

**APPENDIX C
MANAGEMENT AND MITIGATION MEASURES**

Summary of Mitigation Measures	Project Phase
Commitment	
The Project is to be undertaken in accordance with the commitments provided within this EIS.	All
Transport	
<p>The TIA prepared by AECOM has concluded that the Project would not create significant impacts for the surrounding road network. However, it is nevertheless proposed that:</p> <ul style="list-style-type: none"> - Vehicular traffic would be minimised during peak hour traffic periods where practical do to so; - A Construction Traffic Management Plan be prepared prior to the works commencing; and - Demolition and construction generated traffic would be parked at the Project Area to limit the numbers of vehicles situated in the streets surrounding the Clyde Terminal. 	Demolition and Construction
Social and Economic Effects	
<p>Mitigation measures proposed to minimise potential social and economic impacts of the Project on the surrounding Parramatta LGA during the demolition and construction works, and during the continued operation of the converted Clyde Terminal include:</p> <ul style="list-style-type: none"> - Shell would continue to undertake stakeholder engagement and consultation regarding the Project; - Environmental reporting procedures would continue to be implemented, including a complaints register; - A Construction Traffic Management Plan would be prepared to avoid and minimise potential impacts associated with access routes and major intersections; - A CEMP would be prepared to minimise potential environmental, heritage and social impacts during the demolition and construction works (refer to Section 28.1); and - An OEMP would be prepared to minimise potential environmental and social impacts during operation of the converted Clyde Terminal (refer to Section 28.2). <p>Shell would continue to communicate and consult with staff regarding possible alternative redeployment opportunities for those that would no longer be required at the Clyde Terminal once the conversion works have been completed, where this is reasonable and feasible. Further, mechanical trade and instrument electrical trade apprenticeship roles would be retained where possible to enable completion of those apprenticeships. Shell would also continue to support its Employee Assistance Program.</p>	All

Surface Water, Industrial Water and Flooding

In managing surface water, industrial water and flooding at the Project Area, Shell would implement the following mitigation measures:

<ul style="list-style-type: none"> - A detailed ESCP is to be compiled and included in the CEMP; - Demolition and construction waste would be stored on a sealed and bunded surface whilst awaiting transfer or processing; - Dust suppression and sediment runoff prevention would be undertaken during the demolition and construction works to prevent impacts to surface water quality as follows: <ul style="list-style-type: none"> • Areas of demolition and construction activities would be watered down as required in order to suppress the migration of dust; • In the event that excess industrial water is required, e.g. for dust suppression, sediment traps would be employed around the Project Area to prevent runoff and ensure that any contaminated water is treated and managed appropriately; • Where excavation activities are undertaken soil exposure would be minimised where possible and land disturbance would occur for the shortest time possible. Access to the demolition and construction areas would be controlled and vehicles and machinery would be kept to well defined areas away from excavation sites; • Runoff generated outside of demolition and construction areas would be diverted away from those areas to decrease the potential for contaminated runoff to migrate throughout the Project Area; and • Stockpiles of excavated material would be clearly labelled, located away from trafficked areas and other potential disturbances, placed on geo-fabric lining prevent leachate and erosion, be no more than 5 m tall, and allow adequate room for transport around and management of each stockpile. - Wastewater that has been potentially contaminated during the demolition and construction works would be directed via CPIs to allow for sediment and oil to be removed; - Temporary stormwater management measures (such as sandbags, sediment fences and berms) would be used to minimise the risks of sediment-laden runoff and other construction pollutants entering downstream systems; - During demolition works, potential chemical pollutants (e.g. fuels, oils, lubricants, paints, herbicides, etc.) would be stored in appropriate containers within bunded areas within construction compounds to minimise the risk of spillages and mobilisation of these pollutants into aquatic environments; and - Water saving devices would be installed wherever possible during the conversion works to reduce wastage. 	<p>Demolition and Construction</p>
<ul style="list-style-type: none"> - Surface water quality and volume limits for discharge from the Project Area would continue to be monitored, for example as per the sampling of discharge points identified in EPL No. 570, or any replacement/ amended EPL as provided under the POEO Act; - All fuel products and other potentially hazardous substances at the Project Area would continue to be stored in sealed, bunded areas that would prevent their migration offsite in the event that a storm surge or flood event impacts the Project Area; - The Project would not involve the construction of extensive new infrastructure on land lying within the 1:100 year flood event; - Any new development or infrastructure at the Project Area would be constructed with regard to the design principles and standards outlined in the Floodplain Matrix of Planning and Development Controls identified in the Floodplain Risk Management Policy; - Shell would consult with Parramatta City Council and WMA concerning the results of <i>Duck River and Duck Creek Flood Study Review: Final Draft Report</i> (WMA, 2011) whilst this report is still in draft format; - In consultation with Parramatta City Council as the WMA Final Draft Report is finalised 	<p>All</p>

Summary of Mitigation Measures	Project Phase
<p>and is officially adopted by Council, Shell would develop a site specific Emergency Response Flood Plan demonstrating Shell's ability to secure or move plant, goods and substances above the one percent AEP flood level within the flood warning time that is likely to be available. This Emergency Response Flood Plan would also include requirements for personnel evacuation drills and procedures for equipment and product protection;</p> <ul style="list-style-type: none"> - Infrastructure at the Project Area would continue to be located outside of the riparian buffer zone along the southern and eastern borders of the Project Area; and - The Project would not result in a reduction of wetland or riparian vegetation. 	
<ul style="list-style-type: none"> - The <i>Clyde Terminal Conversion Project: Clyde Waste Water Management System</i> (Shell, 2012a) would be revised once the demolition and construction activities are complete, so that it is up to date for operation of the converted Clyde Terminal; and - Once operation of the converted Clyde Terminal commences, Shell would undertake an internal audit of the Project Area to take stock of how reduced operations have reduced water consumption and improved water efficiency. Further recommendations of the audit would then be taken into consideration if further potential water resource savings or opportunities for reuse are identified. 	Operation
Land Use	
<p>It is considered that the Project would not have any significant impacts on land use as it would involve the continued use of the Project Area for purposes similar to its current use. Shell would continue its dialogue with land users who are currently leasing land adjacent to the Project Area from Shell.</p> <p>In considering a future use of the surplus land in the western and north-eastern sections of the Project Area, Shell would take into account:</p> <ul style="list-style-type: none"> - The extent of any contamination that is discovered in the western and north-eastern sections of the Project Area; - The extent of any remediation that is required subsequent to those contamination investigations; and - Consultation with relevant Government departments and agencies such as the EPA, DP&I and Parramatta City Council, and Council's desired strategic planning outcomes for the Camellia Industrial Estate. 	All
Air Quality and Odour	
<p>Potential fugitive dust and odour impacts resulting from demolition and construction works would be managed by the CEMP which would include the following measures:</p> <ul style="list-style-type: none"> - Loads would be covered during transportation; - Exposed surfaces and roads would be watered as required; - Measures would be implemented to modify or suspend dust-generating activities during periods of high wind speeds or whenever dust plumes from the works are visible. A high wind value should be decided through discussions with regulators, however a typical value is 8 m/s averaged over a 1-hour period; - Regularly trafficked surfaces would be sealed as soon as possible after construction; - Roadway use would be controlled i.e. through defined road access to minimise dust; - Complaints management system would be in place; and - Accidental spills would be immediately cleaned up. <p>Potential fuel combustion emissions resulting from vehicles and equipment associated with the demolition and construction works would be managed with the following measures:</p> <ul style="list-style-type: none"> - Engines would be turned off while parked onsite; - Vehicular access would be confined to designated, sealed access roads; - Equipment, plant and machinery would be regularly tuned, modified or maintained to minimise visible smoke and emissions; - Project Area speed limits would be implemented; and 	Demolition and Construction

Summary of Mitigation Measures	Project Phase
<ul style="list-style-type: none"> - Haul road lengths would be minimised. 	
Ecology	
<p>It is considered that the Project would not have a significant effect on the GGBF, Microbats, Grey-headed Flying-fox or any other flora and fauna in the vicinity of the Project Area. Any impacts to species can be adequately managed through development of the following mitigation measures. For the conversion works, measures shall be incorporated into a CEMP.</p>	
<p>Green and Golden Bell Frog</p> <p>A GGBF specific mitigation strategy is to be prepared and included as a sub-plan to the CEMP for the proposed Project, in consultation with the NSW OEH OEH. The CEMP GGBF sub-plan shall include, but not be limited to:</p> <ul style="list-style-type: none"> - Design and implementation of pre-works surveys (conducted by a suitably qualified ecologist) to identify and, if necessary, relocate frogs found within the footprint of the actual conversion works; and - Any frogs found would be relocated to the remnant wetland (within the Project Area boundary), by appropriately trained personnel adopting the <i>Frog Hygiene Protocol</i> (Department of Environment and Climate Change, 2008d). This would not require licensing for translocation of threatened species under the NSW TSC Act. <p>Compensatory actions considered to date for the loss of opportunistic habitat sites within certain tankfarm bunds include those in accordance with Shell's <i>Wetland Management Plan – Clyde Wetlands Shell Refinery Rosehill, 2007</i>. This management plan would be updated to include management measures for GGBF, and would continue to be applied to the remnant wetlands as follows:</p> <ul style="list-style-type: none"> - Creation and management of refuge habitat such as rock piles (being a less complicated refuge habitat option) for long term placement within the subject areas to provide over-wintering habitat; - Replacement of non-endemic vegetation such as <i>Juncus acutus</i> (Spiny rush) within the remnant wetland with alternative native sedges, rushes and grasses to provide GGBF shelter habitat; - Additional enhancement of land within the boundary of the remnant wetland to suit GGBF habitat such as developing additional pondage and/or by the placement of smaller prefabricated ponds to provide additional habitat during breeding season; and - Design and implementation of a systematic monitoring, reporting and feedback program to assess GGBF relocation, mitigation measures undertaken, and population dynamics for this site. <p>Management of Impacts</p> <p>A suitably qualified ecologist is to be engaged prior to the issue of plans for demolition and construction works to improve tankfarm drainage to advise on the following:</p> <ul style="list-style-type: none"> - Proposed works to reduce the risk of potential impacts to GGBF, and - Proposed specific mitigation strategies contained within the CEMP. <p>The CEMP GGBF sub-plan is also to include:</p> <ul style="list-style-type: none"> - Management of site demolition and construction works such that disinfection of demolition and construction plant and equipment is carried out at a safe distance from the remnant wetland, so that excess disinfecting solution or material does not contaminate waterways; and - Site inductions for all workers are to include emphasis on the special requirements for identifying and protecting GGBF. Inductions are to be mandatory prior to access permission to the construction site. Routine updates of the induction are to be provided at routine 'toolbox' meetings. 	<p>All (as appropriate)</p>
<p>Grey-headed Flying Fox and Microbat Species</p> <p>Prior to demolition works, inspection of exterior casings and insulations on towers (i.e. potential habitat where microbats have historically been observed) is to be undertaken</p>	<p>Demolition and Construction</p>

Summary of Mitigation Measures	Project Phase
regularly for signs of microbat occurrence. Regular inspections would also be undertaken of buildings scheduled for demolition.	
<p>Protection of Flora While it is recognised that the proposed Project would require negligible vegetation clearing, the following measures are proposed to ensure that minimal potential impacts occur to vegetation in and adjacent to the proposed works areas:</p> <ul style="list-style-type: none"> - The final demolition plan should minimise the construction footprint and the requirement for clearing of native vegetation wherever possible and within reason given the need to minimise fire hazard risks onsite; - There would be clear marking and delineation of the boundaries between the designated construction sites and "no-go" zones, including vegetation that is to be retained, prior to the commencement of construction. This would include signage, barrier fencing and tree guards, wherever they would be appropriate. There would be no storage of soil, building materials, tools, paints, fuel or contaminants, etc. within the no-go areas; - The Australian Standard 4970 (AS4970) for the protection of trees on development sites should be adopted to reduce the impact of incursions into the root zone of trees to be retained; - Shell would continue to undertake ongoing bush regeneration in and around the vicinity of the Project Area; - If any damage occurs to vegetation beyond the nominated work area the Project Manager should be notified so that appropriate remediation strategies can be developed and implemented; - Should the proposed demolition footprint be changed such that works would encroach into more densely vegetated areas, then it is recommended that a suitably qualified ecologist is to be engaged to: <ul style="list-style-type: none"> • Conduct pre-clearance surveys of the final footprint immediately prior to demolition commencing, and • Undertake additional impact assessment if required. - The riparian vegetation along the southern and eastern borders of the Project Area would continue to be preserved. 	Demolition and Construction
<p>Weed Management The following measures would be put in place to manage weeds:</p> <ul style="list-style-type: none"> - Weed infestations found within the Project Area would be removed or controlled prior to works commencing; - Earth-working equipment and vehicles would be cleaned of excess soil by brushing and/or hosing at the start and finish of construction works to minimise the risk of spreading of weed seeds and plant pathogens; - Sediment fences and sediment traps would be installed for the duration of the construction works and stabilisation of disturbed areas by rehabilitation works. This is to contain any sediments containing weed seeds, propagules or plant pathogens at the Project Area; - Soil and vegetation removed would be covered during transport and taken to an approved disposal sites to minimise the risks of spreading weeds and pathogens beyond the work sites; - Weeds (including vegetation, fruit and seed) removed during clearance would be disposed at an approved green waste site. Weed seed heads or flowers should be carefully removed and bagged immediately onsite before appropriate disposal; - Where applicable, weed control would be undertaken in accordance with NSW Agriculture's noxious and environmental weeds control handbook; and - Contractors undertaking weed removal or control would be trained or experienced in weed identification and removal (as per the <i>Pesticide Act 1999</i>). 	All
<p>Plant Pathogen Hygiene <i>Phytophthora cinnamomi</i> is not known to be present in the Project Area and there is little likelihood that the proposed Project would lead to its establishment or spread. However, the</p>	Demolition and Construction

Summary of Mitigation Measures	Project Phase
<p>consequences of infection can be severe. Therefore, the mitigation proposed for consideration for weed management would also provide a precautionary measure for limiting the risk of spread of soils and vegetation of origin other than the Clyde Terminal.</p>	
<p>Protection of Aquatic Environments The following additional measures are recommended to minimise potential impacts to aquatic flora and fauna and water quality of the aquatic environment of the Duck and Parramatta rivers.</p> <ul style="list-style-type: none"> - A detailed ESCP is to be compiled and included in the CEMP; - Demolition and construction waste would be stored on a sealed and bunded surface whilst awaiting transfer or processing; - Dust suppression and sediment runoff prevention would be undertaken during the demolition and construction works; - Wastewater that has been potentially contaminated during the demolition and construction works would be properly treated via the Clyde Terminal wastewater treatment facilities to ensure compliance with the conditions of Shell's EPL No. 570; - Temporary stormwater management measures (such as sandbags, sediment fences and berms), are to be used to minimise the risks of sediment-laden runoff and other construction pollutants entering downstream systems; - During demolition works, potential chemical pollutants (e.g. fuels, oils, lubricants, paints, herbicides, etc.) are to be stored in appropriate containers within bunded areas within construction compounds to minimise the risk of spillages and mobilisation of these pollutants into aquatic environments; - All fuel products and other potentially hazardous substances at the Project Area would continue to be stored in sealed, bunded areas that would prevent their migration offsite in the event that a storm surge or flood event impacts the Project Area; - Manage ASS in accordance with the mitigation measures detailed in Section 17.3 and the Soil and Groundwater Contamination section below. - The riparian buffer zone along the southern and eastern borders of the Project Area, which has the potential to further minimise the impacts of flooding at the Project Area, would continue to be preserved as follows: <ul style="list-style-type: none"> • Contaminated stormwater and wastewater generally would continue to be treated before they are discharged in the vicinity of this riparian buffer zone; • Infrastructure at the Project Area would continue to be located outside of this riparian buffer zone; and • The Project would not result in a reduction of wetland or riparian vegetation. 	<p>Demolition and Construction</p> <p>All</p> <p>Demolition and Construction</p> <p>All</p> <p>All</p>
<p>Soil and Groundwater Contamination</p>	
<p>Currently, soil and groundwater conditions at the Clyde Terminal site are regulated by Condition U1 of EPL No. 570 which references the need for the SGMP 2010 and an associated annual report. The ongoing operations at the Project Area would also continue to be regulated by the requirements of the POEO Act and CLM Act.</p>	
<p>Demolition and Construction Mitigation Measures</p> <ul style="list-style-type: none"> - Prior to demolition and construction activities taking place, Shell would develop an ESCP to manage those risks at the Project Area. The ESCP would be incorporated as part of the CEMP and would be developed in accordance with <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom, 2004); - The SGMP 2010 would be revised as part of the conversion activities where necessary to take account of demolition and construction activities; - Shell would undertake the following actions in accordance with the CEMP for the Project. During the limited excavation activities that are planned for the conversion works, the following management measures would be applied: <ul style="list-style-type: none"> • Reference would be made to the identification of certain Contaminants of Concern in specific areas of the Project Area as per Conceptual Site Model 2012; • With reference to the Conceptual Site Model 2012, soil and groundwater conditions at the Project Area would continue to be managed through a series of triggers and appropriately designed response mechanisms; 	<p>Demolition and Construction</p>

Summary of Mitigation Measures	Project Phase
<ul style="list-style-type: none"> • Identify any required occupational hygiene monitoring for demolition and construction personnel in relation to VOCs; • Any subsurface works would be designed to control and protect the health and safety of people onsite; • The use of geotextile liners or temporary capping would be used to reduce infiltration of surface water runoff where soil is to be excavated during demolition and construction; • Groundwater routine reporting would continue to be undertaken as per Shell's GWSAP, which would be revised as part of the Project; and • If trigger values are exceeded at the Project Area for soil and groundwater quality as outlined in the Environmental Conditions Summary Report (ERM, 2012), the Conceptual Site Model 2012 would be used to guide appropriate clarification or mitigation measures. <ul style="list-style-type: none"> - If contaminated soils are discovered during excavations, they would be separated and managed in accordance with Shell's existing waste management system for the Project Area (refer to Section 20.0), which would be incorporated as part of the Project CEMP; - Further investigations would be undertaken in areas that are currently unable to be accessed due to plant and equipment on these areas, once the aboveground infrastructure is removed and access to the relevant areas is available; - Throughout the Project, Shell would continue to undertake the following management measures as part of the SGMP 2010: <ul style="list-style-type: none"> • Contaminants of Concern would continue to be monitored as part of the ongoing SGMP 2010. A data gap would be identified in the event that one or more of these Contaminants of Concern are detected at concentrations exceeding their applicable groundwater screening criteria and may have the potential to pose a risk to identified receivers. Additional evaluation would then be completed to fill in those data gaps to confirm whether there is a risk that warrants further action; and • In the event that remedial actions are required to mitigate the risk of pathway exposure to contamination, the Conceptual Site Model 2012 would serve as a design basis for that remedial action. - In general, Shell would continue to use a hierarchy of controls, including engineering controls, to mitigate risks and prevent loss of containment during both the conversion works and operation of the converted Clyde Terminal. Shell would continue to focus its incident prevention at the Project Area on strengthening preventative barriers against spills. The infrastructure upgrades undertaken as part of the conversion works would assist in preventing loss of containment by: <ul style="list-style-type: none"> • Upgrading safeguards to prevent tank overfills; and • Ensuring pipelines continue to be designed to withstand greater pressures than the maximum pump discharge pressures. - Existing bund walls at the Clyde Terminal would be inspected prior to the conversion works commencing to identify any necessary improvements. These improvements would include either: <ul style="list-style-type: none"> • The demolition of the existing bund walls; or • Injection of concrete into the existing bund walls to strengthen the structure or repair any faults. - ASS would be managed according to an ASSMP which would be incorporated into the existing <i>Soil and Groundwater Management Plan Shell Clyde Refinery and Parramatta Terminal, Durham Street, Rosehill, NSW</i> (Shell, 2010), the WMP 2013 and the CEMP to be prepared for the conversion works; - Identify any ASS impacted soils within the Project Area before excavation activities are undertaken; - Any ASS impacted soils excavated from the Project Area would be kept wet at all times until it is disposed of and managed in accordance with the <i>Waste Classification Guidelines Part 4: Acid Sulphate Soils</i> (Department of Environment and Climate Change, 2008e); and 	

Summary of Mitigation Measures	Project Phase
<ul style="list-style-type: none"> - Any residual impacts caused by lapses in the effectiveness of the ASSMP are likely to be identified through the continued implementation of the Soil and Groundwater Management Plan. The ASSMP would also include a contingency plan to manage impacts that have the potential to occur if specified management strategies fail, and to outline any remediation and restoration actions that may therefore be required. This would ensure that the ASSMP addresses its own effectiveness and reliability in managing any residual ASS impacts. 	
<p>Ongoing Operational Mitigation Measures</p> <ul style="list-style-type: none"> - The SGMP 2010 would be revised as part of the operation of the converted Clyde Terminal to take account of the upgraded operations; - Shell would determine if the surplus land in the western and north-eastern portion of the Project Area is to be made available for an alternative use and a separate development application would need to be submitted so that any necessary remediation and also redevelopment of this land can take place (the Clyde Remediation and Redevelopment Application); - Following the conversion works and when unimpeded site access is re-established in certain areas, additional investigation and remediation can be completed as required; - The three key barriers to receivers' exposure would be maintained: primary source management; operational area (internal) monitoring; and boundary containment monitoring. These three key barriers would continue monitoring to evaluate barrier effectiveness on a quarterly basis and when otherwise triggered; - Shell's risk management systems would continue to be reviewed and amended before critical changes throughout the conversion works to identify and assess the risks that these changes pose both onsite and offsite, and to ensure multiple layers of controls exist to minimise the opportunity for incidents to occur; - Shell would notify WorkCover of any changes to the levels of risk before critical changes occur throughout the conversion works and would submit safety reports to WorkCover as required, ensuring WorkCover's oversight of the risks and controls at the Clyde Terminal; - Shell would continually review and amend the Emergency Procedure Plans to account for the changes in risks and the changes in fire fighting equipment at the Clyde Terminal throughout the conversion activities, and consult with Fire and Rescue NSW during this process; - The following management measures would be incorporated as part of the OEMP and undertaken to prevent and manage the implications of any loss of containment scenarios: <ul style="list-style-type: none"> • Current systems in place at the Project Area that would continue to prevent loss of primary containment and spill incidents include: <ul style="list-style-type: none"> ▪ Log checklists carried out every shift by operators to ensure that equipment such as valves are in the correct position; ▪ Water drain tanks through quick flush tanks to separate water from fuels, returning fuel to tanks and draining water to wastewater treatment facility, thus minimising the opportunity for fuel to enter the interceptor system; ▪ Decontaminate the tankfarms, drainage and wastewater systems across the Clyde Terminal area to ensure minimal opportunity for stormwater to be impacted by remnant hydrocarbon contact; ▪ Re-profile tankfarm floors to ensure adequate and effective stormwater draining and bund capacity is preserved to serve its primary purpose of protection of the environment from hydrocarbon spillage; and ▪ Review and repair tankfarm bund walls where required to ensure integrity in the event of a spill incident. 	All (as appropriate)

Summary of Mitigation Measures	Project Phase
<ul style="list-style-type: none"> • Tank overfill would continue to be prevented through a combination of: <ul style="list-style-type: none"> ▪ An automatic tank level gauging system with multiple level alarms including: target fill level; high level alarm with time for appropriate operator action at each point and before the next level; an alarm point; and manual dips to provide accuracy of the tank level gauging system; ▪ A final independent high-high level alarm system that provides an alarm independently from the other alarms and tank level gauging system. This system provides for sufficient response time before overfill is anticipated to occur and would trip inflow facility pumps shutting down product inflow to tanks; ▪ The movement management system that provides for the analysis of data and tank movement management; and ▪ Operational readiness planning with procedural support. 	
<ul style="list-style-type: none"> • A series of facility integrity checklists would be developed consistent with other Shell terminal facilities to ensure inspections and maintenance of safety and environmentally critical equipment and repairs are undertaken in a timely manner; • Shell's existing Permit to Work system would be changed to be appropriate for converted Clyde Terminal operations and would be introduced with appropriate training and mentoring to ensure controls are in place across the Clyde Terminal to control all works, and to integrate these with non-routine activities during operation of the converted Clyde Terminal; • Operators would continue to be trained to look for spills and leaks in the course of their shift rounds; • Operators would be trained in the new environmental controls appropriate for the converted Clyde Terminal operations and specifically in the use of newly installed environmental control equipment; • Existing interceptors within the Project Area would continue to be maintained as a means of tertiary containment; and • Spill incidents would be reported within the Shell incident reporting system and, where required, to the EPA and WorkCover. <p>- If a release event is known or suspected to have occurred, additional assessment may be justified to determine if there have been any soil and groundwater impacts under the SGMP 2010 as follows:</p> <ul style="list-style-type: none"> • A program of works would be developed to cover any data gaps and determine whether any associated risks are within acceptable levels; • Investigation techniques to be employed would include, where relevant: <ul style="list-style-type: none"> ▪ Trial pit excavations; ▪ Advancement of soil bores; ▪ Monitoring well installations; and ▪ Analytical sampling of soil and groundwater quality. • If investigation shows that risks are greater than acceptable levels identified in the SGMP 2010, some form of remedial action would be warranted in order to eliminate or reduce potential exposure pathways. This would be likely to involve one or more of the following: <ul style="list-style-type: none"> ▪ Excavation of surface soil and removal or treatment before reinstatement; ▪ Excavation of interception trenches and associated pumps as needed to remove and prevent further spread of shallow groundwater contamination; ▪ Installation of pumps in groundwater wells to remove or control the spread of contamination; and ▪ Emplacement of impermeable materials in soil trenches to contain the spread of contaminated groundwater. 	
European Heritage	
<p>It is anticipated that the impacts to the historical and technical significance of the Refinery can be managed through a full photographic and documentary archival recording of the facility. Specifically, the following mitigation measures are recommended for the Project to minimise impacts on heritage significance.</p>	

Summary of Mitigation Measures	Project Phase
<ul style="list-style-type: none"> - Parramatta Council requires consideration be given to provision of an Arts Plan. As such, oral histories are to be recorded from past and present staff regarding the operations of the former Clyde Refinery, and a full photographic and documentary archival recording of the Project Area would be used to manage the impact to the historical and technical significance of the former Clyde Refinery; - Photographic recording would be undertaken in accordance with the NSW Heritage Branch guidelines <i>How to prepare archival records of heritage items</i> (NSW Heritage Office, 1998) and <i>Photographic recording of heritage items using film or digital capture</i> (NSW Heritage Office, 2006); - Archival recordings would be undertaken to capture, prior to demolition works taking place, and for infrastructure that would be demolished; - Documentary recording would contain a detailed timeline of each piece of equipment and tankfarm, together with copies of plans and schematics; - A photographic archival recording would be undertaken prior to the demolition of the stacks. The recording would include broad views of the larger Clyde Refinery area; - Subsurface impacts to the area of archaeological potential identified around the bitumen gantry through the removal of foundations or other invasive works, are to be managed through the preparation and implementation of an Archaeological Research Design and Methodology; - The memorial to John Simpsons Fell, Horace Liddon Spencer and Albert Edward Ward, located near the bitumen gantry, is to be relocated to a publicly accessible area (e.g. visitor car park or Project Area). Shell would investigate the feasibility of undertaking a memorial relocation ceremony involving family and descendants of the three men and use of the plaque as a teaching aid for the importance of workplace safety; and - A brief management section is to be prepared within the Project Area's OEMP to guide the management of archaeological potential at the historical residential area along Devon Street and at the second bitumen gantry. 	Demolition and Construction
Hazard and Risk	
<p><i>Risk Management in Design</i> All tanks converted as part of the Project would be constructed to recognised Australian and International Standards, in line with the existing tanks at the Clyde Terminal.</p> <p>The design would be subject to the Shell risk management process. Risk management activities that directly relate to the NSW Seven Stage Planning Process are outlined below:</p> <ul style="list-style-type: none"> - Preliminary Hazard Analysis; - Shell's Hazard and Effects Management Process; - Hazard and Operability Study; - Fire Safety Study; - Final Hazard Analysis; - Emergency Response Plan Review annually or prior to each critical modification; - Construction Safety Study; - Commissioning review; and - Safety Management System Update. 	Design and Construction
<p><i>Terminal Safety Systems</i> Safety Systems proposed for the Project are as follows:</p> <ul style="list-style-type: none"> - Process Control: The process control system (i.e. tank level gauging) is integrated with the existing Clyde Terminal process Distributed Control System; - Process Shutdown Systems: Existing pump interlocks would be retained and new tank high level trips would be provided as required to demonstrate as low as reasonably practicable risk; - Bund Walls and Drains: The existing bunds and drains would be retained; - Articulated and remotely operated foam application system would be installed; - Fire Water: The existing firewater main, monitors and hydrants would be modified for the converted Clyde Terminal operations; 	All

Summary of Mitigation Measures	Project Phase
<ul style="list-style-type: none"> - Tank Rim Seam Foam Pourers: Rim seal foam pourers would be modified or installed to meet the revised tank configuration; and - Hazardous Area Classification: Ignition sources would be controlled by the application of suitable hazardous area classification standards. 	
<p>Safety in Operation</p> <p>The existing Clyde Terminal and Gore Bay Terminal Management System would be updated to align with operation of the modified Gore Bay Terminal and converted Clyde Terminal. The ERP 2012 would also be updated again as required before operation of the converted Clyde Terminal commences, and in particular the Final Hazard Analysis would be prepared at this time. The implementation of the ERP would include the activation of external emergency services if required.</p>	Operation
<p>Proposed Automation and Safeguarding Operation</p> <p>The following safeguards and automation upgrades are proposed:</p> <ul style="list-style-type: none"> - Yokogawa Prosafe SGS would be installed to replace the functionality of the existing relay logic; - Permissives (interlocks) would be improved to prevent the incorrect valves being opened; - Motorised valves would be installed inside tank bunds to allow quicker acting valves and remote operation; - The reliability of telemetry between Clyde/Gore Bay would be improved; - The Independent High Level Alarm and tank gauging systems would be improved; - Pump trip systems would be improved; - The site fire system and dump valve logic would be improved; and - Non-safeguarding controls would also be upgraded. 	Design and Construction
Waste Management	
<p>Demolition and Construction Waste Mitigation Measures</p> <p>Demolition, construction and operational waste would be managed and disposed of in accordance with relevant State legislation and Government requirements. The existing WMP 2013 would be prepared for demolition and construction works, and this would be incorporated into the CEMP. The following waste management mitigation measures would be incorporated as part of the CEMP for the Project to eliminate or reduce the risk of environmental impacts:</p> <ul style="list-style-type: none"> - Demolition and construction contractors would be required to provide a detailed waste management plan and tracking system that incorporates available recycling options; - Before transfer to the designated locations as per the waste permit system, wastes may require stockpiling. Wastes would be: <ul style="list-style-type: none"> • Clearly labelled, to ensure that all such waste is clearly identified and stored separately from other types of materials and wastes, and particular to ensure that contaminated and non-contaminated wastes are stockpiled separately; • Located away from trafficked areas and other potential disturbances; • Placed on geo-fabric lining and covered to prevent leachate and erosion; and • Be no more than 3 to 5 m tall depending in the type of wastes stockpiled, and allow adequate room for transport around and management of each stockpile. - Demolition and construction waste would be stored on a sealed and bunded surface whilst awaiting transfer or processing; - Radioactive substances waste would be disposed of as per the requirements of the <i>Radiation Control Regulation 2003</i> and the <i>Waste Classification Guidelines Part 3: Waste Containing Radioactive Material</i> (Department of Environment and Climate Change, 2008e); - A small amount of asbestos is present on the Project Area and would require removal during demolition activities. As such, Shell and its contractors would comply with the following obligations set out in Chapter 8 of the WH&S Regulation: <ul style="list-style-type: none"> • Ensure that exposure to asbestos at the Project Area is eliminated as far as reasonably practicable; • Ensure an asbestos register is maintained; • Ensure an asbestos management plan is in place for the Project Area; 	Demolition and Construction

Summary of Mitigation Measures	Project Phase
<ul style="list-style-type: none"> • Engage a licensed asbestos contractor to carry out the removal of asbestos from the Clyde Terminal; • Ensure that health monitoring is provided to those personnel undertaking asbestos works as part of the Project; • Ensure access to the asbestos removal area is limited to those who are actually involved in the removal of the asbestos, including the placement of relevant signage and barriers; • If there is uncertainty as to whether the exposure standard is likely to be exceeded, Shell would engage a competent contractor to perform air quality monitoring in the area; • Decontamination facilities would be provided at all times at the Project Area; and • Ensure that asbestos waste, and asbestos contaminated plant or clothing is decontaminated, sealed and labelled before it is removed from the Project Area to a site that is authorised to receive asbestos waste. <p>- As per the requirements of clause 42 the POEO Waste Regulation, asbestos waste would be securely packaged, be in a sealed container, be wetted down, or be contained in a covered, leak-proof vehicle.</p>	
<p>Operational Waste Mitigation Measures</p> <p>Waste management mitigation measures for operation of the Clyde Terminal would be incorporated into an updated version of the WMP 2013. Operational waste management mitigation measures include:</p> <ul style="list-style-type: none"> - Waste management would continue to be undertaken in accordance with the <i>Waste Avoidance and Resource Recovery Act 2001</i> and the <i>Waste Avoidance and Resource Recovery Strategy 2007</i> (Department of Environment and Conservation, 2007), in that resources would be used efficiently, and the hierarchy of waste avoidance, recovery and disposal would be followed; - Waste would continue to be identified, characterised, classified and separated in accordance with the <i>Waste Classification Guidelines</i> (Department of Environment and Climate Change, 2008e), and records of these procedures would be maintained for the life of the conversion works, and beyond that, for the required statutory period; - The waste permit system for the onsite and offsite transfer and disposal of waste would continue to be followed; - EPL No. 570 would continue to provide the key guidelines for waste management at the Project Area. In particular: <ul style="list-style-type: none"> • Waste designated for recycling would be stored separately from other wastes; • All above ground tanks containing material with the potential to cause environmental harm would be bunded or have an alternative spill containment system in place; and • Dewatered oily sludge would be treated in an onsite landfarm or disposed of offsite to a place that can lawfully accept that class of wastes. - Waste materials would be stored in the designated locations as per EPL No. 570 and the WMP 2013; - Wastes scheduled under the POEO Waste Regulation would continue to be subject to waste tracking requirements, except where an exemption exists under EPL No. 570. A record of these waste movements would nevertheless be maintained by Shell; - Leachate or residual water from waste dewatering activities would be directed to the interceptors for treatment before being released as licensed discharge. Waste materials separated out at the interceptors would be disposed at an offsite licensed facility; - In the unlikely event that waste or its leachate is released to the environment, the investigation and remediation measures outlined in the SGMP 2010 would be adhered to; and - PCB wastes would be managed and disposed of according to the CCO issued by the EPA for the handling of PCB wastes. 	Operation

Summary of Mitigation Measures	Project Phase
<p>Hazardous Waste Mitigation Measures</p> <p>Hazardous wastes generated during demolition and construction activities, and/or operation of the converted Clyde Terminal would be treated or immobilised in the following manner before being transported offsite by a licensed waste contractor:</p> <ul style="list-style-type: none"> - Asbestos wastes according to the requirements of the POEO Waste Regulation, that it be securely packaged in a sealed container and wetted down or contained in a covered, leak-proof vehicle; - PCB wastes according to the CCO issued by the EPA for the handling of PCB wastes; - Oil filters and packing and used oily rags would be managed as prescribed waste. Any powdery used oil-absorbent materials would be bagged or drummed or otherwise contained to facilitate their safe handling and disposal; - Oily sludges (for example, from tank cleaning during the ongoing operation of the Clyde Terminal) would continue to be treated in the sludge dewatering facility and/or the landfarm area, as per EPL No. 570; - Redundant equipment containing any radioactive isotopes would be disposed of as per the requirements of the <i>Radiation Control Regulation 2003</i> and the <i>Waste Classification Guidelines Part 3: Waste Containing Radioactive Material</i> (Department of Environment and Climate Change, 2008e); and - Organic solvents, contaminated blue metal and empty drums would be managed by chemical fixation to convert the hazardous contaminants to a chemically stable form. Where this is not possible, macroencapsulation would be used to place a physical barrier between those contaminated wastes and the surrounding environment. 	All
Aboriginal Heritage	
<p>Whilst the ACHA predicts that the Project would not impact on the Aboriginal heritage values of the area, the following management measures would nevertheless be implemented if any potential Aboriginal objects or human remains are discovered at the Project Area.</p>	
<ul style="list-style-type: none"> - Should any suspected Aboriginal objects be uncovered during demolition or construction works, all works in the vicinity should cease immediately to prevent any further impacts and a qualified archaeologist be brought onsite to make an assessment. If the object is found to be an Aboriginal object, it would be notified under the <i>National Parks and Wildlife Act</i> as soon as possible; - If suspected human remains are exposed, all construction work is to cease immediately in the near vicinity of the find location and the Project Manager is to be immediately notified to allow assessment and management: <ul style="list-style-type: none"> • An area of 20 m radius is to be cordoned off by temporary fencing around the exposed human remains site - construction work can continue outside of this area as long as there is no risk of interference to the human remains or the assessment of human remains; • The Police and the OEH are to be contacted immediately; and • A physical or forensic anthropologist would be commissioned by the Police to inspect the remains in situ (organised by the Police unless otherwise directed), and make a determination of ancestry (Aboriginal or non-Aboriginal) and antiquity (pre-contact, historic or modern). - Subsequent management actions would be dependent on the findings of the forensic anthropologist: <ul style="list-style-type: none"> • If the remains are identified as modern and human, the area would become a crime scene under the jurisdiction of the NSW Police; • If the remains are identified as pre-contact or historic Aboriginal, the site would be secured and OEH and all Registered Aboriginal Parties notified in writing. Where impacts to exposed Aboriginal skeletal remains cannot be avoided, remains would be retrieved via controlled archaeological excavation and reburied outside of the Disturbance Boundary in a manner and location determined by Registered Aboriginal Parties; • If the remains are identified as historic non-Aboriginal, the site is to be secured and 	Demolition and Construction

Summary of Mitigation Measures	Project Phase
<p>the NSW Heritage Branch contacted; and</p> <ul style="list-style-type: none"> • If the remains are identified as non-human, work can recommence immediately. <p>- The above process functions only to appropriately identify the remains and secure the site. From this time, the management of the area and remains is to be determined through one of the following means:</p> <ul style="list-style-type: none"> • If the remains are identified as a modern matter liaise with the Police; • If the remains are identified as Aboriginal liaise with the proponent, OEH and Aboriginal stakeholders; • If the remains are identified as non-Aboriginal (historical) liaise with the DP&I and the Heritage Office; and • If the remains are identified as not being human then work can recommence immediately. 	
Noise and Vibration	
<p>Demolition and Construction Waste Contractors would demonstrate best practicable means and include noise mitigation measures in the CEMP plan, which could include:</p> <ul style="list-style-type: none"> - Construction activities to be limited to between 7am and 6pm Monday to Friday and 8am to 1pm Saturday; - Where work is undertaken outside of the standard working hours it would be in accordance with the <i>Interim Construction Noise Guideline</i> (EPA, 2009); - Construction of noise bunds or barriers, where feasible and effective for noise suppression, at the early demolition and construction stage; - Use of temporary barriers for stationary noisy equipment; - Possible restrictions to construction hours (beyond the above hours) where noise impacts are significant; - All plant items should be properly maintained and operated according to manufacturers' recommendations in such a manner as to avoid causing excessive noise; - All pneumatic tools would be fitted with silencers or mufflers; - Any compressors brought on to site should be silenced or sound reduced models fitted with acoustic enclosures; - Consultation with property owners likely to be affected prior to works being carried out; and - Noise monitoring at sensitive locations as agreed with EPA for any excessive noise or noise complaints being assessed with appropriate action taken. 	Demolition and Construction
<p>Traffic Noise The existing OEMP includes provisions for vehicle protocols in and around the Clyde Terminal and the Parramatta Terminal. This would be revised for operations once the demolition and construction works have been completed.</p>	Operation
<p>Blasting The CEMP would include a blast plan and control measures to minimize the impact of ground vibration and noise as a result of blasting at a particular site. Items to be considered in the development of this part of the CEMP are:</p> <ul style="list-style-type: none"> - Reducing maximum instantaneous charge, for example by reducing blasthole diameter or deck loading; - Using a combination of appropriate delays; - Allowing for excessive humps or toe in the blast design; - Optimising blast design by altering drilling patterns, delaying layout or altering blasthole inclination from the vertical; - Exercising strict control over the location, spacing and orientation of all blastholes and using the minimum practicable sub-drilling that gives satisfactory to conditions; and - Establishing times of blasting to suit the situation; - Using experienced blast contractor to be used; - Using a series of test blasts to be used to determine site specific conditions. As a result 	Demolition

Summary of Mitigation Measures	Project Phase
<p>of these tests the maximum instantaneous charge should be determined;</p> <ul style="list-style-type: none"> - Restricting blasting or ceasing blasting if the predictions indicate that air blast overpressure levels are likely to be exceeded at neighbouring dwellings unless agreed with the owner(s); - Ensuring all reasonable attempts are made to contact sensitive receivers located within 500 m of a blast location; - Using linear enclosures or shielding would be used to assist in airblast attenuation if required; - Ensuring stemming type and length is adequate; - Eliminating exposed detonating cord and investigating alternative initiation method; - Making extra efforts to eliminate the need for two shots (e.g. better control of drill patterns); - Using survey methods, as appropriate, to ensure burden is adequate; - Considering delaying or cancelling the blast by not loading if the weather forecast is unfavourable; - Allowing for the effects of temperature inversion and wind speed and direction on the propagation of airblast to surrounding areas; - Orientating faces where possible so that they do not directly face residences; - Varying the direction of initiation; - Exercising strict control over the burden, spacing and orientation of all blastholes; - Taking particular care where the face is already broken or where it is strongly jointed, sheared or faulted; - Considering deck loading where appropriate to avoid broken ground or cavities in the face (e.g. from back break); - Adequately monitoring the blasts to help minimise complaints and also to provide documentation in the event of any claims for damages arising from blasting; and - Recording of complaints associated with blasting, identifying the nature of the complaint, the particular operation that initiated the complaint, and documenting action taken. 	
GHG Emissions	
<p>Shell would undertake an internal energy audit of the Project Area following completion of the demolition and construction works to take stock of how the operation of the Clyde Terminal has reduced electricity consumption and improved energy efficiency. Recommendations arising from the audit would then be taken into consideration where significant further energy savings can be made.</p>	Operation
Landscape and Visual Amenity	
<p>Dust control measures included in the CEMP and outlined in the Surface Water, Industrial Water and Flooding section of this table would avoid or minimise potential visual impacts from dust.</p>	Demolition and Construction
<p>The riparian vegetation within the wetlands would be retained thereby conserving the visual amenity and landscape character of the area.</p>	All

Summary of Mitigation Measures	Project Phase
Ongoing Monitoring at the Converted Clyde Terminal	
<p>Shell would continue to undertake existing environmental and safety monitoring at the Project Area following completion of the conversion including:</p> <ul style="list-style-type: none"> - Interceptor sampling; - Wetlands management; - Waste management; - Groundwater sampling and analysis; - Safety critical equipment inspection and maintenance; - Safety management system auditing; - Process safety observations and audits; - Emergency response exercises and plan reviews; - Hazard and effect management process reviews; and - Competency assessment of all operational staff. 	All