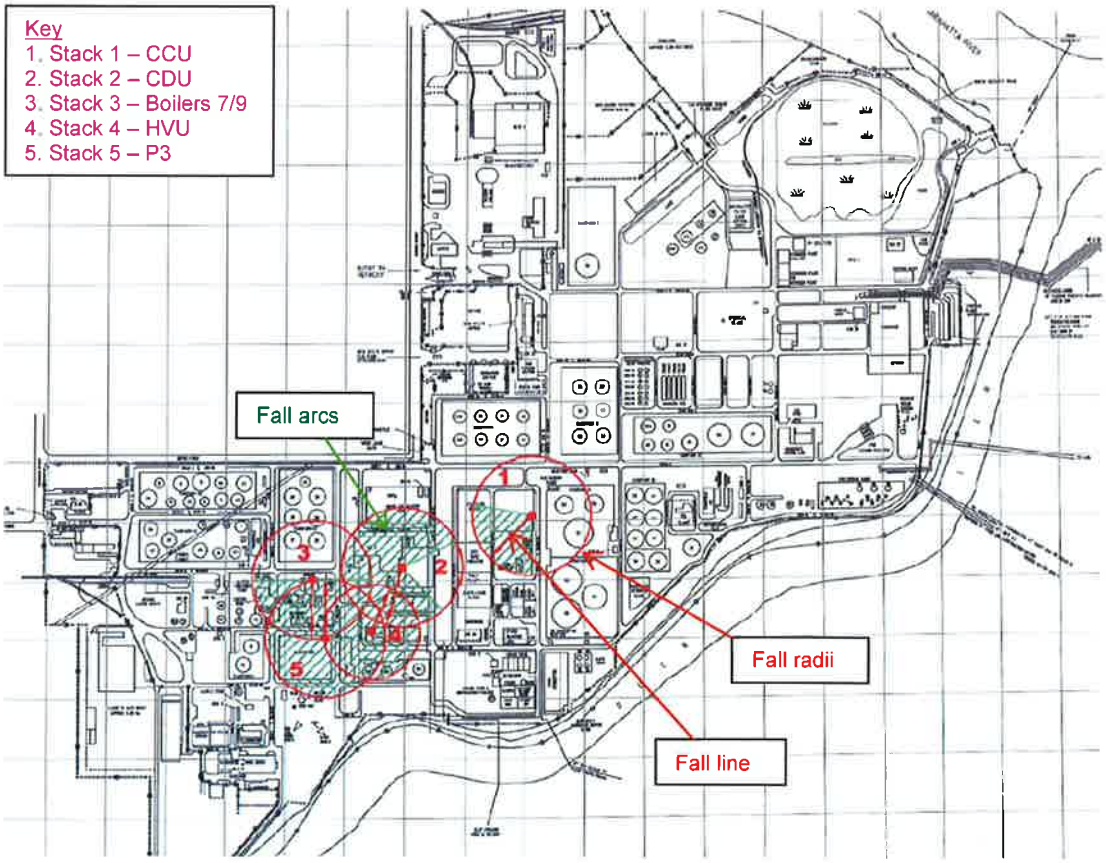

Figure 11: *Indicative Stack Fall Zones [Fall radii (red circles), fall arcs (green hatching), fall lines (red arrows)]*

The nearest residential area to the Shell site is around 600m to the south and approximately 800m from the nearest stack. The stacks range in height from 80 – 100m and given their location on the site would fall entirely within the boundary of Shell's site (see **Figure 11**). As such, the proposed felling of the stacks is also unlikely to cause any disruption to residences, neighbouring industrial premises or roadways.

The Department concludes that demolition of the stacks would be undertaken by an experienced demolition expert that is licensed by WorkCover for this activity. To provide further rigour, the Department has recommended that the demolition methodology and blast calculations be reviewed by an independent structural engineer to ensure that they are appropriate for the site and the structures, and so that any potential impacts and risks are adequately managed and minimised. In addition, the Department has recommended that the demolition expert prepare a Stack Demolition Management Plan to be approved by the Secretary, prior to the commencement of demolition. The Stack Demolition Management Plan is to be prepared in consultation with relevant agencies, including WorkCover, Council, EPA and RMS.

WorkCover did not raise any specific concerns relating to demolition of the chimney stacks. The Department concludes that the recommended conditions would enable the safe demolition of the chimney stacks in accordance with the requirements of the *Work Health and Safety Regulation 2011*.

2. Community Notification

It is anticipated that the stacks would be blasted in five single events occurring on the same day. Felling of each stack would take approximately 15 seconds. The demolition contractor would prepare a detailed methodology for demolishing the stacks, which would include any required exclusion areas or road closures, in accordance with the *Australian Standard 2601 – Demolition of Structures, 2001.*

As shown on **Figure 11**, the stacks would be felled entirely within the site and are unlikely to cause any disruption to residences, neighbouring industrial premises or roadways. Nevertheless, the Department has recommended that the Stack Demolition Management Plan include procedures for notifying residences, businesses and relevant agencies of the timing and method for stack demolition

works, including any required road closures or exclusion areas. In addition, Shell has committed to notifying all sensitive receivers within 500m of the blast locations.

The Department concludes that the recommended conditions are adequate for ensuring that the surrounding community and businesses are informed of the timing and procedures for stack demolition works.

3. Blasting

Blasting of the stacks would be undertaken in five single blasting events (likely to be conducted on the same day), once the majority of the other demolition activities have been completed and the surrounding ground area is cleared.

The EIS included a noise impact assessment (NIA) that considered the impacts of blasting (airblast overpressure and ground vibration) and compared the results against the relevant criteria, including the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC).

The felling of the stacks would create overpressure from the use of explosives and ground borne vibration from the actual impact of the stacks hitting the ground. These impacts would be short-term in nature, lasting around 15 seconds for each stack, but have the potential to cause human annoyance and/or structural damage. Ground vibration is the main cause of structural damage, whereas overpressure relates to human annoyance or window breakage.

Damage and Human Discomfort

Ground vibration levels were predicted based on generic values recommended in *Australian Standard Explosives – Storage and Use Part 2: Use of explosives* (AS 2187.2:2006) and considering 'average' conditions. The NIA predicted that blasting would comply with the relevant criteria at all residential and non-residential receiver locations for the largest maximum instantaneous charge, under average conditions.

The Department concludes that blasting is unlikely to cause physical damage to properties or infrastructure and would meet the relevant criteria for human discomfort. Notwithstanding, the Department has recommended conditions requiring Shell to repair any public, private or commercial property that is physically damaged as a result of the demolition and construction activities.

Blasting Noise

Airblast overpressure levels were predicted using AS 2187.2:2006 including estimates for site characteristics. The estimated airblast overpressure levels are predicted to comply for all residential receivers, however, exceedances are predicted at six surrounding industrial premises, based on estimated values. The maximum predicted exceedance of 131dB(lin) compared with the criteria of 115dB(lin) was predicted for the nearest industrial premises, being 180m to the north of the stacks. Despite the predicted exceedance, the Department notes that the estimates would be confirmed once the detailed blast calculations are completed and reviewed by the independent structural engineer. The exceedance of overpressure levels would not result in structural damages, but present a short-term discomfort for neighbouring industrial premises.

The EPA advised that it is difficult to comply with overpressure levels for discrete blasting events such as the demolition of the chimney stacks and confirmed that the noise impacts could be effectively managed by restrictions on blasting hours (daytime only, Monday to Friday) and through best practice measures and monitoring to be detailed in a Blast Management Plan. The Department has incorporated the EPA's recommendations into the conditions. The Department has recommended that the Blast Management Plan also describe the measures to be implemented to protect people, property and infrastructure during blasting, include a blast monitoring program and detail the procedures for notifying the public of proposed blasting times.

The Department concludes that airblast overpressure and ground vibration from blasting would be effectively monitored and managed through implementation of the recommended conditions.

The Department concludes that the potential impacts of demolition can be appropriately managed via Shell's proposed management measures and the additional recommended conditions requiring a Stack Demolition Management Plan.

5.3. Noise

Issue

The development has the potential to generate noise impacts at sensitive receivers with the primary noise generating activities likely to occur during the concurrent construction, demolition and interim operations phases. Heavy vehicle traffic on site also generates noise with the potential to impact on sensitive receivers.

Consideration

The Clyde Terminal is located in the Camellia Industrial Estate in Rosehill, which is a large industrial precinct supporting medium and heavy industries, many of which operate 24 hours a day. The nearest residential receivers are located in Rydalmere, around 400m to the north-east and Silverwater, some 600m to the south (see **Figure 12**).

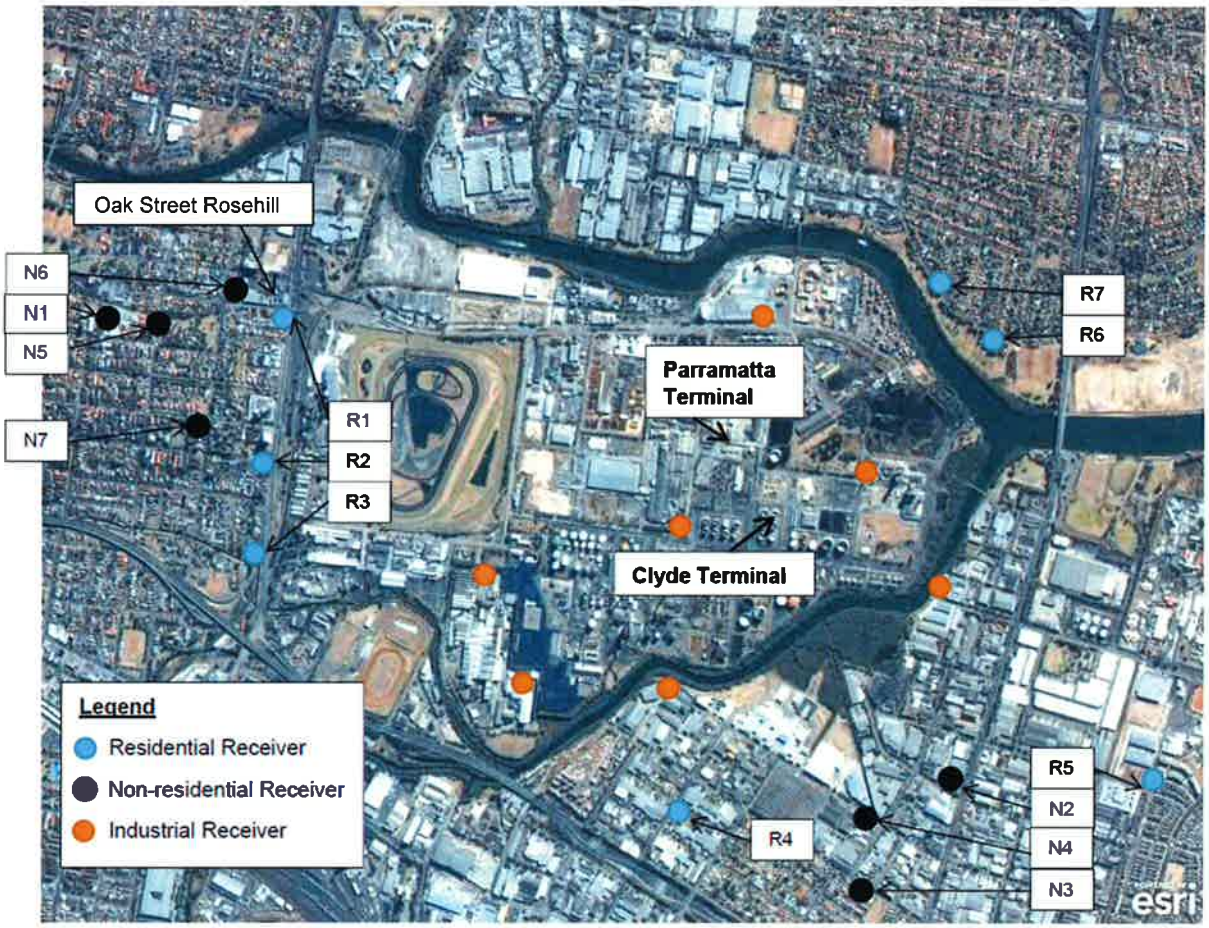

Figure 12: *Nearest Sensitive Receivers*

The EIS included a noise impact assessment (NIA) prepared by AECOM, which considered worst-case noise emissions from construction, demolition and operation and road traffic noise. The NIA considered noise emissions from concurrent construction and demolition activities and provided a separate assessment of noise from the operation of the terminal once conversion works are complete.

The EIS identified the key noise sources from demolition and construction activities, including noise from:

- demolition of plant, tanks, pipework and buildings using mechanical shears, hydraulic shears, pneumatic wrenches and cutting torches;
- use of cranes and trucks for removing waste materials from demolition and during construction works; and
- demolition of the five chimney stacks by blasting.

The primary noise sources during operation of the facility involve the use of pumps to deliver and transfer product to and from the tanks, to the loading gantries and to the slops tanks. Heavy vehicle

movements on the site (257 per day) are also a key noise source. The terminal operates 24 hours a day, 7 days a week.

Construction and Demolition
The EIS included the calculation of Noise Management Levels (NMLs) for all sensitive receivers, in accordance with the *Interim Construction Noise Guideline* (ICNG). The NMLs for the residential receivers range from 46-47dB(A). Noise levels from construction and demolition were predicted for the daytime period only as these works would be limited to standard construction hours (daytime only).

The NIA predicted that concurrent construction and demolition works would exceed the NMLs by 3-4dB(A) at the residential receivers in Rydalmere [predicted level of 50dB(A) at R6, R7] and Silverwater [predicted level of 49dB(A) at R4], with demolition activities the main contributor, see **Figure 12**. Noise levels would comply with the NMLs at all other residential and non-residential receivers, including the nearby school, childcare centre and churches. The assessment was considered conservative as it assumed simultaneous operation of all construction and demolition equipment with no noise mitigation in place. In practice, it is unlikely that all equipment would operate simultaneously and a number of mitigation measures are proposed, which are discussed below.

To address the predicted exceedance of NML's, Shell proposes to implement a number of mitigation measures which would be incorporated into a construction noise management plan, including the use of temporary noise barriers, silencers on noisy equipment and consultation with landowners prior to undertaking noisy works. The NIA did not clarify the predicted noise reductions that would be achieved by these measures. Notwithstanding, the Department notes that these measures can be effective in reducing noise impacts. The EPA did not raise any concerns regarding the predicted exceedances for the construction and demolition phase and confirmed that a construction and demolition noise management plan would be an appropriate mechanism for managing noise impacts during these phases of work.

The Department notes that whilst the noise levels of concurrent construction and demolition are predicted to exceed the NML's by up to 4dB(A) at residences in Rydalmere and Silverwater, this was based on a conservative assessment. The Department considers that Shell should be required to implement all reasonable and feasible measures to minimise construction and demolition noise and notes that some of these measures have already been identified in the EIS. The Department also notes that where noise levels are predicted to exceed the NML's after application of all reasonable and feasible mitigation measures, the *Interim Construction Noise Guideline* (ICNG) specifies a maximum acceptable construction noise level of 75dB(A) at the nearest receptors for the protection of hearing. The predicted noise levels for construction and demolition are well below the maximum of 75dB(A).

The Department considers that the predicted exceedances during the construction and demolition phases would be short-term and could be effectively managed through the implementation of mitigation measures. The predicted exceedances are not excessive and are well below the maximum acceptable construction noise level of 75dB(A). Construction and demolition works would be restricted to day-time only and would not occur on Sundays or public holidays. The Department has included recommended conditions requiring the preparation of a construction and demolition noise management plan to detail the specific mitigation measures to be implemented, as well as consultation procedures for informing residents of noisy works, prior to undertaking such works. The plan must also detail procedures for responding to noise complaints, such as undertaking noise monitoring at sensitive receivers.

Operation
Operational noise levels were predicted for the fully converted terminal and included noise from 27 different pumps, an air compressor and vehicle movements on-site.

Noise levels from the operation were predicted to comply with the project specific noise levels (PSNLs) developed in accordance with the *NSW Industrial Noise Policy* (INP) at all residential and non-residential receivers during day, evening and night-time periods. However, operational noise levels are predicted to equal the night-time noise criteria of 36dB(A) at the nearest residential receivers in Rydalmere (R7) and Silverwater (R4), see **Figure 12**.

The EPA requested some clarifications on the calculations and following review of the RTS, were satisfied with the results of the NIA. The EPA provided recommended noise limits for operation and a requirement to monitor noise to measure compliance with the noise limits.

The Department concludes that the operation of the converted terminal would comply with the relevant noise criteria and would be unlikely to result in adverse noise impacts at sensitive receivers. The Department also notes that the operation of the converted Clyde Terminal would have a reduced noise impact than when the site operated as a refinery, which included the use of large refinery equipment and noise generated by the release of steam from equipment and pipework. Therefore, it is expected that long-term noise from the site would reduce as a result of the development. The Department also notes that the inclusion of noise limits, as recommended by the EPA would provide for stronger regulation of noise from the site, as there are currently no noise limits in the EPL.

The Department concludes that noise from the operation of the terminal would not adversely impact on sensitive receivers and would be consistent with the industrial zoning and use of the site and surrounding Camellia Industrial Estate. The Department has recommended conditions to adequately manage noise, including noise limits, the requirement to implement all reasonable and feasible measures to minimise noise, measures to ensure all plant and equipment are maintained and noise monitoring to demonstrate compliance with the noise limits.

Traffic Noise
The NIA assessed road traffic noise from traffic expected to be generated during the construction, demolition and operational phases, at the most affected residence (Oak Street, Rosehill) in accordance with the EPA's *Road Noise Policy*. The NIA concluded that road traffic noise associated with construction, demolition and operation of the terminal would not increase above existing noise levels at this residence. The existing noise levels are already well above relevant criteria at this residence, being 80dB(A) in the afternoon peak period, compared with a criteria of 60dB(A). The existing traffic noise levels were found to be high at the residence due to its location being adjacent to James Ruse Drive, a six lane arterial road. In addition, the development would not increase road traffic noise levels at this residence, as there would be no change in the number of heavy vehicles accessing the site (compared to previous refinery operations) and the development would also result in a reduction in light vehicles (from 238 to 32 per day). The EPA, RMS and Council did not raise any concerns regarding road traffic noise. Notwithstanding, the Department has recommended conditions requiring a Driver Code of Conduct (refer to Section 5.6) to ensure road traffic noise impacts are minimised as far as practicable.

5.4. Air Quality

Issue
The development has the potential to release volatile organic compounds (VOC's), dust and particulates from the storage of petroleum products and from demolition and construction activities.

Consideration
The primary air emissions from the development include:
- VOC's from the storage of petroleum products such as diesel and jet fuel;
- benzene (a VOC), contained within the fuel blends stored on site; and
- dust and particulate emissions during construction and demolition works.

The EIS included an air quality impact assessment (AQIA) prepared by AECOM. The assessment modelled total VOC and benzene emissions from the converted terminal (end-state operations), in accordance with the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, 2005*. The assessment also provided a qualitative analysis of odour and dust emissions from concurrent construction, demolition and interim operations. The EPA requested additional information regarding specific fuel composition data, inclusion of the final configuration of jet fuel storage tanks in the modelling and details of the proposed emissions monitoring program during and post conversion works. Supplementary assessment information was provided in the RTS which satisfied the EPA's queries.

Construction and Demolition
The EIS outlined the air emissions during the construction and demolition phase that may occur from minor earthworks, demolition of tanks and handling and stockpiling of excavated and demolished material. Decontamination activities have already commenced with the refinery processing assets

cleaned, purged and freed of gas. Pipework and tanks have also been water washed and residual hydrocarbons have been recovered.

The AQIA provided a qualitative assessment of air emissions concluding that there would not be significant odour, particulate or VOC emissions generated during construction and demolition works. The nearest residences are located around 600m to the south of the proposed demolition works and given this distance, the potential dust and particulate emissions are expected to be minor. Shell proposes to manage air emissions through a number of best practice mitigation measures including covering loads during transport, watering exposed surfaces and roads and suspending dust-generating activities during high wind speeds. The Department and the EPA are satisfied that air emissions can be adequately managed through such measures, which are to be incorporated into a construction and demolition air quality management plan.

Operation

The AQIA predicted worst-case emissions of total VOC's and benzene from the 16 fuel storage tanks and 5 slops tanks to be retained as part of the on-going operation of the Terminal using conservative assumptions. Fugitive emissions from pipework, spillages, water/slops systems and pressure relief valves were measured through Shell's existing leak detection and repair program and were determined to be insignificant, hence they were excluded from the modelling. The blending of butane with gasoline was also excluded from the modelling as it is carried out in an enclosed system.

The worst-case predicted emissions of all VOC's within the site boundary are substantially below the EPA's assessment criteria for each fuel type assessed. Therefore, the concentrations at sensitive receptors off-site are also expected to be well below the criteria. The maximum 1-hour average concentration of benzene was predicted to be 0.68 ug/m^3 within the site boundary and is expected to be lower at sensitive receivers. This is well below the EPA criteria of 29 ug/m^3 which applies to sensitive receivers located off-site.

The AQIA also provided a comparison of VOC and benzene emissions from the previous refinery operations with the predictions for the operation of the converted terminal, see Table 6.

***Table 6**: Emissions from Refinery Operations compared to the Fully Converted Terminal*

	Annual Emissions (kg/year)		
Compound	**Refinery (maximum)**	**Converted Terminal**	**EPL Load Limits**
Total VOCs	263,470	40,688	1,250,000
benzene	12,000	148	26,000

Conversion of the terminal would reduce total VOC emissions by 85% and benzene emissions by 99%. The annual loads for the converted terminal would represent 3% of the current allowable EPL limit for VOC's and less than 1% of the allowable limit for benzene.

Given the substantial reduction in emissions during the operation, Shell did not propose any management measures, beyond the preparation of an operational environmental management plan.

As VOC's are the primary source of odour emissions, the assessment concluded that odour would be considerably reduced and no further assessment was warranted. The development involves the installation of domes on the jet fuel storage tanks to minimise odour and emission losses from these tanks. No other measures were considered necessary for the management of odour. The EPA did not raise any concerns regarding odour and provided general conditions for odour emissions.

The EPA recommended that an emissions monitoring program be implemented for on-going operation of the terminal and requested that this form part of an air quality management plan for the development. The EPA also noted that Shell has an existing leak detection and repair program to minimise fugitive VOC emissions, and that the EPA would review the need for an on-going leak detection and repair program following review of the air quality management plan.

The Department concludes that whilst emissions from the converted terminal would be considerably less than when the site operated as a refinery, it is still important that an on-going emissions monitoring program is in place for operation of the converted terminal. Therefore, the Department has incorporated the EPA's recommendation into the conditions. In addition, the Department has recommended general conditions relating to the minimisation and management of dust and odour.

The Department concludes that emissions from the operation would be well below the relevant assessment criteria for VOC's. The Department also considers that an air quality management plan, including an emissions monitoring program would enable the Department and the EPA to regulate the site on an on-going basis and to measure the performance of the development against the predictions in the EIS. The Department acknowledges that the proposed conversion will result in a significant reduction in air emissions from the site and concludes that the converted terminal will not cause adverse air quality impacts.

5.5. Flooding

Issue

The development has the potential to impact on the local flood regime, and flood events have the potential to impact on the development in the following ways:

- causing changes to the local flood regime due to physical works on-site and potential impacts on other developments on the floodplain;
- off-site environmental impacts from flood-induced spills from the site, such as discharge of petroleum products into the Parramatta and Duck Rivers; and
- damage to Shell's assets during a flood event.

Consideration

The EIS considered the local flood regime with reference to Council's recently completed *Duck River and Duck Creek Flood Study Review, 2013* (Flood Study), and qualitatively considered the potential impacts of construction, demolition and operation of the development on flood behaviour.

The Flood Study shows that the majority of the eastern part of the site is affected by a 1% Annual Exceedance Probability (AEP) event, or 1 in 100 year flood event (see **Figure 13**). As the site is low-lying (2-5m AHD), some parts of the site become inundated by floodwaters between 1-4m in depth. Large areas of the eastern part of the site are identified as high hydraulic hazard, which is defined as a 'high flood risk precinct' in the *City of Parramatta Local Floodplain Risk Management Policy, 2006* (see **Figure 13**). The remainder of the eastern part of the site is classified as 'medium flood risk precinct', labelled as low hazard on **Figure 13**. The western part of the site is above the 1% AEP, but would be inundated by the Probable Maximum Flood (PMF) event. This part of the site is classified as low hydraulic hazard.

The EIS noted that the development would involve minimal physical changes to existing infrastructure and considered the key aspect likely to impact on flooding is the replacement of three existing electrical substations in the eastern part of the site. Of the three substations, one is located in the high hydraulic hazard area, one is located in the low hydraulic hazard area and one is located above the 1% AEP, see **Figure 13**.

The EIS concluded that as only minor physical works would be undertaken, the potential impacts on the local flood regime and other users on the floodplain would be negligible. Shell proposes to construct the three electrical substations above the 1% AEP with 100mm of freeboard to ensure that these structures are protected from floodwaters. Shell also noted that it has operated on the site for over 80 years and has an established Emergency Response Plan (ERP) for dealing with flood risks. The ERP includes a specific procedure for flood emergencies, including procedures to shut-down and isolate equipment, valves and bunds and evacuate personnel.

Both Council and OEH raised concerns that the EIS did not include detailed flood modelling of the site and the proposed development. In summary, the concerns raised included:

- that existing infrastructure and roads on site should be assessed for the impact of a flood event;
- the height of the bund walls should be clarified to determine if they would prevent floodwaters impacting on stored substances;
- there is insufficient detail regarding the location of the proposed construction works with respect to the hydraulic categories;
- Council's existing flood model should be updated to include all floodplain obstructions on Shell's site (bunds) to establish any change in flood conveyance and hence hydraulic categories;
- there should be a merit-based argument to support the conclusion that the development is a suitable land use in the high flood risk precinct; and
- the flood emergency response plan should consider the potential for flash flooding in the Duck River and an analysis of when roads become inaccessible to move people and equipment.

Shell met with both Council and OEH to discuss the issues raised. In the RTS, Shell clarified some aspects of the flooding assessment and advised that the bund wall heights on the site range from 4.2m to 5.8m. All bund walls are above the 1% AEP, hence Shell maintains that they would not be overtopped in the 1% AEP. Shell also advised that its pipeline infrastructure is designed to withstand floodwaters and the majority of pipelines containing petroleum products are located within the central part of the site, outside of the high hydraulic hazard area. The hazards and risks associated with flooding were also considered within Shell's Preliminary Hazard Analysis.

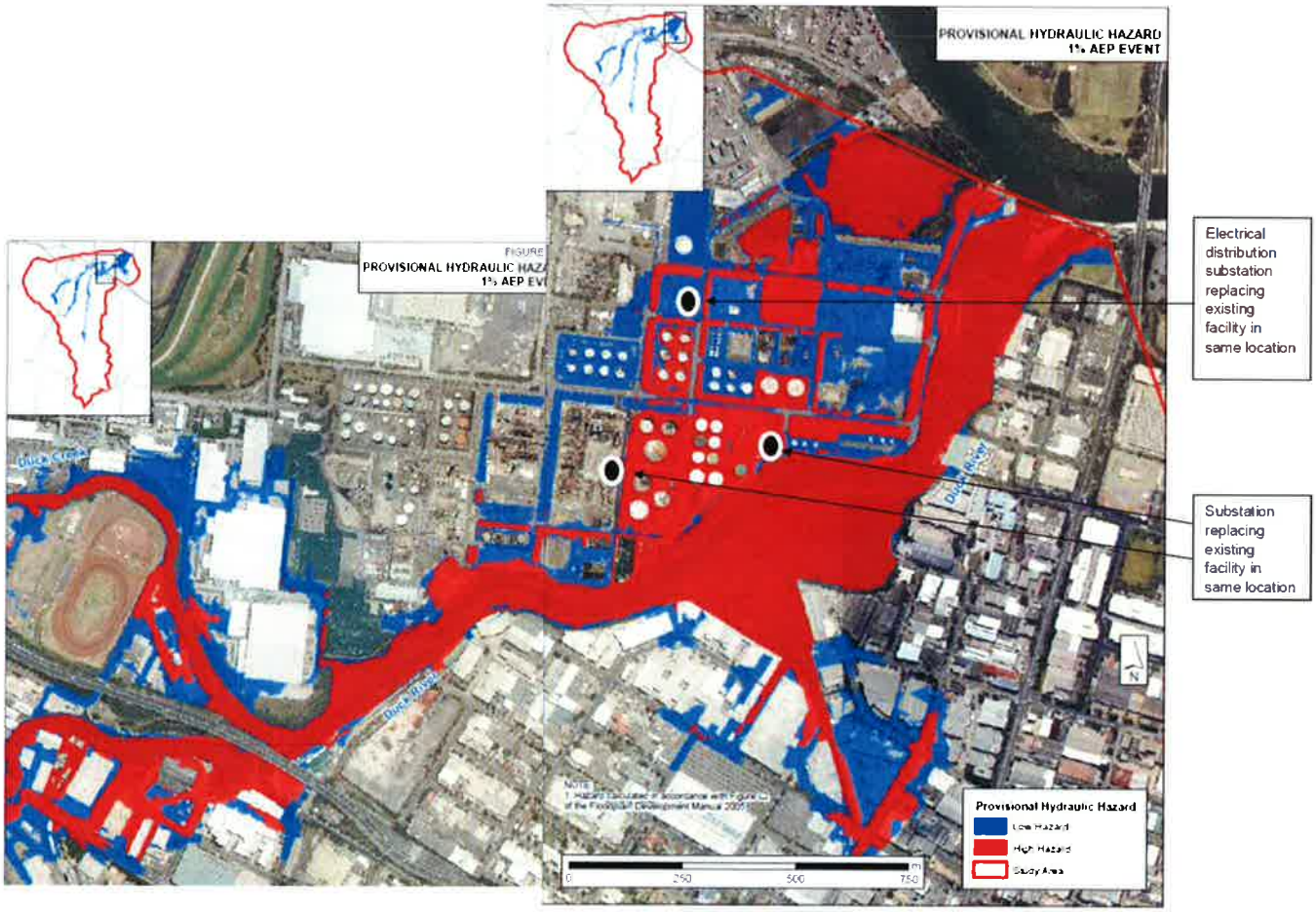

***Figure 13**: Hydraulic hazard categories and location of the three substations*

OEH advised the Department that it was satisfied with Shell's response and did not provide any further recommendations regarding flooding. However, Council still had residual concerns and recommended that Shell provide an assessment of flood risks, flood damage potential and impacts on the local flood regime of existing and new infrastructure and all proposed demolition works. Council advised that the requirement for a detailed flood emergency response plan could be included as a recommended condition.

The Department has considered the flooding aspects of the development in the context of the concerns raised by Council, the future strategic planning for the Camellia peninsula and the *City of Parramatta Local Floodplain Risk Management Policy, 2006.*

Existing Infrastructure

Shell has operated a refinery on the site for the past 80 years, which has involved the construction of large bunded tankfarms for the management and containment of product spills, pipework (much of it elevated), pumping systems and substantial refinery processing equipment. Two major upgrades to the refinery equipment (the fluidised catalytic cracking unit in 2007 and the hydrodesulphurisation unit in 2008) were undertaken in accordance with Ministerial approvals. The existing infrastructure is subject to flooding and this would not change as a result of the development. Shell would continue to manage flood risks on site through its existing ERP.

Proposed Construction Works
The Department requested confirmation from Shell regarding the physical construction works that would be undertaken within the high and low hazard areas. Shell confirmed that the primary activity likely to influence flood behaviour is the replacement of three electrical substations. The Department notes that the existing substations are below the flood planning level and would be removed and replaced by elevated structures that above the 1% AEP. The Department considers that this work is unlikely to substantially alter flood behaviour, or impact on other users on the floodplain. The Department has included a condition requiring the substations to be constructed above the 1% AEP with a freeboard determined in consultation with Council and to the satisfaction of the Secretary.

Strategic Planning / Council Flood Model
The Department acknowledges Council's focus on floodplain management given the recent Flood Study undertaken for the Duck River and Duck Creek. The Department accepts that this is an important step in the planning for future development of the Camellia peninsula. To this effect, the Department understands that any future redevelopment of the residual land created by demolition of the refinery would be required to consider Council's Flood Study and *Local Floodplain Risk Management Policy, 2006* as part of any development application. As the majority of demolition is located on land above the 1% AEP, the Department concludes that flood modelling of this aspect of the development is not warranted. Similarly, the Department considers that a detailed flood study is not required to assess the minor physical works that would be undertaken in the eastern part of the site, as they are unlikely to alter flood behaviour given the small-scale nature of the works.

However, to assist Council with future development planning on the Camellia peninsula, the Department recommends that Shell provide details of all floodplain obstructions on its site, including bunds, buildings and equipment and fund the work required to update Council's flood model with this data. This would ensure that Council's flood model provides an accurate representation of the development post conversion works. The Department has recommended that this be completed within two months of the date of development consent.

Local Floodplain Risk Management Policy, 2006
Council's *Local Floodplain Risk Management Policy, 2006* sets out general principles for development on flood liable land. The Department has considered the development against these principles, see Table 7.

***Table 7**: City of Parramatta Local Floodplain Risk Management Policy, 2006*

General Principles for Development on Flood Liable Land		Department's consideration
O.1	Ensure proponents and the community are fully aware of potential flood hazard and consequent risk associated with the use and development of the floodplain	Shell has operated on the site for over 80 years and is aware of the high hydraulic hazard areas on the site as detailed in the EIS. Shell has designed the development (replacement of electrical substations) to meet relevant flood design criteria to address this risk. The EIS and RTS for the development were publicly exhibited; hence the community is informed about the site's flood risk.
O.2	To require developments of high sensitivity to flood risk (e.g. critical public utilities) be located and designed such that they are subject to no or minimal risk from flooding and have reliable access	Whilst not a public utility, the development is critical to fuel supply security in NSW. It is sensitive to flood risk and if it were a new facility, it would not be appropriate to locate it within a high flood risk precinct. However, the facility has been operating in this location for over 80 years and the development would not substantially alter this use. Shell has confirmed that the infrastructure is able to withstand flooding and have indicated that they would have sufficient warning time to enable emergency evacuation from the site either via road or via Shell's existing boat stored on site.
O.3	Allow development with a lower sensitivity to the flood hazard to be located within the floodplain	Not applicable.
O.4	Prevent any intensification of use within a high flood risk precinct or floodway	The proposal would not intensify the development within the high flood risk precinct as the only physical works are to replace existing substations.
O.5	Ensure that the development does not expose existing development to increased flood risks	As detailed above, the replacement of three substations is unlikely to increase flood risk off-site as the works would remove existing obstructions and replace these with elevated structures that are above the 1% AEP.

General Principles for Development on Flood Liable Land		Department's consideration
O.6	Ensure that design and siting controls to address flood hazard do not result in unacceptable impacts on the character, amenity or ecology of an area	The raising of three substations above the 1% AEP would have no impact on the character, amenity or ecology of the site or surrounding area as it is an industrial site within the Camellia Industrial Estate.
O.7	The minimise the risk to life by ensuring the provision of appropriate access from areas affected by flooding up to extreme events	Shell has an existing ERP detailing evacuation procedures during a flood event. The Department has recommended that this be updated by a qualified and experienced expert, in consultation with Council, prior to the commencement of construction or demolition. This plan would ensure that risks to life are minimised during flood events. The Department has also recommended a condition requiring flood warning signs on site showing the location of assembly and evacuation points above the 1% AEP.
O.8	To minimise the damage to property, including motor vehicles, arising from flooding	As above, the ERP details procedures for making safe and shutting down equipment and product storages in a flood event. These would be updated to address the development and would ensure that damage to property on and off-site is minimised.

The Department concludes that the proposal would not intensify development within the high flood risk precinct; it is unlikely to expose other developments to increased flood risk and there would be appropriate controls in place to respond to and manage flood emergencies to minimise the risk to life and damage to property.

Flood Emergency Response Plan
Shell has an existing emergency response plan that includes procedures for managing a flood event. The Department has recommended that this plan be updated by a qualified and experienced expert, to include procedures for flood emergency response during construction, demolition and operation. The plan must also detail sufficient warning times for flash flooding and detail procedures for the protection of infrastructure and human safety. The plan must be prepared in consultation with Council and be approved by the Secretary prior to the commencement of construction or demolition activities. The Department concludes that through this recommended condition, Council will have the opportunity to contribute to the development of Shell's flood emergency response procedures.

The Department's assessment concludes that the development is unlikely to alter flood behaviour on or off-site due to the minor nature of the physical works and given that there would be no new structures built below the 1% AEP flood level. The Department also concludes that through implementation of the recommended conditions, Shell would have suitable flood emergency response procedures in place for the duration of demolition and construction works and for on-going operation of the facility.

5.6. Traffic and Access

Issue
The site is located within an industrial estate, on a peninsula that is serviced by one main road, Grand Avenue, which is accessed via an intersection with James Ruse Drive and Hassall Street. The volume of traffic utilising this intersection currently exceeds its capacity, hence any increase in traffic accessing the Shell site could further exacerbate delays and queues at this intersection.

Consideration
The EIS included a Transport Impact Assessment (TIA) prepared by AECOM detailing the traffic volumes generated during demolition, construction and concurrent operation, and traffic volumes once the Terminal is fully converted. The TIA also provided a comparative assessment of traffic volumes from when the facility was operating as a refinery.

The entrance to the site is located on Durham Street, which is accessed from Grand Avenue (see **Figure 14**). The primary vehicular route to the site is via Grand Avenue and James Ruse Drive. Vehicles then travel south along James Ruse Drive to access the M4 Motorway, north on James Ruse Drive to access Victoria Road and the Cumberland Highway and directly west along Hassall Street to the Parramatta CBD. A secondary route to the site is also available from Parramatta Road, via Wentworth, Kay, Unwin, Colquhoun and Devon Streets.

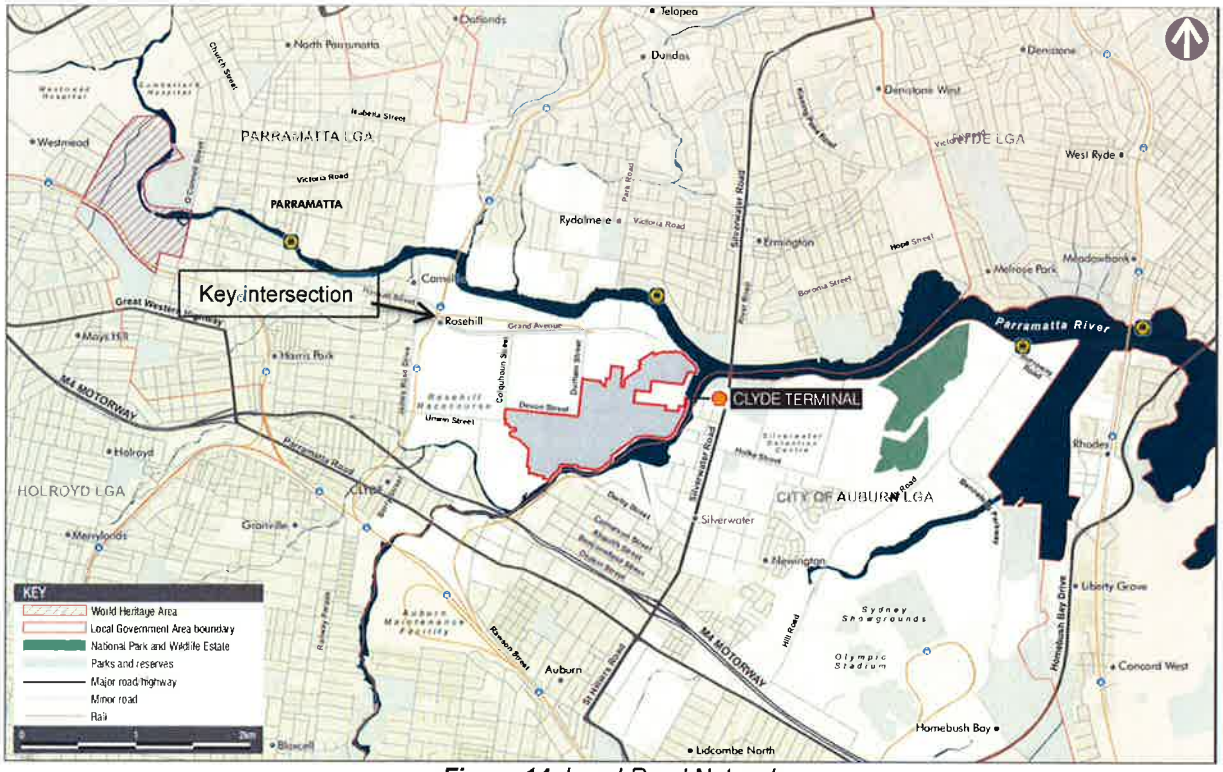

***Figure 14**: Local Road Network*

The TIA provided RMS traffic count data for James Ruse Drive, showing that approximately 65,000 vehicles travel on James Ruse Drive per day. The James Ruse Drive, Grand Avenue, Hassall Street intersection has a level of service of 'F', with long queue lengths and delays, particularly during the AM and PM peak periods. The intersection has no capacity to absorb any additional traffic and requires upgrading or an alternative access to the peninsula to alleviate existing congestion.

The estimated traffic volumes for the development, compared with refinery operations are shown in Table 8.

***Table 8**: Traffic Movements (vehicles per day)*

	Demolition, Construction & Interim Operation	Operation (end-state)	Previous Refining Operations
Light vehicles	169	32	238
Heavy vehicles	277	257	265
Total	**536**	**289**	**503**

The TIA concluded that there would be a temporary increase in vehicle movements during the demolition, construction and concurrent operations phase, however this would be short-term as demolition activities would be concentrated over a 14 month period. The TIA concluded that traffic movements during this phase would be effectively managed via the implementation of a construction traffic management plan. The TIA also noted that once this phase of work is complete, there would be a considerable reduction in light vehicles accessing the site due to the reduction in staff numbers. The TIA confirmed that there is adequate parking available on site to accommodate all light vehicles during the demolition, construction and concurrent operations phase and for on-going operation.

The Department's consideration of the TIA concluded that the development would not alter the level of service at the key intersection for the first 14 months when compared with previous refinery operations. However, once the terminal is fully converted, the development would place less demand on the local road network due to the considerable reduction in light vehicle movements to and from the site.

The Department notes that as the development would only marginally increase traffic volumes for the 14 month period of concurrent demolition, construction and interim operations, no additional management measures are required. The Department has recommended a condition requiring implementation of a construction traffic management plan, including a driver code of conduct to

minimise the impacts of construction and demolition related traffic on the local road network. As the operational phase would see a substantial reduction in light vehicle movements, but a similar number of heavy vehicle movements, the Department has recommended a number of traffic management conditions for on-going operation. These include restrictions on parking and queuing off-site, covering of loads and use of designated routes.

Whilst RMS raised no concerns with the development, Council noted that the existing road network is currently under considerable stress. Council stated that any future redevelopment on the Camellia Peninsula must first address the local traffic issues and noted that the redevelopment of Shell's residual land would likely exacerbate existing traffic congestion.

The Department acknowledges Council's concerns and notes that these issues have been discussed at the Camellia Interagency Committee, which is chaired by the Department and comprises representatives of Council, RMS and other government agencies. This Committee has discussed this and other issues as part of its discussion on broader strategic issues associated with the redevelopment of the Camellia Peninsula. Further to these discussions, the Department understands that Council has recently issued a 'Discussion Paper' on the future strategic direction and uses of the Peninsula. As part of this work, issues such as traffic management and access are being considered at a broader strategic level for the Peninsula as part of a broader whole of government investigation, coordinated between Council, the Department, RMS and Transport NSW.

Redevelopment of Shell's residual land does not form part of this SSD application, hence the Department concludes that the more appropriate forum for consideration of the broader traffic issues is through a whole of government approach, which has been established for this purpose. Shell has also committed to continue working with the Department and Council through participation in these discussions.

Council also raised concerns regarding the current state of disrepair of local roads in the vicinity of the site due to heavy vehicle movements and requested that Shell provide funding to contribute to local road upgrade works (separate to Section 94A development contributions). As the development would result in an overall reduction in vehicle movements than when the refinery was operating, (reduction of 206 light vehicles and 8 heavy vehicles), the Department considers it unwarranted that Shell be required to upgrade local roads. Again, the Department considers that the interagency working group is the appropriate forum for dealing with traffic management and road upgrades required on the peninsula.

The Australian Turf Club raised similar concerns about traffic congestion and suggested that heavy vehicle traffic be directed away from the James Ruse Drive, Grand Avenue intersection, as this area is proposed to be redeveloped for mixed uses. As detailed above, this issue is being considered through the interagency working group.

The Department also notes that any future development application for the residual Shell land would be subject to a detailed merit assessment which would consider traffic impacts.

The Department concludes that the development would generate a minor short-term increase in traffic volumes during demolition and construction, but would have considerably reduced volumes during operation. The Department concludes that traffic impacts would be adequately managed via the recommended conditions.

5.7. Other Issues

The Department's assessment of other issues is provided in Table 9.

***Table 9**: Assessment of other issues*

Consideration	Recommended Conditions
Contamination	
• As required by the existing EPL, Shell implements a Soil and Groundwater Monitoring Plan (SGMP) for the site and reports to the EPA annually on monitoring and site investigations. • In 2012, the EPA issued a preliminary investigation order for the site and requested a report of all available contamination information and identification of data gaps.	Require Shell to: • prepare and implement a Contamination Management Plan prior to the commencement of construction and demolition,

Consideration	Recommended Conditions
• To satisfy the EPA order, Shell commissioned an Environmental Conditions Summary Report which identified the need for additional investigation of the western part of the site following demolition of the refinery assets. • Previous site investigations have identified the primary contaminants on the site as, total recoverable hydrocarbons, benzene, benzo[a]pyrene, total polyaromatic hydrocarbons, asbestos and light non-aqueous phase liquids. • The EIS noted that the development would involve minimal excavation for the removal of foundations and the work is unlikely to intercept groundwater (which is the primary contaminant transport mechanism). • The EIS also noted that soil and groundwater contamination on site is isolated and limited in extent so as not to pose a risk to on-site workers or ecological receptors (such as the wetland and riparian vegetation). • Shell proposes to manage the impacts of the development in accordance with the procedures in the SGMP. Additionally, Shell notes that the development includes improvements and upgrades to Shell's infrastructure which would further reduce the potential for leaks and spills, thus reducing the risk of further site contamination. • The EPA raised no concerns with Shell's proposed management measures and recommended that Shell provide a report of any site investigations undertaken as part of the removal of sub-grade assets. The EPA also recommended that removal of any underground petroleum storage tanks be undertaken in accordance with relevant regulations. • The EPA noted that the existing surface water discharge limits on the EPL do not include all contaminants that may be encountered during construction and demolition. EPA requested information regarding all potential contaminants that could be mobilised and discharged to receiving waters to determine the need to amend the EPL to include discharge limits for specific contaminants. • The Department concludes that construction and demolition works would be managed effectively in accordance with the SGMP and the EPL. Operation of the development would not contribute to further contamination on the site and any future development of the residual land in the western part of the site would be subject to separate contamination investigations and development assessment. • To address the EPA's comments, the Department has recommended that Shell prepare and implement a Contamination Management Plan prior to the commencement of construction and demolition, detailing the contaminants that could be mobilised and the procedures for classifying, handling and disposing of contaminated soils, groundwater and surface water.	detailing the procedures for identifying, classifying, treating and/or disposing of contaminated soil, groundwater and surface water; • identify all contaminants that could be mobilised and discharged to receiving waters; • remove underground petroleum storage tanks in accordance with the *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008*; and • provide a contamination report to the EPA detailing any site investigations in the immediate vicinity of any sub-grade asset removal.
Soil and Water	

• Water on site is managed in three streams:
  • clean stormwater is discharged directly to the Duck River, Parramatta River and the remnant wetland on site;
  • accidentally oily contaminated (AOC) water, which is captured within the tank bunds is diverted through primary water treatment and then discharged to the Duck and Parramatta Rivers;
  • continuously oily contaminated (COC) water, drained from storage tanks, is diverted through primary water treatment structures, tested and then discharged either to the Duck and Parramatta Rivers or to sewer in accordance with a trade waste agreement with Sydney Water.
• The EPL includes licensed discharge points and six monitoring locations on the Duck and Parramatta Rivers.
• The development would result in only minor changes to existing water management on site, including the addition of a phenol treatment facility to further improve the treatment of water, and demolition of the biotreater.
• Stormwater, AOC and COC water volumes would not change substantially as a result of the development, nor would the type or volume of contaminants change.
• However, as noted above, the EPA requested information regarding all potential contaminants that could be mobilised and discharged to receiving waters, as a result of the disturbance of contaminated soil.
• Construction and demolition activities would generate increased sediment and debris which would be captured in stormwater. Shell proposes to manage these impacts via the implementation of an erosion and sediment control plan.
• As there would be no major change to water management on the site, the
	Require Shell to:
	• prepare and implement an erosion and sediment control plan for construction and demolition;
	• comply with the discharge requirements of the EPL;
	• protect foreshore and inter-tidal areas on the site;
	• store all chemicals, fuels and oils in bunded areas, in accordance with relevant Australian Standards;
	• update and implement a Water Management Plan for the site covering surface water, groundwater and leachate; and
	• prepare and implement an ASSMP for construction and demolition works.

Consideration	Recommended Conditions
Department concludes that it is unlikely that there would be adverse impacts on the Duck and Parramatta Rivers and the remnant wetland. • The Department concludes that the management of stormwater and wastewater would be managed effectively in accordance with the EPL, and the Department's recommended conditions. Acid Sulfate Soils • The Parramatta LEP characterises most of the site as Class 3 Acid Sulfate Soils (ASS), with a high probability of occurrence. • The development includes excavation to an estimated depth of 300mm, hence there is potential to encounter ASS, although the extent and quantity of material likely to be encountered is unknown. • Shell has committed to develop and implement an acid sulphate soils management plan (ASSMP), including a program to monitor for the presence of ASS prior to disturbing soils. • The Department supports Shell's commitment and has included the requirement for an ASSMP in the recommended conditions.	
Waste Management	
• Shell currently manages waste in accordance with the EPA's *Waste Classification Guidelines*, the existing EPL and relevant immobilisation approvals from the EPA. • Shell receives wastes from the Parramatta Terminal, Gore Bay Terminal and the Sydney Metropolitan Pipeline, such as oily water and hydrocarbon/water mixtures. These waste materials are treated on-site by dewatering and weathering in a landfarm, prior to off-site disposal by contractors to licensed facilities. • Shell's existing Waste Management Plan details the procedures for the classification, treatment, handling and disposal of wastes. Construction and Demolition • Construction and demolition waste would include scrap metal, concrete, erosion and sediment control materials, fencing, soil, contaminated soil, timber, glass, plastics, asbestos, polychlorinated biphenyls (PCBs), nuclear isotopes from instrumentation, bathroom wastes and general office waste. • Shell proposes to update its existing Waste Management Plan to detail the procedures for the management of construction and demolition waste, in particular the management of waste that is stored or stockpiled on site, leachate management and recycling of scrap metal and concrete. • The management of special wastes such as asbestos and PCBs would be undertaken in accordance with relevant legislation. • A small amount of nuclear isotopes contained within instrumentation, is classified as hazardous waste and would be managed and disposed of by licensed contractors in accordance with the *Radiation Control Act 1990*. The instrumentation is generally returned to the manufacturer for disposal. • The Department concludes that construction and demolition waste would be adequately managed via an update to the existing Waste Management Plan and has included this as a recommended condition. Operation • Wastes generated during operation would be less than when the refinery was operating and would include sludge, oil filters, oily rags, chemicals, contaminated blue metal (from sludge drying bays), empty drums, scrap metal, erosion and sediment control materials, contaminated soil, soil, bathroom wastes and office waste. • Shell's existing Waste Management Plan would be updated to reflect the converted terminal operations. • The EPA did not raise any concerns regarding waste management and recommended conditions relating to the management of special waste, hazardous waste and the recording of waste sampling and classification data. The Department has included these in the recommended conditions. • Overall, the Department concludes that waste generated during the operation of the development would be satisfactorily managed, subject to the implementation of the recommended conditions.	Require Shell to: • comply with the EPA's *Waste Classification Guidelines* for the management of all wastes on site; • comply with the EPL for the receipt, treatment and handling of wastes received from other sites; • comply with the *Environmentally Hazardous Chemicals Act, 1985* and relevant chemical control orders; • comply with the *Radiation Control Act 1990* and the requirements of the EPA for the management of waste containing radioactive substances; • retain all sampling and waste classification data; and • update and implement the Waste Management Plan to cover the construction, demolition and operational phases of the development.
Pipeline and the Gore Bay Terminal	
• Several public submissions and Hunters Hill Council raised concerns that the Clyde Terminal SSD application, the proposed Gore Bay Terminal (GBT) SSD application and the pipeline connecting the two facilities were not assessed concurrently as one development. • Submitters also expressed concerns that the product being pumped through	No conditions are recommended.

Consideration	Recommended Conditions
the pipeline had already changed since the closure of the refinery and the change in product (from crude oil to petrol) needs to be thoroughly examined in the SSD application. • There are three elements to Shell's operations, the Clyde Terminal, the GBT and the underground pipeline connecting the two terminals. • Shell's conversion to finished product distributions terminals involves two SSD applications, one for the works at the Clyde Terminal and one for the GBT. • Shell had intended to lodge the applications concurrently; however there were delays in lodging the GBT application due to the requirement to undertake further refinement of its technical assessments to support the application, hence delaying this SSD application. • Shell made the decision to lodge the SSD application for the Clyde Terminal first, whilst continuing with the preparation of its assessment for the GBT. • As such, the Department has considered the Clyde Terminal SSD application on its merits, in accordance with the EP&A Act. • With respect to the pipeline, the Department confirms that it is regulated separately by WorkCover under the *Work Health and Safety Regulation 2011*. • This regulatory arrangement does not require development consent for any change to the type of material transferred through the pipeline. However, the regulation does require pipeline owners and operators to manage any potential health and safety issues associated with the transfer of material, in this case finished petroleum products, through the pipeline. • The Department also notes that historically Shell has, under this regulatory regime, imported finished petroleum products through the pipeline to balance any shortfalls between refinery production and demand, or during periods of routine plant maintenance. • Since no physical development is proposed to the pipeline and changes to the type of petroleum transported through the pipeline does not require development consent, Shell has not included it within the scope of the SSD application. As such, the Department does not consider it necessary to consult with Councils and landowners along the length of the pipeline as it does not form part of the application. • The Department concludes that the pipeline is appropriately regulated and does not require consideration under the SSD process.	
Biodiversity	
• AECOM undertook an Ecological Assessment (EA) noting that site is highly industrialised but contains remnant vegetation along the foreshore adjoining the Duck and Parramatta Rivers (mangroves and coastal saltmarsh), and in a remnant wetland in the north-eastern part of the site. A small area of Swamp Oak Floodplain Forest, an endangered ecological community (EEC) surrounds the wetland. • The EA identified that the development is unlikely to impact on listed flora and fauna species, EEC's or migratory birds, as there would be no clearing of vegetation. • Assessments under the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were undertaken for the Grey-headed Flying Fox and other microbat species (noted as utilising the chimney stacks for opportunistic roosting) and the Green and Golden Bell Frog (GGBF), concluding that the development is unlikely to impact on these species. • The site supports a key population of the GGBF, recorded within the remnant wetland and some tankfarm bunds. • The development would not impact on the remnant wetland, however it would result in the removal of several tankfarm bunds where GGBF have been recorded. The EA concluded that these are considered unsuitable habitat for this species as the tankfarm bunds are regularly drained to retain capacity for spills. • The EA recommended that pre-work surveys be undertaken for the presence of GGBF to enable relocation, as well as inspections of exterior casings of the chimney stacks prior to demolition, for the presence of Grey-headed Flying Fox and other microbat species. • OEH noted that the artificial habitat of the tankfarm bunds may provide critical breeding habitat for the GGBF due to the lack of predatory fish (*Gambusia*). OEH recommended that the loss of this habitat be offset by providing compensatory breeding habitat that is actively managed to be free	Require Shell to: • prepare and implement a Biodiversity Management Plan, to be approved prior to construction and demolition; • update the PoM for the GGBF to include active management to ensure the habitat remains free of predatory fish; • a qualified ecologist to conduct pre-work surveys to establish the presence of GGBF, Grey-headed Flying Fox and other microbat species and relocate if identified on site; and • implement a pest, vermin and noxious weed management plan.

Consideration	Recommended Conditions
of *Gambusia*. • In the RTS, Shell advised that it had engaged Dr Arthur White to prepare a Plan of Management (PoM) for the GGBF, which had been submitted to the Commonwealth Department of the Environment (as part of the referral as a 'controlled action' under the EPBC Act) and subsequently to OEH. The PoM details the planned re-structuring of the wetlands to provide improved breeding habitat for the GGBF, separate from the operational areas. • OEH were satisfied with the measures proposed by Shell in the PoM and provided some additional recommendations for the active management of *Gambusia*. • The Department concludes that the development is unlikely to impact on listed flora and fauna species and EECs. The Department has recommended that Shell submit a Biodiversity Management Plan for the development, including an updated PoM for the GGBF incorporating OEH's recommendations.	
Heritage	
Non-Aboriginal Heritage • The EIS included an historical archaeological assessment (HAA) that identified four key historical phases for the site, including Aboriginal occupation pre 1804, early land grants and Elizabeth Farm from 1816 to 1918, early refinery operations by John Fell & Co from 1918 to 1927 and the Shell refinery from 1928 to the present. • The HAA noted that whilst the site is not listed on any State or local heritage register, it is of State historical, associative, rarity and representative significance and of local social, research and technical significance. • The wetland in the north-eastern part of the site is listed as a local heritage item on the Parramatta LEP and the Shell Oil Refinery Wharf (located just outside the development area) is listed on the *Sydney Harbour Catchment Regional Environmental Plan 2005.* • Two areas of archaeological potential are located on the site, including the area at the corner of Devon and Colquhoun Streets that previously contained three houses for site managers and the area of the bitumen gantry that may contain information relating to the layout and functions of the initial refinery established by John Fell in 1918. A memorial plaque to John Simpson Fell, Horrace Liddon Spencer and Albert Edward Ward, who were killed in an explosion on the site in 1927, is located in the bitumen gantry area. • The HAA concluded that demolition of the refinery would have a negative impact on the heritage significance of the site and recommended that oral histories, photographic and archival recording be undertaken prior to demolition. • The development would not impact on the heritage listed wetland. • The HAA also recommended that the memorial plaque be relocated and that subsurface impacts in the areas of archaeological potential be managed in accordance with an Archaeological Research Design and Methodology. • OEH did not provide any comments on the HAA or proposed mitigation measures. Council supported the mitigation measures and the conclusion that the development would not impact on the heritage listed wetland. • The Department has incorporated the mitigation measures into recommended conditions requiring archival recording in accordance with the guidelines of the NSW Heritage Council and a Heritage Management Plan and detailing the procedures for relocation of the memorial plaque and management of subsurface impacts in the areas of archaeological potential. • The Department concludes that the heritage impacts of the development would be appropriately recorded and managed. Aboriginal Heritage • An Aboriginal Cultural Heritage Assessment (ACHA) undertaken by AECOM in consultation with registered Aboriginal parties (RAP) concluded that the site is grossly disturbed, comprised of large areas of fill and highly unlikely to contain Aboriginal archaeological sites. • OEH and Council did not raise any comments regarding Aboriginal heritage. • The Department concludes that the development would not impact on Aboriginal heritage and has recommended conditions in the unlikely event that any objects are uncovered during demolition and construction works.	Require Shell to: • prepare an archival photographic and documentary recording of the existing fabric and operations of the Clyde Refinery; • prepare and implement an Archaeological Research Design and Methodology to manage subsurface impacts in the areas of archaeological potential; • relocate the existing memorial plaque to a publicly accessible area; and • stop work if any further (non-Aboriginal or Aboriginal) heritage items are discovered during demolition and construction, until an assessment is carried out by a qualified heritage professional.
Greenhouse Gas Emissions	
• The EIS included an assessment of Scope 1, 2 and 3 greenhouse gas emissions (GHG) from construction, demolition and operation, in	Require Shell to: • implement all reasonable and

Consideration	Recommended Conditions
accordance with the *National Greenhouse Accounts Factors, 2012*; • The assessment estimated that GHG emissions from operation would total 66,930 tonnes of carbon dioxide equivalent per year (tCO_2-e/yr). • Total GHG emissions during demolition and construction (including concurrent operations) would be slightly higher at 67,066 tCO_2-e/yr due to the increased workforce. • The majority of emissions are Scope 2 (externally purchased electricity), comprising 54,846 tCO_2-e/yr. • Scope 3 emissions did not include emissions from the combustion of finished fuels, as the assessment maintained that the Clyde Terminal is not the end point for these products, as fuels are transferred from the terminal to other facilities for final sale. • Notwithstanding, Shell reports on the GHG emissions from product end use through its global greenhouse reporting protocols. • The estimated 66,930 tCO_2-e/yr from operation represents 0.012% of Australia's total annual emissions of 560.8 million tCO_2-e/yr. • The assessment did not include a comparison of emissions from refining operations, however, given the AQIA noted an 85% reduction in total VOC emissions, a considerable reduction in GHG emissions would also be expected. • Shell has committed to undertaking an energy audit once construction and demolition works are complete to identify energy efficiencies and would implement reasonable and feasible recommendations for efficiency improvements. • Overall, the Department notes that operation of the converted terminal would represent a minor source of GHG emissions in terms of Australia's national emissions and is unlikely to contribute significantly to climate change.	feasible measures to minimise energy use and GHG emissions during construction, demolition and operation.
Development Contributions	
• Council requested that Shell provide contributions in accordance with its Section 94A Development Contributions Plan 2013 to contribute to local infrastructure. • Shell and the Department agreed that Section 94A contributions shall be paid to Council in accordance with the plan, totalling $424,000 to be paid prior to the issue of a construction certificate.	Require Shell to: • pay $424,000 to Council as development contributions, prior to the issue of a construction certificate.
On-going Consent Regime	
• The SSD application involves four primary phases of work including, construction, demolition, interim operations and end-state operations. • The application also seeks to replace all existing development consents and continuing use rights with a single planning approval that encompasses all activities on the site. • The Department has structured the recommended conditions to ensure that all phases are adequately covered and has included a requirement an over-arching environmental management strategy for all aspects of the development, including procedures for informing the local community. • The Department has also included a requirement for an annual review and an independent environmental audit every three years to report on the environmental performance of the development. • The Department concludes that the recommended conditions provide a strong framework for on-going regulation of the site under a single planning approval.	Require Shell to: • surrender all existing development consents for the site within 6 months of approval of the SSD; • prepare and implement an Environmental Management Strategy for all phases of the development; • conduct annual reviews; • conduct an independent environmental audit every 3 years.
Socio-Economic Impacts	
• The EIS identified the potential socio-economic impacts of the development by an analysis of workforce changes. • During refining operations, the facility employed 280 staff. Following the cessation of refining, employee numbers have reduced to 83 for the interim operations period and would further reduce to 58 once fully converted. • Whilst this represents a considerable reduction in the number of full time employees, the development would ensure that Shell's operations remain viable in NSW, providing for the retention of 58 full time jobs. • The development would also ensure that fuel security in NSW is maintained and that Shell is able to meet future growth in fuel demand, thereby ensuring the continued growth of the NSW economy. • The construction and demolition phase would boost employment numbers to a total of 224, providing a short-term stimulus to the local and regional	No conditions recommended.

Consideration	Recommended Conditions
economy. • The Department acknowledges that whilst the cessation of refining activities has led to a reduction in long-term employment on the site, the development would allow for the release of a large area of residual land that is zoned for industrial purposes. This land would be re-developed and would generate jobs that are consistent with the strategic planning for the Camellia peninsula. • On balance, the Department concludes that the socio-economic impacts of the development are acceptable.	

6. CONCLUSION

The Department has assessed the merits of the development having regard to the objects of the EP&A Act and the principles of ecologically sustainable development.

This assessment has concluded that with the implementation of the recommended conditions of approval, the impacts of the development can be mitigated and/or managed to ensure an acceptable level of environmental performance.

The assessment concluded that the proposed development would reduce the overall hazards and risks from the facility as well as reduce the overall noise and air quality impacts from operations at the site, compared to previous refining activities. However, there would be some short-term noise, vibration and dust impacts as a result of demolition and construction works. Operation of the converted terminal would have a minimal effect on the local flood regime and would result in a minor reduction in traffic volumes in the long term.

The Department has recommended a number of conditions including measures to manage hazards and risks, procedures for asbestos removal and demolition, noise limits, air quality monitoring, flooding and emergency response, water, waste, biodiversity and heritage management. The Department has also recommended conditions for on-going environmental management, including annual reporting and regular independent audits.

Overall, the Department concluded that the proposed development would improve the environmental performance of the site and appropriately manage risks associated with the storage of finished petroleum products in line with current best practice.

The development would enable Shell to remain viable and competitive and thereby maintain a presence in the NSW market. Upgrading and improving the efficiency of the ageing infrastructure on the site would ensure that fuel security is maintained in NSW, with Shell supplying 40% of NSW's fuel requirements. The development would also provide adequate capacity to service growth in fuel demand over the next 15 years to support the growing NSW economy.

In addition, the proposal would make a large parcel of residual land available on the Camellia peninsula for future economic use and employment purposes, consistent with the strategic planning currently being undertaken for the area.

The recommended conditions consolidate approximately 215 existing Council and Ministerial consents that apply to the site, providing a single, modern planning approval to simplify regulation of the site.

Consequently, the Department considers that the development is in the public interest and should be approved, subject to conditions.

7. RECOMMENDATION

It is recommended that the Planning Assessment Commission:

- **consider** the findings and recommendations of this report;
- **approve** the development application under section 89E of the EP&A Act; and
- **sign** the attached development consent (refer Appendix A).

Deana Burn
Senior Planning Officer, Industry

8/10/14

Chris Ritchie
Manager – Industry
Industry Assessments

9. 10. 14

Chris Wilson
Executive Director
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