Part F – Environmental Impact Assessment

This Part details the environmental assessment that has been undertaken for the Project by describing the existing environmental conditions of the Site, the methodologies of the assessment undertaken, potential impacts of the Project identified by these assessments, and measures recommended to minimise these impacts.

11.0 Hazard and Risk

11.1 Existing Environment

A Terminal Preliminary Hazard Analysis (**Appendix D**) and a Transport Preliminary Hazard Analysis (**Appendix E**) were prepared for the Project by Cockshott Consulting Engineers Pty Ltd. These documents are summarised below.

The Site neighbours include Koppers main site on George Bishop Drive to the north-west and Arrium Ltd (previously OneSteel) to the west. Koppers product receiving plant and undeveloped port land are located to the east. The land immediately to the south-east includes the Mayfield Intertrade Site. This area is a large clear hardstand area which does not currently have any land use. This land has a history of heavy industrial land uses notably the former BHP Steelworks, and is currently zoned for a range of industrial and Port related uses. There are currently no known or approved projects that would take place on this vacant land.

The existing Stolthaven terminal is located on the northern end of the site. Tanks in the existing terminal only store combustible fuels. Due to their higher flashpoint and low vaporisation relative to flammable fuels, combustibles are less volatile and not subject to the same level of hazard and risk of flammable fuels. Despite this full consideration of the hazard requirements of the existing operational would be incorporated into the hazard assessment as required by relevant Hazardous Industry Planning Advisory Papers (HIPAP

The layout of the Stage 3 Project and Mayfield Berth M7 is depicted on the **Figure 5**, which shows the developed site in relation to surrounding land areas. The closest residential development is approximately 500m from tanks proposed as part of the Project and approximately 900m form the existing tanks that are currently operational at the site.

11.2 Methodology

The PHAs, incorporating a Quantitative Risk Assessment (QRA) were prepared to identify and examine all hazards associated with Project with the potential to have any offsite impacts as well as the potential offsite impacts associated with the transportation of fuels from the Project. The PHAs include the assessment of consequences of these impacts and a quantification of individual risk of offsite property damage and accident propagation. The PHAs were prepared in accordance with DP&E relevant HIPAP's, particularly:

- HIPAP No. 4 - Risk Criteria for Land Use Planning; and
- HIPAP No. 6 - Guidelines for Hazard Analysis.

The PHAs follow a series of sequential steps in the assessment of potential hazards associated with the Project which can generally be described as:

1) Identification of Hazards:
    - Identify all major incidents and major incident hazards and to control risks, by elimination of the risk or if that is not reasonably practicable, to reduce the risk so far as is reasonably practicable; and
    - Undertake hazard workshops and reporting including the development of Hazard Identification Studies (HAZIDs) and Hazard Operability Studies (HAZOPs). The Identification of hazards then moves into the Front End Engineering Design (FEED).
2) Frequency Assessment - An assessment of consequences for each scenario:
    - Analyse a range of data applicable to the operation of the Project, and similar projects including, logistics data , historical failure rates etc; and
    - Calculate the probabilities for the chances of certain events occurring through the use of tools such as Probability Bow Tie (PBT) and Fault Tree Analysis.
3) Consequence Assessment - An assessment of the probability of each scenario occurring:

- Establish a range of models which can be used to determine the consequence of various hazards and events which may occur as a result of the operation of the Project. The range of specific consequence models assessed in the PHA, are listed in **Appendix D**.

4) Risk assessment resulting from the potential combination of frequency and consequence of creditable risk scenarios:

- Utilise specialist hazardous industry *TNO Effects* modelling software for the calculation of effects and consequences, and *TNO Riskcurves* for the quantitative risk assessment.

5) Presentation of results in a standardised format:

- Present modelling outputs as risk contours over the site and surrounding areas; and
- Identify risk levels at identified receivers and land use locations in the vicinity.

6) Comparison with established risk criteria.

- Compare the outcomes of the site specific risk and consequence assessment for each of the developed scenarios against the relevant criteria for each studied receiver location; and
- Establish compliance or otherwise against the established risk criteria.

A detailed description of the methodology applied in the PHA is provided in Section 4 of **Appendix D** and **Appendix E**.

11.2.1 Criteria

On completion of Stage 3, the Facility would operate as a Major Hazard Facility. As a consequence of the types of fuel that would be managed at the site and their quantities, accidents can have impacts outside of the site boundary. The purpose of the QRA, conducted as part of the PHA, is to quantify the risks against the relevant criteria. DP&E has established appropriate criteria for the assessment of potentially hazardous developments against which judgements can be made. These criteria are specified in HIPAP 4 and the applicable criteria against which the Project is assessed are listed in **Table 25**.

Table 25 Risk Assessment Criteria

Description and Land Use	Criteria (per year)
Individual fatality risk	
Hospitals, child-care facilities and old age housing (sensitive land uses).	0.5×10^{-6}
Residential developments and places of continuous occupancy such as hotels and tourist resorts (residential land use).	1×10^{-6}
Commercial developments, including offices, retail centres and entertainment centres (commercial land use).	5×10^{-6}
Sporting complexes and active open space areas (recreational land use).	10×10^{-6}
Target for site boundary (boundary limit).	50×10^{-6}
Injury risk – heat radiation exceeding 4.7 kW/m^2	
Residential and sensitive use.	5×10^{-5}
Injury risk – explosion overpressure exceeding 7 kPa	
Residential and sensitive use.	5×10^{-5}
Risk of property damage and accident propagation – 23 kW/m^2 heat flux	
Neighbouring potentially hazardous installations or at land zoned to accommodate such installations.	5×10^{-5}
Risk of property damage and accident propagation – 14 kPa explosion overpressure	
Neighbouring potentially hazardous installations, at land zoned to accommodate such installations or at nearest public buildings.	5×10^{-5}

For societal risks, HIPAP No. 4 adopts the application of an F-N curve (the frequency (F) of an event in which a certain number (N) of fatalities may occur). Societal risk (F-N) curves are useful to provide a view of potentially

catastrophic events if the development is co-located with residential areas or commercial areas of moderate density. The application of F-N curves incorporates an As Low As Reasonably Possible (ALARP) approach to examine risks to the community as a result of hazardous developments.

11.3 Potential Impacts

11.3.1 Terminal Risk Assessment

Individual Fatality Risk

Individual fatality risk contours are presented in **Figure 6** along with the probability levels relevant to HIPAP 4. It can be seen that the individual fatality risk level is highest in the plant itself and that the risk level rapidly falls off with distance. As a result of the rapid decrease in the reduction in individual fatality risk at greater distance from the Project, compliance is achieved for all land use individual fatality risk criteria.

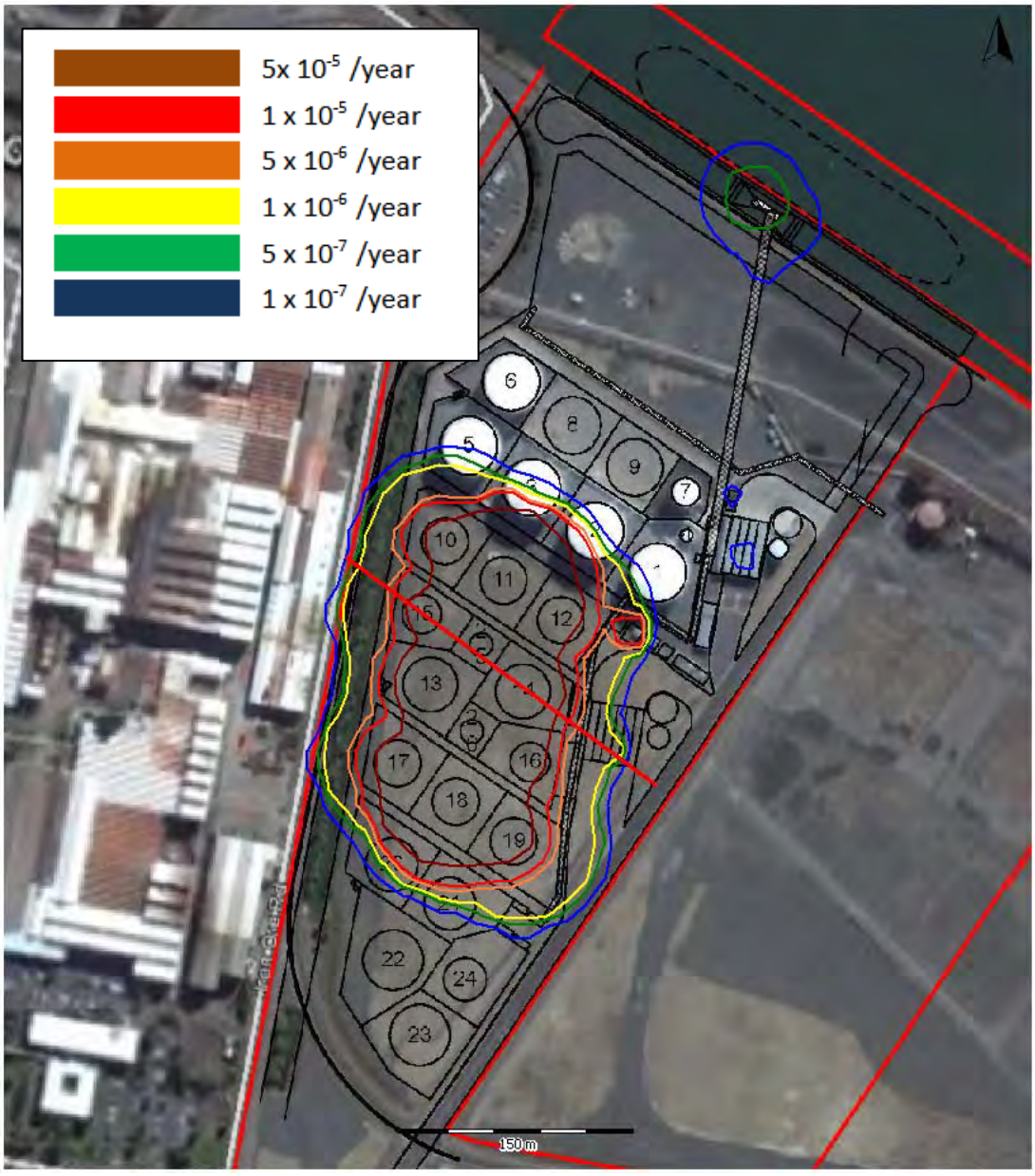

Figure 6 Probability Contours for Individual Fatality Risk

Individual Injury Risk

In addition to individual fatality risk, HIPAP 4 suggests levels of injury risk – i.e. in terms of effects that may not cause a fatality but may nevertheless result in injury. HIPAP 4 provides two criteria, for heat radiation and for explosion overpressure.

Heat Radiation

The heat radiation assessment undertaken for the Project is shown in **Figure 7**. As shown the 5 x 10^{-5} probability contour (brown) line for incident heat flux radiation at a level of 4.7 kW/m^2 does not extend beyond the site boundary. The closest residential and sensitive use areas are located in the residential area south of Industrial Drive, more than 500m from this contour line. The HIPAP 4 criterion for injury risk (incident heat flux radiation) is therefore satisfied.

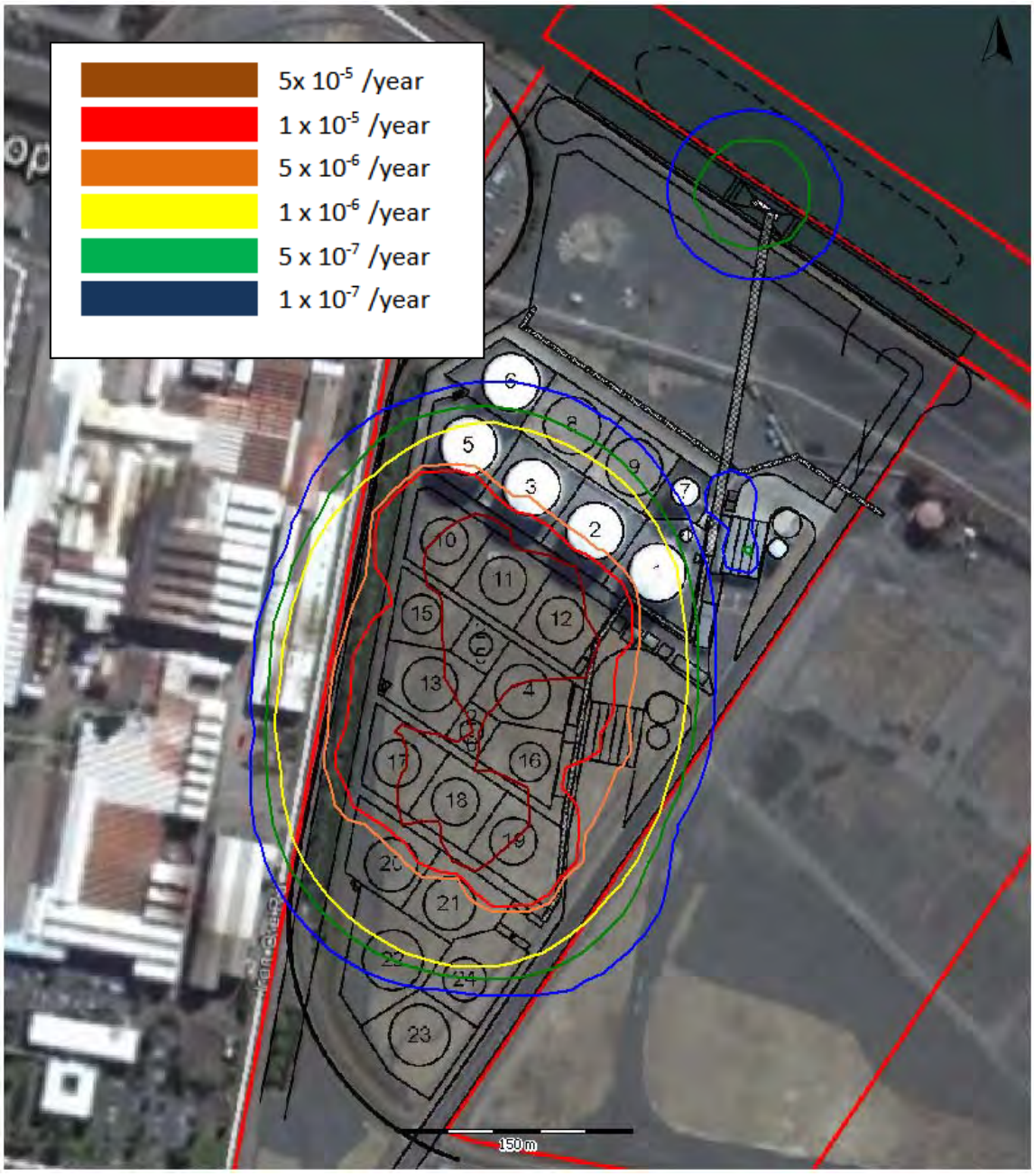

Figure 7 Probability Contours for Incident Heat Flux Radiation of 4.7 kW/m2

Explosion Overpressure

Individual injury risk contours for an incident explosion overpressure of 7 kPa are presented in **Figure 8**. The 5 x 10^{-5} probability contour line for incident explosion overpressure at a level of 7 kPa (**Figure 8**, brown) extends

beyond the boundary of the site but is more than 500m from the closest residential and sensitive use areas, located south of Industrial Drive. The HIPAP 4 criterion for injury risk (incident explosion overpressure) is therefore satisfied.

Figure 8 Probability Contours for an Explosion Overpressure of Pressure of 7 kPa

It is noted that HIPAP No. 4 also includes criteria for the assessment of individual injury risk for exposure to toxic materials that result in acute, chronic or delayed effects. As the Project does not include the storage of any toxic materials, the application of toxic exposure criteria are not applicable.

Risk of Property Damage and Accident Propagation

In addition to potential impacts to individuals, the siting of a hazardous installation must take account of the potential for an accident at the facility to cause damage to neighbouring operations and potential escalation by the

domino effect. HIPAP 4 sets two criteria for damage to property and of accident propagation, for heat radiation and for explosion overpressure.

Heat Radiation

Incident heat flux radiation contours are presented **Figure 9** for a heat flux level of 23 kW/m^2. The contour for a risk level of 1 x 10^{-7} pa at the 23 kW/m^2 heat flux level (blue line) does not reach neighbouring sites. This meets the HIPAP 4 criterion for a risk not exceeding 50 in a million at this heat flux level at neighbouring sites.

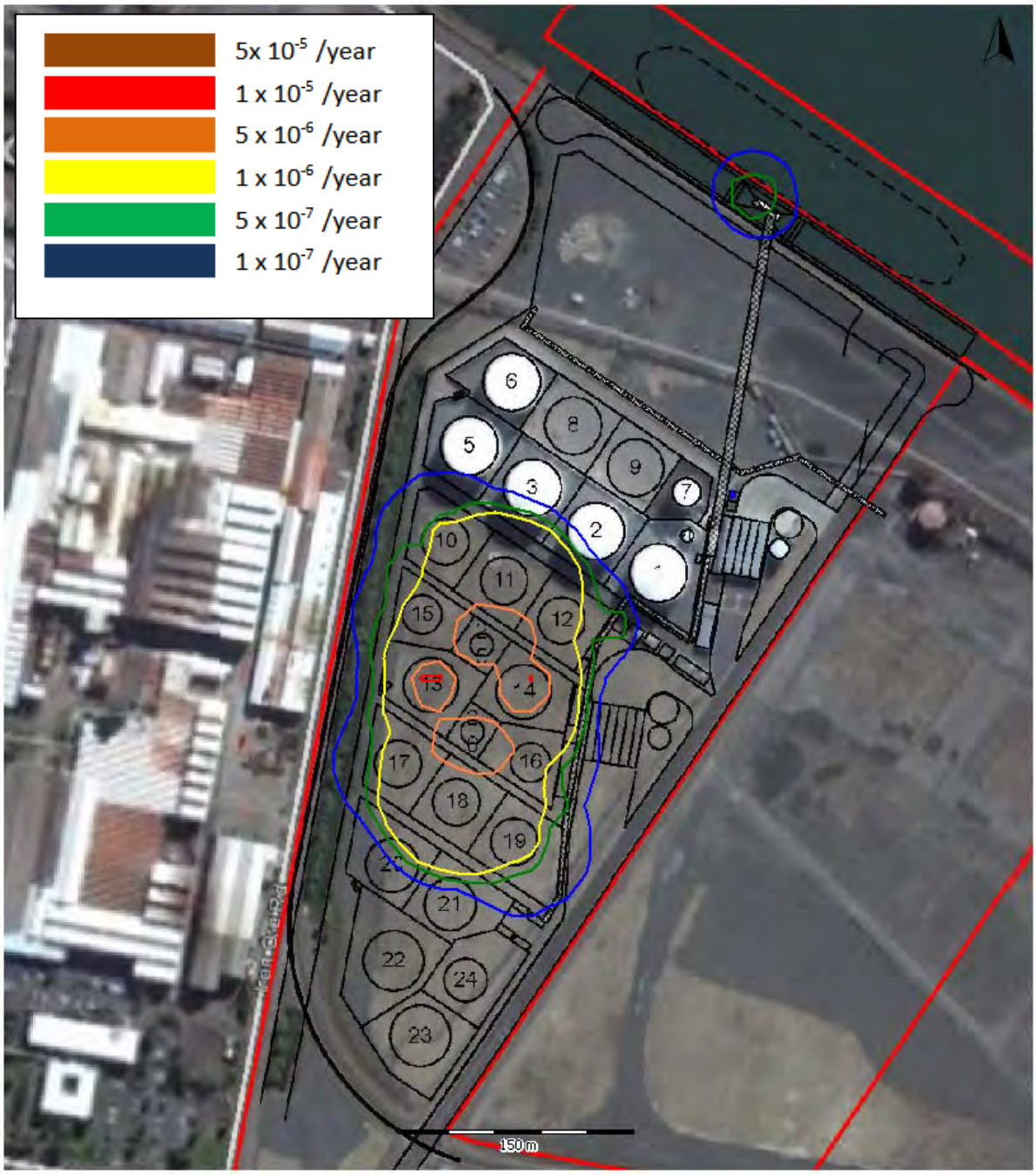

Figure 9 Probability Contours for Incident Heat Flux Radiation of 23 kW/m^2

Explosion Overpressure

Explosion overpressure risk contours are presented **Figure 10** for an incident explosion overpressure level of 14 kPa. The 5 x 10^{-5} year probability contour for a level of 14 kPa incident explosion overpressure (**Figure 10**, brown)

is contained within the Stolthaven site. This meets the HIPAP 4 criterion for a risk of less than 50 in a million at this incident explosion overpressure at neighbouring sites.

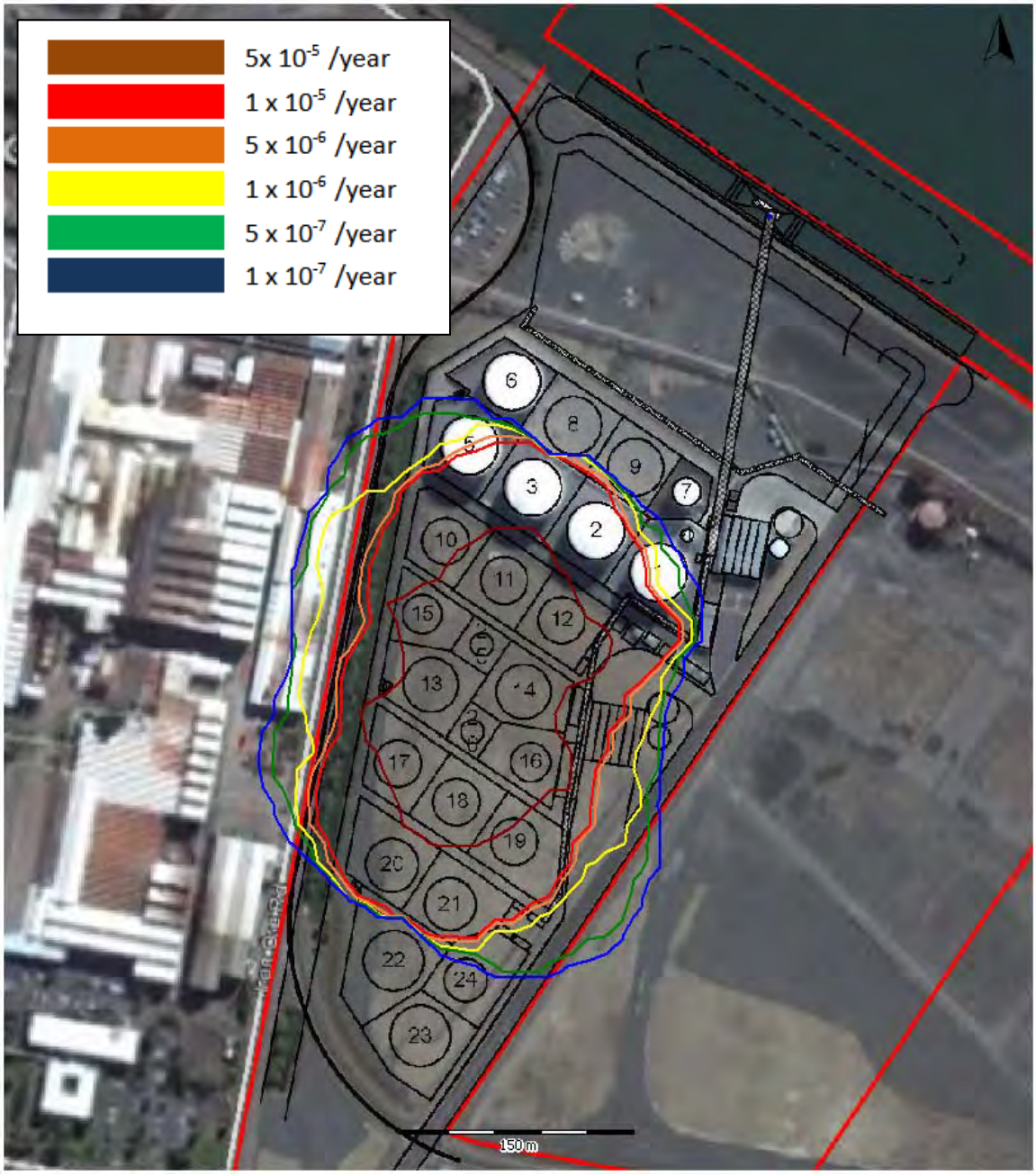

Figure 10 Risk probability Contours for an Explosion Overpressure of 23 kPa

Societal Risk

The Facility is located on land with a buffer of more than 500m to the North Mayfield residential area and more than 200m to the Intertrade Site for commercial development.

To test the requirement for societal risk analysis, fatality risk transects were drawn from the centre of the Site to the edge of the Mayfield North residential area and the edge of the Intertrade site.

An analysis point was set up for the closest point in the residential area (Mayfield East Public School, a sensitive land use). The calculated individual fatality risk at this analysis point is less than 1 x 10^{-21} /year (the selected lowest significant frequency). An analysis point set up at the closest point in the Intertrade Site (on Steel Works Road) also had an individual fatality risk less than 1 x 10^{-21} /year. Therefore no societal risk F-N curve was prepared.

11.3.2 Risk Mitigation Analysis

A range of risk management and reduction control measures have been identified during the design, planning and assessment phase of the Project as detailed in **Section 11.5**. Generally, the probability of an adverse event occurring is as a result of several failures of control measures in a chain of events. The inclusion of those measures would further reduce the overall probability of adverse consequences occurring as a result of an incident and would also limit the impacts of that consequence.

Where more than one identified control measure is included in chains of events (e.g. tank overfill situations) these measures contribute multiple risk reduction to the same scenario. Incorporation of the control measures included in **Section 11.5** would have a significant impact on the potential risk posed by the Facility.

In accordance with Company policy, and as a duty under the Work Health & Safety Regulation 2011, Stolthaven would eliminate risk so far as is reasonably practicable, and if this is not reasonably practicable, would reduce the risk so far as is reasonably practicable. Potential risk reduction measures would continue to be identified and reviewed as the detailed design progresses. During the detailed design process, further risk assessment work would include the final design Hazard and Operability Study (HAZOP), Safety Integration Level (SIL), so far as reasonably practical (SFARP) practices and Fire Safety studies.

HIPAP 6 (Section 9.11) notes that *"where risk reduction measures have been identified as options, their effect on the risk results should be documented and risk with and without recommended risk reduction measures shown where appropriate."*

The QRA model was re-run taking account of the advanced control measures already identified by Stolthaven and incorporated in its Front End Engineering Design documentation. Individual fatality risk probability contours are presented in **Figure 11** at the following probability levels relevant to HIPAP 4.

The proposed control measures already identified by Stolthaven reduce risk to an extent that the individual fatality risk is reduced to 1×10^{-7} /year within a few metres of the site boundary.

Probability contours for incident heat radiation (at 4.7 kW/m2) and explosion overpressure (at 7 kPa) taking into account the advanced control measures proposed by Stolthaven, show that these exposure levels are below a probability of 0.5×10^{-6} within a few metres of the site boundary.

Figure 11 Individual Fatality Risk Contours with Advanced Control Measures

11.3.3 Transport Hazard Assessment

Assessment

A transport specific Preliminary Hazard Assessment has been prepared for the Project and is attached at **Appendix E**. Three locations were chosen to represent worst-case scenarios in the event of a transport incident involving load road tankers containing fuels to or from the Project:

- Location 1 is for southbound loaded flammable goods transport on Industrial Drive passing the Fronditha Aged Care Centre;
- Location 2 is for northbound flammable goods traffic on Industrial Drive, north of the junction with Tourle St. The area to the south of Industrial Drive is residential; and
- Location 3 is for flammable goods traffic passing through the industrial area surrounding the terminal along Ingall St. before joining Industrial Drive.

As with the terminal hazard assessment, the transport hazard assessment determined the likely hood of impacts against the relevant criteria in relation to:

- Qualitative assessment criteria;
- Individual risk fatality;
- Individual injury risk:
    - Heat radiation;
    - Explosion overpressure; and
    - Toxic exposure.
- Societal risk;
- Risk of property damage and accident propagation:
    - Heat radiation; and
    - Explosion overpressure.

In addition a sensitivity analysis was undertaken whereby all consequence probabilities used were increased by a factor of ten and then reassessed against the same criteria as derived from HIPAP No. 4.

The Transport PHA concluded that all criteria would be met at all locations for all scenarios studies. In addition the sensitivity analysis concluded that all indicted scenarios at all locations would continue to meet the criteria even when the consequence probabilities used where increased by a factor of ten.

Summary

All risks associated with transportation of flammable products from the Stolthaven Bulk Liquids Terminal, when operating at the full capacity of 3,500 ML per annum, met all of the established HIPAP 4 criteria. The HIPAP 4 criteria were also satisfied for a sensitivity case, wherein the risks were arbitrarily increased by a factor of ten.

When considering the transport safety context of the Project it is noted that transport of combustible and flammable products associated with the Project would be undertaken by customers and their chosen transport contractors. Regardless all drivers would be subject to a site specific driver induction prior transporting fuel from site, in addition to RMS heavy vehicle driver requirements. Drivers accessing the terminal would do so via the terminal control system which is linked to the provision of a “safe load pass” by the driver and the unit he is driving. This confirms validity of the vehicle licence and trailer unit fitness certificate prior to allowing loading.

Importantly it should be noted that the importation of fuel products directly into Newcastle would reduce the overall transport risk involved in supplying customers in the Hunter region as the overall loaded trip from Sydney will be reduced by about 175 km.

11.4 Buncefield Incident

On 11 December 2005, a series of explosions and subsequent fire destroyed large parts of the Buncefield Herefordshire, UK oil storage and transfer depot. As a result of this incident the Buncefield Major Incident Investigation Board (MIIB) was established to undertake an investigation into the incident. The MIIB issued a report *Recommendations on the Design and Operation of Fuel Storage Sites* (MIIB, 2007) and as a result of these recommendations revised environmental standards for fuel storage sites were established.

Section 7.0 of **Appendix D** provides an overview of the incident and resulting design measures and operational features of the Buncefield facility in comparison to the Project. The comparison concludes that of the identified design and operational features identified as problematic at Buncefield, appropriate management measures have been recommended to be built into, or form part of the operational practices of the Project.

11.5 Management and Mitigation Measures

During the design development for the Project, process design reviews, HAZIDs and HAZOPs have identified a number of design, operating and maintenance procedures to reduce potential risks associated with the operation of the bulk fuel terminal. These were subsequently incorporated in the Front End Engineering Design documents that defined the design of the Facility and which have shown the Project would meet all relevant hazard assessment criteria.

To provide further reduction in risk, the hazard assessment recommended that the following measures be incorporated into the Project’s design and operation to provide additional hazard mitigation:

- Pre-transfer planning would be carried out before each marine discharge event;
- A Stolthaven supervisor would be in charge and have oversight of all product ship to terminal transfer activities;
- Continuous communications would be maintained by radio during all transfer operations;
- An established protocol (shutting down ships pumps and closing wharf and tank valves) would be agreed as part of the pre-transfer planning in case of loss of communication;
- The Stolthaven Supervisor would continuously monitor tank levels and regularly make predictions of discharge completion time (or times to switch tanks);
- Tank gauging systems on receiving tanks would be fully operational during any discharge event;
- The tank gauging system would have an appropriate preventative maintenance schedule;
- An independent high-high level alarm (in addition to a standard high level alarm) with automatic closure of tank inlet remotely operated shut-off valves would be provided on each tank;
- The high-high level alarm and the automated closure of the tank inlet valve would be a safety instrumented function within the life-cycle maintenance schedule;
- All maintenance contractors would be fully qualified for their task and appropriately inducted into the site;
- A change-in-level alarm would be installed to operate on non-duty tanks;
- Flammable gas detection systems would be provided in tank bund sumps and pump bay sumps;
- Tank floor leakage detection systems would be installed underneath all tanks;
- Tank bunds would be constructed to a high standard, be impermeable and fire resistant;
- High definition CCTV would be installed for remote monitoring of tank bunds;
- Internal bund walls would be provided to limit the surface area of moderate spills;
- Tertiary containment would be reviewed in accordance with the ‘so far as reasonably practical’ principle;
- Foam pourers would be provided to allow application of foam in the event of a spill to a compound or full bund; and
- The siting and protection of emergency response equipment would be reviewed in the Fire Safety Study to ensure that firefighting systems are available in the event of a fire. The Fire Safety Study would be prepared in consultation with Fire and Rescue NSW.

The additional protection afforded by these control measures have not been taken into account in the QRA. Despite this, Stolthaven commits to the incorporation of these measures to provide a high level of protection for staff, neighbours and the community.

In addition it is noted that in accordance with the relevant conditions of the Mayfield Concept Plan Approval, Stolthaven would also consult with PON to provide input to the following as relevant:

- Port Emergency Response Plan – as required by Schedule 3, Condition 2.26; and
- Hazard Audit – As required by Schedule 3, Condition 2.28.

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12.0 Air Quality

An Air Quality Impact Assessment (AQIA) for the Project has been prepared by AECOM and is provided in **Appendix G**.

12.1 Existing Environment

The primary pollutants of interest in the Newcastle airshed are particulate matter and photochemical smog/ozone and its precursors (oxides of nitrogen and Volatile Organic Compounds) (Newcastle City Council, 2009). Significant industrial pollutant sources are located in the surrounding area manufacture of metal products, ammonium nitrate production, coal terminals and air pollutants associated with transportation (road and rail). Other fuel storage facilities in Newcastle include Caltex (Wickham) and BP (Carrington), which are located in proximity to residential areas, and Park Fuels on Kooragang Island which commenced operations on 10 September 2015 (Park, 2015).

The pollutants of prime interest in NSW are ozone and particulates, with levels of these pollutants approaching or exceeding the national standards prescribed in the National Environment Protection Measure for Ambient Air Quality (NEPM) on occasion. Pollutant levels in Newcastle, however, are generally acceptable, with limited exceedances noted. The Facility does not currently generate significant levels of ozone or particulates.

No local monitoring of Volatile Organic Compounds (VOCs) was identified at the time of preparation of this report. However the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005) does not require the cumulative assessment of VOC impacts (i.e. consideration of background VOC levels).

The Bureau of Meteorology records long-term meteorological data at a number of automatic weather stations around the country. It is relevant to note that the NSW EPA monitoring stations are generally run for the short-term, and therefore do not provide long-term data and statistics. The Bureau of Meteorology station best representing the Hunter region is located at Williamtown, approximately 13 km northeast of the Site. Selected long-term regional meteorological data were obtained from the Bureau of Meteorology Williamtown monitoring station. Average climate parameters recorded at this station are shown in **Appendix G**.

The warmest temperatures occur between November and March, with the warmest average maximum temperatures occurring in January (28.0ºC). The coldest temperatures are recorded in the winter months, with the lowest average minimum temperature occurring in July (6.4ºC).

The highest average rainfall is recorded in June (121.9 mm), while September is the driest month (59.3 mm). Humidity in the area is relatively high, with recorded levels typically between 50 and 80 per cent. Wind speeds are typically higher at 3 pm compared to 9 am.

Long-term wind rose diagrams for the Williamtown monitoring station are shown in **Appendix G**. The wind roses show the frequency of occurrence of winds by direction and strength. Winds recorded at Williamtown at 9 am blow predominantly from the west. In the afternoons, recorded winds blow predominantly from the east and southeast.

12.2 Potential Impacts

12.2.1 Methodology

Mayfield Concept Plan – Site Air Quality Model

Condition 2.1 of the Mayfield Concept Plan Approval requires the Project to be assessed against PON's Site Air Quality Model. Condition 2.12 of the Mayfield Concept Plan Approval required PON to develop this model to facilitate the assessment of air quality impacts of developments within the Concept Plan Area. The Model also provides the opportunity to coordinate the cumulative assessment of all projects within the Concept Plan Area and identify potential air quality issues during project planning to aid the identification of appropriate mitigation measures.

PON has prepared this Site Model in consultation with the EPA and in accordance with the following documents:

- DEC (2005). *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, particularly in relation to defining the averaging periods for the relevant pollutants of interest; and
- Barclay, J. and Scire, J. (2011). *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia*'.

The Facility is the only development to date that falls under the Site Model requirements.

Emissions Inventory

The emissions inventory for the Project was prepared using site-specific measured data for storage tank liquid composition and gantry vapour composition for all pollutants of concern. For storage tank emissions, this included the use of the TANKS emissions estimation model to predict total VOC emissions (refer Section 4.6.1 of **Appendix G**). The gantry vapour emissions inventory was determined by reference to sampling results and a conservative vapour recovery unit efficiency of 97 per cent, as well as consideration of the fact that the composition of expelled gantry vapours may depend on the previous contents of the tanker filling at the gantry at that moment in time (refer Section 4.6.2 of **Appendix G**).

The CALMET model and subsequent settings were selected in accordance with the 'hybrid' mode discussed in Barclay and Scire (2011). The hybrid mode can be considered an 'advanced model simulation', or 'refined model run' since it combines the numerical prognostic model data in a 3D.DAT file along with surface data.

Various air dispersion models were used to model the air quality impacts of the Project. These included:

- The Air Pollution Model (TAPM), which is used to generate prognostic meteorological data;
- CALTAPM, which is used to process the TAPM output into a format suitable for input into the CALMET model;
- CALMET, which generates three-dimensional wind fields used in the dispersion modelling;
- CALPUFF, which predicts the movement and concentration of pollutants and relied on the following inputs:
    - Meteorology;
    - Terrain;
    - Building wake effects;
    - Sensitive receptor locations; and
- CALPOST, which is used to process the CALPUFF output files.

The selection of the dispersion modelling for this assessment was undertaken in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005). These dispersion models are explained in more detail in Section 4.2 of **Appendix G**.

Assessment Scenarios

Dispersion modelling was undertaken for two scenarios as described in **Table 26** for both the typical operations and theoretical maximum operations predicted for the Project. Common parameters to both scenarios are as follows:

- Continuous operation of the Facility (24 hours per day, seven days per week, 365 days per year);
- A vapour control system with an efficiency of 97 per cent. This has been provided by the vapour control system designer and is considered to be the minimum efficiency of the system, typically it would be higher than this value (>98 per cent) (refer to Section 2.4.1 of **Appendix G**;
- Storage tank emissions calculated using TANKS (refer Section 4.6.1 of **Appendix G**); and
- A total of 10 gantry bays (four existing and six proposed) operating three loading arms each, totalling 30 arms.

Table 26 Operational AQIA Scenarios

Scenario	Description
Scenario 1: Typical Operations	One hourly gantry emission rate applied to all hours of the year based on: - Three 50,000L capacity tankers filled per bay per hour i.e. 30 tankers per hour serviced by the Facility; and - A combustible to flammable fuel ratio of 60:40 of residual fuel in tankers.
Scenario 2: Maximum Operations	One hourly gantry emission rate applied to all hours of the year based on: - Four 50,000L capacity tankers filled per bay per hour i.e. 40 tankers per hour serviced by the Facility; and - All tankers contain residual flammable fuel.

Three tankers per bay per hour would be a conservative normal operating maximum during the operation of the Project. Generally there are likely to be fewer tankers per hour. In addition, it is likely that only three quarters of the bays or less would have residual flammable tankers as a likely maximum. The use of four flammable tankers in Scenario 2: Maximum Operations is therefore considered to be a significant overestimation of VOC emissions and duly conservative in accordance with the precautionary principle (refer **Section 26.2.1**).

12.2.2 Construction Impacts

Activities that have the potential to result in airborne pollutants during the construction of the Project include earthmoving during site preparation and handling of any excavated material. Such emissions during construction works would be minimised and mitigated through the application of standard measures outlined in the CEMP (refer **Section 12.3.1**). Construction emissions were not assessed quantitatively in the Air Quality Impact Assessment due to the relatively short duration and intermittent nature of the works. The preparation of an appropriate CEMP is expected to adequately mitigate any construction emissions from the Facility as discussed in **Section 24.1.2**.

12.2.3 Operational Impacts

When considering the following operational impact assessment scenarios, it should be noted that the operation of the gantry Vapour Recovery Unit (VRU) has been factored into each of the assessed scenarios with an assumed efficiency rating of 97%.

Scenario 1: Typical Operations Assessment

The predicted ground level concentrations for Scenario 1: Typical Operations (refer **Table 26**) resulting from the dispersion model are summarised in **Table 27** for principle and individual air toxics assessable at the site boundary and in **Table 28** for individual odorous air pollutants assessable at the nearest sensitive receptor.

Table 27 Scenario 1: Ground Level Concentrations of Air Pollutants at the Site Boundary

Pollutant	NSW EPA Criteria ($\mu g/m^3$)	Predicted Maximum Concentration 99.9th Percentile ($\mu g/m^3$)			
		Site Boundary	% of EPA Criterion	Residential / Industrial / Commercial Receiver	% of EPA Criterion
Benzene	29	3.6	12.4%	2.6	9.0%
Trimethylbenzene (mixed isomers)	2,200	1.9	0.09%	1.4	0.1%
Ethylbenzene	8,000	1.2	0.01%	0.9	0.01%

Table 28 Scenario 1: Ground Level Concentrations for Individual Odorous Air Pollutants at the Nearest Sensitive Receptor

Pollutant	NSW EPA Criteria (µg/m^3)	Predicted Maximum Concentration 99.9th Percentile (µg/m^3)			
		Residential Receiver	% of EPA Criterion	Industrial / Commercial Receiver	% of EPA Criterion
Cumene	21	0.4	1.7%	0.7	3.3%
Toluene	360	4.6	1.3%	5.5	1.5%
Xylenes	190	3.9	2.1%	4.3	2.3%
Ethanol	2,100	0.6	0.03%	1.3	0.1%

Table 27 and **Table 28** show that the VOC concentrations would comply with the NSW EPA guideline criterion at all sensitive receptor and boundary locations assessed. The predicted value with the highest proportion of the NSW EPA criteria was for benzene at 12.4 per cent (for a boundary receptor). Concentration contour Plots showing the predicted 1hour 99.9th percentile impacts from cumene is provided in **Figure 12** as cumene has the highest percentage of the EPA criteria at the receiver and therefore all other pollutants are less impacting.

The assessment predicts that no adverse impacts are likely to occur as a result of typical operations at and beyond the Site boundary or at residential receptors. The assessment also suggests that the contribution the Facility makes to local VOC levels is low and there is a considerable amount of room for other VOC generating activities to operate in the area and still comply with the NSW EPA criteria given adequate mitigation and management measures are applied to these other activities (refer **Section 12.3**).

Scenario 2: Maximum Operations Assessment

The predicted ground level concentrations for Scenario 2: Maximum Operations (refer **Table 26**) resulting from the dispersion model are summarised in **Table 29** for principle and individual air toxics assessable at the site boundary and in **Table 30** for individual odorous air pollutants assessable at the nearest sensitive receptor.

Table 29 Scenario 2: Ground Level Concentrations of Air Pollutants at the Site Boundary

Pollutant	NSW EPA Criteria (µg/m^3)	Predicted Maximum Concentration 99.9th Percentile (µg/m^3)			
		Site Boundary	% of EPA Criterion	Residential / Industrial / Commercial Receptor	% of EPA Criterion
Benzene	29	4.6	16.0%	3.1	10.9%
Trimethylbenzene (mixed isomers)	2,200	4.5	0.2%	1.9	0.1%
Ethylbenzene	8,000	2.7	0.03%	1.2	0.02%

Table 30 Scenario 2: Ground Level Concentrations for Individual Odorous Air Pollutants at the Nearest Sensitive Receptor

Pollutant	NSW EPA Criteria (µg/m^3)	Predicted Maximum Concentration 99.9th Percentile (µg/m^3)			
		Residential Receptor	% of EPA Criterion	Industrial / Commercial Receptor	% of EPA Criterion
Cumene	21	0.4	1.7%	0.7	3.4%
Toluene	360	8.1	2.3%	14.6	4.1%
Xylenes	190	4.8	2.5%	5.3	2.8%
Ethanol	2,100	1.0	0.05%	2.0	0.1%

As shown in **Table 29** and **Table 30**, the results of the modelling assessment predicted that all assessed VOC concentrations would comply with the NSW EPA guideline criterion at all sensitive receptor locations assessed.

Experience during the operation of the existing Facility indicated that three tankers per bay, per hour is a conservative normal operating maximum, and that generally there is likely to be fewer tankers. In addition, it is likely that only three quarters of the bays or less would have residual flammable tankers (tanker trucks which previously contained flammable fuels and therefore have some residual flammable fuel vapours on their headspace when empty) as a maximum. The use of four flammable tankers in Scenario 2: Maximum Operations is therefore considered to be a significant overestimation of VOC emissions and subsequently Scenario 2: Maximum Operations is likely to present a significant overestimation of impacts.

The assessment predicts that no adverse impacts are likely to occur as a result of the Project operating at this maximum capacity both within and beyond the site boundary, as well as at residential receptor locations.

Due to the inclusion of a VRU for the Project emissions of benzene and cumene would likely be lower than for the existing operating facility due to the treatment of gantry vapours. In addition to the two operational scenarios provided in **Table 26**, a sensitivity analysis was undertaken to identify the potential impact during times of low gantry use. That is when fuel pumping into tankers and subsequent air displacement through the vapour control system and vapour recovery system is minimal. The velocity at these times would be low, but so would the related mass emissions of pollutants. The results of this assessment are provided in **Appendix G**. The results indicate that during times of low flowrate, predicted ground level impacts meet the NSW EPA criteria, and are lower than both the typical and maximum scenarios.

Odour

The Air Quality Impact Assessment included relevant pollutants from the NSW EPA *Approved Methods for Modelling and Assessment of Air Pollutants in NSW* (DEC 2005) for individual odorous air pollutants listed in Table 7.4a of the NSW EPA Approved Methods. Table 7.4a provides criteria for selected odorous pollutants that represents the lower (i.e. stricter) of its principle/toxic criteria or its odour criteria. The Air Quality Impact Assessment compared these against the stated criteria, including for cumene, toluene, xylenes and ethanol.

The odorous pollutant criteria presented have been selected based on the stricter value of either the toxicity level or odour nuisance level for each of these specific pollutants. As odours associated with the operations would be as a result of the VOC emissions, and the VOCs assessed included those from the NSW EPA Approved Methods for odorous pollutants, the VOC assessment was considered to adequately address both air quality and potential odour impacts. This assessment concluded that odour impacts as a result of the Project are unlikely.

Assessable Pollutant Load for Inclusion in the EPL

Under Schedule 1 of the *Protection of the Environment Operations (General) Regulation 2009* (POEO General Regulation), the operation of the Project would be classified as petroleum products storage. The assessable pollutants for this activity are benzene and VOCs. The assessable loads for these pollutants to determine the potential additional requirements of EPL 20193 are calculated in accordance with the EPA's Load Calculation Protocol (June, 2009) (refer Section 5.2 of **Appendix G)**.

Sampling was undertaken at the Site for both the transfer and storage of liquid fuels and the gantry emissions for VOC composition. Sampling results together with the inputs from the TANKS model were used to estimate the emissions for the operation of the Project. The sum of the emissions from the storage tanks and truck filling gantry represent the total estimated assessable loads for the Site.

The total assessable load for total VOC is estimated to be 92,494 kilograms pa, and around 847 kilograms pa for benzene (refer **Table 31**). However, the final limits would be confirmed in consultation with the EPA.

Table 31 Revised Assessable Load Limits

Pollutants	Revised Assessable Loads Limits (kg/year)
Storage Tank Emissions	
Benzene	744
Total VOCs	89,223
Gantry Emissions	
Benzene	103
Total VOCs	3,271
TOTAL	
Benzene	847

Pollutants	Revised Assessable Loads Limits (kg/year)
Storage Tank Emissions	
Total VOCs	92,494

12.3 Management and Mitigation Measures

12.3.1 Construction Mitigation Measures

As part of the construction of the existing Facility and for subsequent modifications, Stolthaven has prepared CEMPs providing the framework for the implementation of environmental management requirements necessary for each construction phase of the Facility. Prior to each construction phase, the CEMP was updated and reviewed by the relevant agency stakeholders as nominated by the Project Approval. Subject to approval the Project would also be subject to a specific CEMP that incorporates the outcomes and recommendations of the EIS. CEMP measures to manage air quality during the construction of the Project would be identical to those implemented during the construction of the existing Facility, and would include the following:

- Disturbed surfaces would be stabilised as soon as practical;
- All vehicles leaving the Site would not have excessive soil on their tyres which may fall onto surrounding roadways, thereby creating dust emissions;
- Roadways would be kept clean during construction works; and
- Any stockpiled material would be sprayed with water during times of high wind.

12.3.2 Operational Mitigation Measures

The assessment of air quality impacts undertaken for the Project has demonstrated compliance with all applicable EPA criteria provided the proposed VRU is installed with a minimum 97% efficiency. This VRU would be operated for the duration of the Project and would be in operation prior to the movement of any fuels through any new tanks or gantry.

An Air Quality Management Plan was previously prepared for the Facility in consultation with the PON, the NSW EPA and DP&E, and in accordance with the requirements set out in the consent conditions and Environment Protection Licence (EPL 20193). The Air Quality Management Plan:

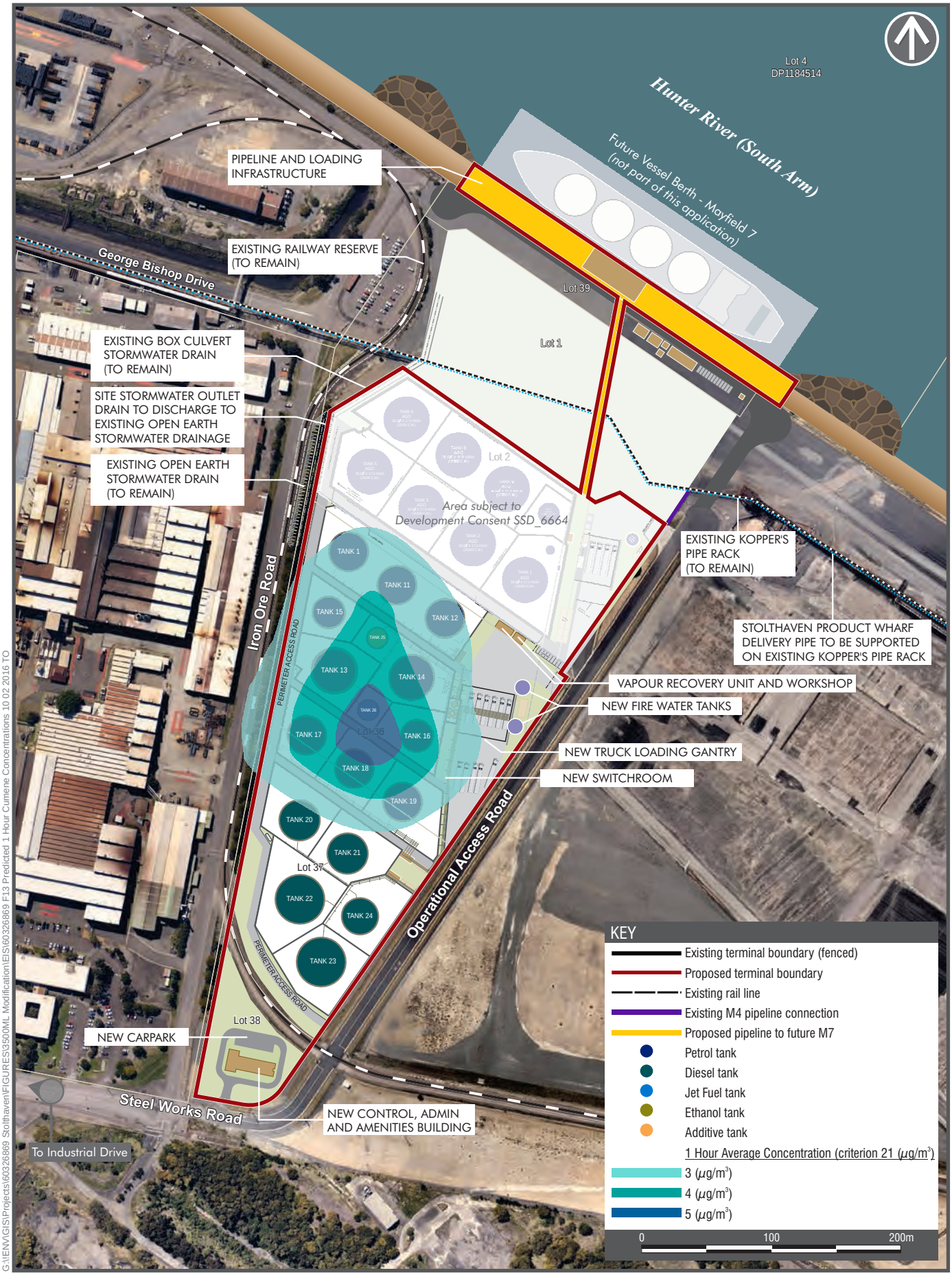
- Identifies the sensitive receptors in proximity to the Site;
- Outlines the legislative framework and standards applicable to the operation;
- Details the potential contributors to off-site pollutant impacts, including the pollutants that are of concern;
- Proposes mitigation measures required to minimise the operation’s impacts on the local air quality;
- Outlines the contingency plans for complaints and pollution incidents; and
- Details the review and reporting protocols.

The Air Quality Management Plan would be reviewed and updated where appropriate to reflect the Project. Relevant mitigation measures provided in the Air Quality Management Plan which would be applied to the Project are summarised as follows:

- All vehicles and plant/equipment should be fitted with appropriate emission control equipment and be serviced and maintained in accordance with the manufacturers’ specifications. Smoke from vehicles/plant should not be visible for more than ten seconds;
- Trucks entering and leaving the premises that are carrying loads of dust-generating materials must have their loads covered at all times, except during loading and unloading (as per EPL condition O3.3);
- Hard surfaces or paving should be used where possible, as unpaved routes can account for a significant proportion of fugitive dust emissions, particularly during dry/windy conditions. Routes should be inspected regularly and repaired when necessary, and roads should be swept and watered as required to limit dirt/dust build up and potential dust generation during windy conditions;
- Any areas on site that are not covered with hard surfaces should be vegetated wherever possible to minimise wind erosion and associated dust generation; and
- All vehicles should be switched off when not in use for extended periods.

Specifically, the Project would include the installation of a vapour control system at the Facility to capture and process vapours generated by loading petroleum, diesel, jet fuel and ethanol into road tankers at the truck gantry. These vapours would be collected by a common vapour head system at each loading bay in the gantry, and directed to a carbon absorption vapour recovery unit designed to recover more than 98 per cent of the hydrocarbon content from the waste vapour stream generated by loading road tankers.

Further details on the vapour recover unit are provided in Section 2.5.1 of **Appendix F**.



G:\ENVGIS\Projects\60326869 Stolthaven\FIGURES\3500ML Modification\EIS\60326869 F13 Predicted 1 Hour Cumene Concentrations 10 02 2016 TO

AECOM

PREDICTED 1 HOUR CUMENE CONCENTRATIONS 99.9th PERCENTILE

Bulk Fuel Storage Facility
State Significant Development - Stolthaven Stage 3

FIGURE 13

13.0 Traffic and Transport

A Traffic Impact Assessment (TIA) for the Project was prepared by AECOM and is provided in **Appendix G**.

13.1 Existing Environment

Site Context

The Facility is located within the Mayfield Concept Approval Site, to the east of the existing OneSteel development on Steelworks Road off Ingall Street and Industrial Drive.

Under the proposed Concept Plan layout the most direct and therefore main access to the Facility is via the traffic signal controlled intersection of Industrial Drive and Ingall Street. PON has provided Stolthaven and its contractors with access to the Facility with a permanent road and services access from Ingall Street, along Steelworks Road and down the eastern side of the Facility (refer **Figure 13**).

OneSteel occupies the bulk of the land adjacent to and west of the Facility, with its Pipe and Tube, and Wire Works. Other land uses in the area to the east of Industrial Drive include Koppers Australia. There is also a Technical Training Centre on the northeastern corner of Ingall Street and Steelworks Road, and a Storage World on the northwestern corner of the intersection of Industrial Drive and Ingall Street.

Existing Traffic Conditions

RMS traffic volume data have been obtained to determine the historical traffic growth and current mid-block traffic flows in the vicinity of the Site. The data show that between 1995 and 2004 (the last available traffic count data available), there has been an average yearly growth rate of 0.27% in the surrounding area. However, a growth rate of 1% was specified by RMS for the traffic impact assessment undertaken for the Mayfield Concept Plan, and this rate has been used to assess traffic volumes associated with the Project.

Traffic Generation from the Existing Stolthaven Facility

The performance of the Industrial Drive / Ingall Street intersection was evaluated using SIDRA Intersection 5.1, a computer-based modelling package designed for calculating isolated intersection performance.

The main performance indicators for SIDRA 5.1 include:

- Degree of Saturation (DoS) – measure of the ratio between traffic volumes and capacity of the intersection is used to determine the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase rapidly. Satisfactory operations usually occur with a DoS range between 0.7-0.8 or below;
- Average Delay – duration, in seconds, of the average vehicle waiting time at an intersection, which corresponds to the Level of Service (LoS) – a measure of the overall performance of the intersection (this is explained further in **Table 32**).

The existing intersection was modelled as a signalised intersection illustrated in **Figure 3**.

Table 32 Performance Criteria for Intersections

Level of Service	Average Delay (secs/veh)	Traffic Signals, Roundabouts	Give Way and Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Development s, RTA, 2002

Table 33 provides a summary of the intersection analysis in 2015 for both AM and PM peak. The analysis indicates that the intersection currently operates at LoS B during the AM peak and PM peak hour periods, with spare capacity of approximately 30 per cent in both AM and PM peak hours.

Table 33 Existing Intersection Performance

Intersection	AM Peak				PM Peak			
	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service
Industrial Drive / Ingall Street	3,182	0.693	15.7	B	3,277	0.685	18.2	B

13.2 Potential Impacts

13.2.1 Construction Traffic Generation

The Stage 3 construction phase is forecast to take approximately three years to complete. During this timeframe, there would still be operational traffic generated by the existing Facility. The traffic generation during the construction phase is expected to be up to 55 light vehicles (110 light vehicle movements) and 10 heavy vehicles (20 heavy vehicle movements) anticipated during peak construction periods.

Construction vehicles would use the existing open hardstand areas in and around the Facility for parking. This area has been designed for port and industrial related uses and has appropriately designed load and bearing capacities for the parking and storage of large vehicles and equipment. As the land immediately surrounding the Facility and the wider Concept Plan area is vacant, there would be no cumulative parking impact from construction traffic.

As operational traffic totals would be much larger than construction traffic totals, intersection modelling has only been undertaken for the operational scenarios as it represents a largest potential impact from the Project. The potential level of impact for construction traffic can therefore be deduced by the results of the operational traffic assessment provided below. .In summary it is found that construction traffic would have a minor impact on the operation of the local road network, even when factoring in existing operations traffic generation from the operational terminal elements.

13.2.2 Operational Traffic Generation

Trip Generation and Distribution

An additional 109 trucks per day are forecast to use the site (not including current movements). Based on the assumption that 60 per cent of the traffic would occur during peak periods and the peak period lasts for nine hours (7am - 4pm), the truck numbers in the peak hour would be about eight trucks per hour. The current operational truck volume, referred to as the typical operational traffic scenario, is 10 trucks per hour; therefore, a total of 18 trucks per hour (36 truck movements per hour) are forecast in the operational phase.

However, there would be short periods where movements may reach up to 40 trucks per hour (80 truck movements per hour), which represents a theoretical maximum operational scenario. This theoretical maximum operation does not account for turnaround time, pump ramp up/down time, driver administration time, etc. This operation has only been tested as an extreme worst case and is considered very unlikely to happen.

The existing access at Ingall Street would be used during operation with 80 per cent of the traffic coming from the north and 20 per cent from the south. This is consistent with the Port Terminal Facilities Mayfield Concept Plan submission. **Table 34** summarises typical operational traffic at the site (based on maximum tanker bay capacity). **Table 35** summarises theoretical maximum operational traffic at the site.

Additional light vehicle movements would be limited to the 24 per day assuming a 1 person per car occupancy rate for the additional 12 workers that would be employed by the Project. This would be a relatively minor addition to total Project traffic.

Table 34 Typical Operational Traffic Scenario per hour

Direction Split	AM Peak / per hour				PM Peak / per hour			
	In		Out		In		Out	
	LV	HV	LV	HV	LV	HV	LV	HV
From/to North	15	14	--	14	--	14	15	14
From/to South	4	4	--	4	--	4	4	4
Total	**19**	**18**	**0**	**18**	**0**	**18**	**19**	**18**

LV = Light Vehicles HV = Heavy Vehicles

Table 35 Theoretical Maximum Traffic Scenario per hour

Direction Split	AM Peak / per hour				PM Peak / per hour			
	In		Out		In		Out	
	LV	HV	LV	HV	LV	HV	LV	HV
From/to North	15	32	--	32	--	32	15	32
From/to South	4	8	--	8	--	8	4	8
Total	**19**	**40**	**0**	**40**	**0**	**40**	**19**	**40**

LV = Light Vehicles HV = Heavy Vehicles

Intersection Performance

Initial Operations - 2017

Intersection modelling was undertaken of the Industrial Drive/Ingall Street intersection to examine the potential traffic impacts of the proposed operational traffic increase.

Table 36 summarises AM and PM peak intersection performances at the Industrial Drive / Ingall intersection for 2016 with existing operational traffic.

Table 36 Intersection Performance (2016 including Typical Operational Traffic Scenario)

Intersection	AM Peak				PM Peak			
	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service
Industrial Drive / Ingall Street	3,242	0.707	15.9	B	3,340	0.707	18.9	B

Results indicate that typical operational traffic associated with the throughput increase would have a negligible impact on the intersections in the peak hours compared to the 2016 base case. The intersections would continue to operate at LoS B in both AM and PM peaks.

Table 37 summarises AM and PM peak intersection performances at the Industrial Drive / Ingall intersection for 2016 with the Projects theoretical maximum operational traffic.

Table 37 Intersection Performance (2016 including theoretical maximum Operational Traffic)

Intersection	AM Peak				PM Peak			
	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service
Industrial Drive / Ingall Street	3,286	0.732	16.6	B	3,383	0.726	20.0	B

Results indicate that theoretical maximum operational traffic associated with the throughput increase would have a negligible impact on the intersections in the peak hours DoS compared to the 2016 base case. The intersections would continue to operate at LoS B in both AM and PM peaks.

Future Operations - 2026

Assessment of the impact of the Project on the intersection 10 years after opening is shown in **Table 38**. The same annual growth rate of 1% has been applied to generate background traffic at the Industrial Drive / Ingall Street intersection in 2026.

Table 38 summarises AM and PM peak intersection performances at the intersection for 2026 under the typical operational traffic scenario.

Table 38 Intersection Performance (2026 including Typical Operational Traffic Scenario)

Intersection	AM Peak				PM Peak			
	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service
Industrial Drive / Ingall Street	3,576	0.781	16.6	B	3.684	0.779	19.3	B

Results indicate that typical operational traffic associated with the throughput increase would have a negligible impact on the intersections in the peak hours. The intersections would continue to operate at LoS B in both AM and PM peaks.

Table 39 summarises the AM and PM peak intersection performances at the intersection in 2026 with the theoretical maximum operational traffic.

Table 39 Intersection Performance (2026 including Theoretical Maximum Operational Traffic Scenario)

Intersection	AM Peak				PM Peak			
	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service	Vehicles Per Hour	Degree of Saturation	Average Delay	Level of Service
Industrial Drive / Ingall Street	3,618	0.806	18.1	B	3.726	0.799	20.9	B

Results indicate that the theoretical maximum operational traffic associated with the throughput increase would similarly have a negligible impact on the intersections in the peak hours compared to the 2016 base case. The intersections would continue to operate at LoS B in both AM and PM peaks.

Consistency with Mayfield Concept Plan

The proposed throughput increase to a maximum of 3,500 ML per annum, and the proposed increase in traffic volumes of a maximum of 200 truck movements per day, are within the development envelope established and assessed for the Mayfield Concept Plan, which identified 1,268 truck movements per day as the initial trigger for further detailed assessment of traffic infrastructure capacities. Therefore the Project would be developed in line with the conditions of approval of the Concept Plan.

As no other elements of the Concept Plan are proposed to be developed to any significant extent by 2017, the Traffic Impact Assessment demonstrates that the Facility can operate without triggering intersection upgrades or exceeding the LoS criteria for the Industrial Drive/Ingall Street intersection.

Internal Access and Parking Criteria

Operational activity would continue to take place 24 hours a day, seven days a week, in accordance with Development Consent SSD_6664. Eight onsite parking spaces are provided for the seven existing staff in a designated area next to the entrance of the Facility. The Project would also generate around 12 full time equivalent jobs at the Facility. Additional staff parking and amenities are proposed to be constructed for these personnel at the southern end of the Site immediately adjacent to the proposed office building as show on **Figure 5**. The access to the new administration and amenities building would be directed to the south, connecting with Steelworks Road. This location provides good visual sight lines for vehicles entering the site from the west. It is also the maximum distance between the driveway and the railway crossing to minimise potential hazards with traffic entering or existing the driveway, through traffic and rail traffic.

13.3 Management and Mitigation Measures

Analysis of the impact of the Project indicates a negligible impact to the overall intersection performance at the Industrial Drive / Ingall Street intersection during the future year AM and PM peaks.

As construction traffic is expected to be less than operational traffic it was deduced that construction traffic impacts would be negligible. Regardless the CEMP would include management measures for the control of vehicle movements throughout the construction period.

A Traffic Management Plan governing operations was prepared for the existing Facility, in accordance with the original Project Approval, and was prepared in consultation with PON, HDC, Newcastle Council and RMS. This Traffic Management Plan would be revised to incorporate the proposed Stage 3 elements including detail of staff parking and measure for the management of heavy vehicle traffic through the new gantry.

Measures identified to manage potential traffic impacts include:

- An induction process for drivers;
- Entry and exit conditions; and
- Approved operational access and egress routes via Steelworks Road to the Industrial Highway.

The revised Traffic Management Plan would be prepared in consultation with DP&E prior to the commencement of operations associated with Stage 3. The revised Traffic Management Plan would also incorporate the relevant management, monitoring and reporting requirements of the Mayfield Concept Plan Traffic Management Plan, and the Mayfield Concept Plan Traffic Monitoring and Review document managed by PON.

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SITE ACCESS

Bulk Fuel Storage Facility
State Significant Development - Stolthaven Stage 3

FIGURE 14

14.0 Noise

A Noise Impact Assessment (NIA) for the Project has been prepared by AECOM and is provided in **Appendix H**.

14.1 Existing Environment

The noise environment around the existing Stolthaven terminal is typified by industrial and port related land uses. The nearest residential areas to the site are located to the south-west of the project site at Mayfield, with the closest receptors in Crebert Street, approximately 900 m from the existing terminal site. To the south east there are residential receivers located in Carrington, approximately 2 km away.

14.1.1 Noise Receivers

The locations of the Facility and nearby sensitive receivers are shown in **Figure 15**. The representative receiver locations and the associated receiver areas for assessment purposes, along with the land use classification (as defined in the Industrial Nosie Policy (EPA, 2000) (INP) of each receiver are presented in **Table 40**.

Table 40 Representative Sensitive Receiver Locations

Receiver Number	Concept Plan Receiver	Address	Land use Classification	Associated Receiver Area
R1	A	1 Arthur St, Mayfield	Residence - Urban	Mayfield
R2	-	52 Arthur St, Mayfield	Residence - Urban	Mayfield
R3	B	2 Crebert St, Mayfield	Residence - Urban	Mayfield (Industrial Dr)
R4	-	21 Crebert St, Mayfield	Residence - Urban	Mayfield (Industrial Dr)
R5	-	30 Crebert St, Mayfield	Residence - Urban	Mayfield (Industrial Dr)
R6	-	50 Crebert St, Mayfield	Residence - Urban	Mayfield (Industrial Dr)
R7	-	2 McNeil Cl, Mayfield	Residence - Urban	Mayfield
R8	C	32 Elizabeth St, Carrington	Residence - Urban	Carrington
R9	D	186 Fullerton Rd, Stockton	Residence - Suburban	Stockton
R10	-	Mayfield East Public School	School	Mayfield (Industrial Dr)
R11	-	40 Industrial Dr, Mayfield	Commercial	Mayfield (Industrial Dr)
R12	-	OneSteel Site (Lot 224 Steelworks Rd, Mayfield)	Industrial	Industrial area

The identified representative receivers are consistent with receivers identified in previous Stolthaven noise impact assessments undertaken for MP08_0130 and SSD_6664, as well as the Mayfield Concept Plan.

14.1.2 Existing Noise Environment

In order to establish the existing noise environment adjacent to the Project area, and for consistency with previous assessments undertaken within the study area, ambient noise monitoring results presented in other noise assessments that incorporate the Project area have been reviewed in addition to attended and unattended measurements undertaken by AECOM.

Background Noise Monitoring - Mayfield

Ambient noise logging was undertaken at locations deemed to be representative of noise sensitive receivers in the area of Mayfield. The logger locations, and attended measurement locations and the representative receiver locations are shown in **Figure 15**.

A noise logger was used to continuously monitor background noise levels between 7 September 2011 and 15 September 2011.

Table 41 provides details of the measurement locations.

Table 41 Ambient Noise Monitoring - Mayfield

Location Duration	Instrumentation	Comments
81 Margaret St, Mayfield Start: 07 Sept 11 Finish: 15 Sept 11	ARL-315 Noise Logger S/N: 15-199-414	Noise sensitive residential receiver. Assessment location to determine noise levels impacting on residential receivers in the Mayfield area. Noise logger located approximately 1.5 m above ground level.

Ambient noise monitoring results at this location are illustrated in **Appendix H** and **Table 42**.

A noise logger measures the noise level over the sample period and then determines the following environmental noise levels:

- L_{A1} – The average sound power noise level exceeded for 1 percent of the monitoring period;
- L_{A10} – The average sound power noise level exceeded for 10 percent of the monitoring period;
- L_{A90} – The average sound power level that is exceeded for 90 percent of the monitoring period. This is considered presentative of background noise;
- L_{Amax} ;The maximum average sound power level over the monitoring period; and
- L_{Aeq} – The equivalent continuous noise level.

The assessment background level (ABL) is established by determining the lowest tenth-percentile level of the L_{A90} noise data acquired over each of the day, evening and night periods. The background noise level or rating background level (RBL) representing the day, evening and night-time assessment periods is based on the median of individual ABLs determined over each period for the entire monitoring duration.

Table 42 Ambient Noise Monitoring Results - Mayfield

Logger Location	Day[2]		Evening		Night	
Sensitive Receiver Catchment - Mayfield						
81 Margaret Street, Mayfield East	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}
Wednesday, 7 September 2011			38	46	33	45
Thursday, 8 September 2011	41	57	36	48	37	47
Friday, 9 September 2011	43	54	37	44	37	44
Saturday, 10 September 2011	42	60	40	45	37	47
Sunday, 11 September 2011	40	52	35	42	34	53
Monday, 12 September 2011	44	55	43	47	42	49
Tuesday, 13 September 2011	43	62	41	47	39	46
Wednesday, 14 September 2011	*[1]	*	*	*	*	*
Thursday, 15 September 2011	*	*				
RBL[3]	**43**		**38**		**37**	
Log Average L_{Aeq}[4]		**58**		**46**		**47**

Notes:

1) Fields marked with (*) in **Table 42** are periods that were affected by adverse weather conditions such as rain, excessive wind speeds or extraneous noise events.

2) Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays and Public Holidays. Evening is defined as 6:00 pm to 10:00 pm, Monday to Sunday and Public Holidays. Night is defined as 10:00 pm to 7:00 am, Monday to Saturday and 10:00 pm to 8:00 am Sundays and Public Holidays.

3) RBL - Rating Background Noise Level (RBL) is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the background level L_{A90}. The RBL is based on the median of the individual daily background noise levels during each assessment period over the entire monitoring period.

4) The L_{Aeq} level is the equivalent continuous sound level and has the same sound energy over the sample period as the actual noise environment with fluctuating sound levels. The overall representative L_{Aeq} noise level is determined by logarithmically averaging each assessment period for the entire monitoring period.

Ambient Noise Monitoring – Industrial Drive

Ambient noise logging was undertaken at a location deemed to be representative of noise sensitive receivers in the area of Mayfield, adjacent to Industrial Drive.

Existing ambient noise levels along Industrial Drive, Mayfield were measured at 118 Woodstock Street, Mayfield. A noise logger was used to continuously monitor background noise levels between 29 July 2014 and 4 August 2014. **Table 43** provides details of the measurement location.

Table 43 Ambient Noise Monitoring Location – Industrial Drive

Location Duration	Instrumentation	Comments
118 Woodstock Street, Mayfield Start: 29 July 14 Finish: 4 Aug 14	SVAN 957 Noise Logger S/N: 27540	Noise sensitive residential receiver. Assessment location to determine traffic noise levels impacting on residential receivers in the Mayfield area adjacent to Industrial Drive. Noise logger located approximately 1.5 m above ground level, free field. A correction for façade reflection in accordance with the EPA Road Noise Policy (RNP) has been applied to the results for use in the traffic noise assessment.

Ambient noise monitoring results at this location are presented in **Table 44**, with noise logging graphs included in **Appendix H**.

Table 44 Ambient Noise Monitoring Results – Industrial Drive

Logger Location	Day[2]	Evening	Night

Industrial Drive Receiver Locations, Mayfield						
118 Woodstock Street, Mayfield	**L_{A90}**	**L_{Aeq}**	**L_{A90}**	**L_{Aeq}**	**L_{A90}**	**L_{Aeq}**
Tuesday 29 July, 2014	-	-	-*	-*	-*	-*
Wednesday 30 July, 2014	-*[1]	-*	51	67	44	64
Thursday 31 July, 2014	-*	-*	53	66	47	65
Friday 01 August, 2014	-*	-*	-*	-*	44	63
Saturday 02 August, 2014	55	67	48	63	42	63
Sunday 03 August, 2014	53	66	50	63	48	63
Monday 04 August, 2014	58	71	-	-	-	-
RBL[3]	**55**	**-**	**51**	**-**	**44**	**-**
Log average L_{Aeq}[4]	**-**	**68**	**-**	**65**	**-**	**64**

Notes:

1) Fields marked with (*) in Table 44 are periods that were affected by adverse weather conditions such as rain, excessive wind speeds or extraneous noise events.

2) Day is defined as 7:00 am to 6:00 pm, Monday to Saturday and 8:00 am to 6:00 pm Sundays and Public Holidays. Evening is defined as 6:00 pm to 10:00 pm, Monday to Sunday and Public Holidays. Night is defined as 10:00 pm to 7:00 am, Monday to Saturday and 10:00 pm to 8:00 am Sundays and Public Holidays.

3) RBL - Rating Background Noise Level (RBL) is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the background level L_{A90}. The RBL is based on the median of the individual daily background noise levels during each assessment period over the entire monitoring period.

4) The L_{Aeq} level is the equivalent continuous sound level and has the same sound energy over the sample period as the actual noise environment with fluctuating sound levels. The overall representative L_{Aeq} noise level is determined by logarithmically averaging each assessment period for the entire monitoring period.

G:\ENVGIS\Projects\60326869 Stolthaven\FIGURES\3500ML Modification\EIS\60326869 F15 Noise Sensitive Receivers 10 02 2016 TO

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NOISE SENSITIVE RECEIVER LOCATIONS

Bulk Fuel Storage Facility
State Significant Development - Stolthaven Stage 3

FIGURE 15

14.2 Criteria for Assessment

A detailed description of the methodology and Project specific criteria is provided in **Appendix H** and summarised below.

14.2.1 Construction Noise Criteria

In accordance with the methodology described in the *Interim Construction Noise Guidelines (ICNG, 2009)* (ICNG), the construction noise management levels for the nearest sensitive residential receivers grouped by suburb have been calculated as shown in **Table 45**.

Table 45 Construction Noise Management Levels – Residential Receivers

Residential Receivers Area	Daytime Rating Background Level (RBL) L_{A90} dB(A)	ICNG Standard Hours - Daytime Noise Management Levels L_{Aeq} dB(A)
Mayfield	43	53
Carrington	44	54
Stockton	47	57

Noise management levels for other sensitive land uses around Mayfield, such as schools, places of worship are shown in **Table 46**.

Table 46 Construction Noise Management Levels – Sensitive Land Uses Other Than Residential

Land Use	Noise Management Level, $L_{Aeq\ (15\ min)}$ (applies when premises are in use)
Classrooms at schools and other educational institutions	Internal noise level 45 dB(A)
Places of worship	Internal noise level 45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
Passive recreation areas(characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB(A)
Community centres	Depends on the intended use of the centre. Refer to the recommended 'maximum' internal levels in AS2107 for specific uses.

Criteria for industrial and commercial premises are shown below:

- Industrial premises: external $L_{Aeq\ (15min)}$ 75 dB(A), and
- Offices, retail outlets: external $L_{Aeq\ (15min)}$ 70 dB(A).

14.2.2 Operational Intrusive and Amenity Noise Criteria

The INP provides guidance and recommendations on the assessment of noise impacts from industrial and commercial facilities throughout all periods of the day. The assessment procedure for industrial noise sources has two components that must be satisfied:

- Controlling ***intrusive noise*** impacts in the short term for residences. Intrusive noise is defined as noise that intrudes above the background level by more than 5dB; and
- Maintaining ***noise level amenity*** for particular land uses for residences and other land uses. The INP provides a range of accepted noise amenity levels for a variety of land uses and receivers.

A summary of the environmental noise criteria for the Facility is given in **Table 47**. The Project Specific Noise Levels for each residential receiver are shown in bold.

Table 47 Project Specific Noise Levels

Receiver Area	Period	RBL ($L_{A90, 15\ minute}$)	Intrusive Criterion RBL + 5 dB(A), ($L_{Aeq, 15\ minute}$)	Ambient ($L_{Aeq, period}$)	Industrial Contribution, ($L_{Aeq\ 15\ minute}$)	Amenity Criterion[1] ($L_{Aeq, Period}$)
Mayfield (Industrial Drive)	Day	43	**48**	58	48[2]	**60**
	Evening	38	**43**	46	49[3]	**54**
	Night	37	**42**	47	49[4]	**52**
Mayfield	Day	43	**48**	58	48[2]	**60**
	Evening	38	**43**	46	47[5]	**47**
	Night	37	**42**	47	45[6]	**37**
Carrington	Day	44	**49**	57	57[7]	**57**
	Evening	43	**48**	54	54[7]	**44**
	Night	39	**44**	46	47[4,6]	**37**
Stockton	Day	47[8]	**52**	58[8]	52[4]	**52**
	Evening	46[8]	**51**	54[8]	52[4]	**42**
	Night	46[8]	**51**	54[8]	52[4]	**42**

1) The amenity criterion has been modified in accordance with the industrial contribution adjustment in Table 2.2 of the INP.

2) AECOM attended measurement, 15 September 2011 (85 Margaret Street, Mayfield).

3) AECOM attended measurement, 1 September 2013.

4) AECOM attended measurement, 28/29 July 2014. For Stockton, it has been assumed that the night time industrial contribution estimation from measurements is applicable for all periods.

5) This industrial contribution has been based upon the evening Mayfield industrial contribution presented in *"Noise Impact Assessment, Stolthaven Terminals Newcastle, Mayfield (BHP) Site, NSW",* 2008 by Spectrum Acoustics.

6) AECOM attended measurement, 16 January 2012. Mayfield measurements were at 85 Margaret Street, Mayfield.

7) *Mayfield Site Port-Related Activities Concept Plan EA"*, Revision F, July 2010 by Wilkinson Murray.

8) 218 Fullerton Road, Stockton from AECOM report *Noise Impact Assessment, Modification of Project Approval 08_0129*, referenced as 60306451, Rev 3, dated 13 November 2013, with measurements undertaken from 20 May 2013 until 28 May 2013.

14.2.3 Mayfield Concept Plan Criteria

PON is in the process of finalising the implementation of a Cumulative Environmental Noise Management Tool (CENMT), which includes the development of a Site Noise Model as required by Condition 2.16 of the Mayfield Concept Plan Approval. It's objective is to control the cumulative impact of all existing and future developments within the Mayfield Concept Plan area through the allocation of noise quotas for individual operations.

PON has developed a 'User guide' (reference AECOM report 60289391.RPT01.01, latest version dated 15 July 2015) that provides guidance to future proponents on how to assess noise impacts from the Project site that fall within the Mayfield Concept Plan area. Provisional quotas for the purposes of this assessment have been calculated as detailed in **Table 48**.

Table 48 Summary of Mayfield Concept Plan Provisional Noise Quotas for SSD_7065

Receiver	Applicable Amenity Noise Quota, $L_{Aeq, period}$ dB(A)		
	Day (7.00 am to 6.00 pm)	*Evening (6.00 pm to 10.00 pm)*	*Night (10.00 pm to 7.00 am)*
A – 1 Arthur St, Mayfield	47	36	30
B – 2 Crebert St, Mayfield	51	40	34
C – 32 Elizabeth St, Carrington	42	30	25
D - 186 Fullerton Rd, Stockton	39	28	22

Notes: These cumulative amenity noise quota levels are subject to approval by PON and DP&E and have been included for assessment purposes.

These noise quotas apply under winds of up to 3 metres/second (measured at 10 metres above the ground level) and Pasquill stability class from A to F which equates to a range of atmospheric conditions from very unstable (A) through to stable (F).

14.2.4 Sleep Disturbance Criteria

Based on the measured background noise levels during the night, the sleep disturbance criteria for the nearest noise sensitive residential receivers are presented in **Table 49**.

Table 49 Night-time Sleep Disturbance Criteria

Location	Measured RBL $L_{A90, 15\ minute}$ dB(A)	Sleep Disturbance Criteria $L_{A1\ (1\ minute)}$ dB(A)	
		Screening Criterion	Awakening Reaction
Mayfield	37	52	60 - 65
Carrington	39	54	60 - 65
Stockton	46	61	60 - 65

14.2.5 Operational Road Noise Traffic Criteria

EPA's Road Noise Policy (RNP, 2011) guideline is appropriate for assessing both operational and construction traffic noise associated with the bulk fuel facility. Utilising the methodology outlined in the RNP, the Project specific traffic noise criteria have been calculated as detailed in **Table 50**. The external noise criteria are applied 1 m from the external facade of the affected building.

Table 50 Road Traffic Noise Criteria

Period	Parameter	Criterion
Sub-arterial roads		
Day (7:00 am – 10:00 pm)	$L_{Aeq, (15\ hour)}$	60 dB(A)
Night (10:00 pm – 7:00 am)	$L_{Aeq, (9\ hour)}$	55 dB(A)

A more detailed explanation of how each of the nominated noise criteria has been determined is provided in **Appendix H**.

14.3 Construction Noise Assessment

A detailed program of the likely works program required through the construction phase of the Project and the required construction equipment necessary to undertake this work is described in **Section 6.3**. Based on the identified phases of construction, five construction works scenarios were established for the purposes of assessing potential construction noise impacts. These scenarios are:

- Scenario 1 – Reasonable Worst Case Civil Works Tank Location (Month 10);
- Scenario 2 – Reasonable Worst Case Tank Fabrication Works Tank Location (Month 21);
- Scenario 3 – Reasonable Worst Case Mechanical Works Location (Month 26);
- Scenario 4 – Reasonable Worst Case Electrical Works Tank Location (Month 28); and
- Scenario 5 – Reasonable Worst Case Commissioning Works Tank Location (Month 32).

The worst case assessment has been undertaken assuming that the operational equipment is at its closest point to (approx. 500m) to the nearest sensitive receiver, in order to determine the highest level of potential impacts.

The assessment in **Table 51** indicates that no exceedance of the construction noise criteria are expected to occur under any of the assessed construction scenarios. Noise contour maps illustrating the assessment are provided in **Appendix H**.

Table 51 Predicted Construction Noise Levels

Receiver[1]	$L_{Aeq(15min)}$ Noise Level (external) (dB(A))		
	Predicted (external)[2]	NML	Exceedance
Scenario 1– Reasonable Worst Case Civil Works Tank Location (Month 10)			
R1	40	53	-
R2	41	53	-
R3	48	53	-
R4	47	53	-
R5	49	53	-
R6	48	53	-
R7	32	53	-
R8	32	53	-
R9	30	54	-
R10	30	57	-
R11[3]	38	50	-
R12	46	70	-
R13	65	75	
Scenario 2 – Reasonable Worst Case Tank Fabrication Works Tank Location (Month 21)			
R1	44	53	-
R2	45	53	-
R3	50	53	-
R4	49	53	-
R5	52	53	-
R6	52	53	-
R7	39	53	-
R8	45	53	-
R9	31	54	-
R10	28	57	-
R11[3]	45	55	-
R12	50	70	-
R13	68	75	

Receiver[1]	$L_{Aeq(15min)}$ Noise Level (external) (dB(A))		
	Predicted (external)[2]	NML	Exceedance
Scenario 3 – Reasonable Worst Case Mechanical Works Location (Month 26)			
R1	30	53	-
R2	31	53	-
R3	38	53	-
R4	37	53	-
R5	40	53	-
R6	38	53	-
R7	27	53	-
R8	26	53	-
R9	18	54	-
R10	18	57	-
R11[3]	29	55	-
R12	36	70	-
R13	58	75	
Scenario 4 – Reasonable Worst Case Electrical Works Tank Location (Month 28)			
R1	28	53	-
R2	29	53	-
R3	36	53	-
R4	35	53	-
R5	37	53	-
R6	36	53	-
R7	24	53	-
R8	24	53	-
R9	17	54	-
R10	17	57	-
R11[3]	27	55	-
R12	34	70	-
R13	54	75	
Scenario 5 – Reasonable Worst Case Commissioning Works Tank Location (Month 32)			
R1	26	53	-
R2	29	53	-
R3	35	53	-
R4	34	53	-
R5	37	53	-
R6	35	53	-
R7	26	53	-
R8	26	53	-
R9	13	54	-
R10	13	57	-
R11[3]	26	55	-
R12	32	70	-
R13	55	75	

1) In the EPA ICNG school classroom criteria is an internal noise level, with a recommended internal noise level of 45 dB(A). A 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation. Schools are required to be assessed during school hours only.

In accordance with Schedule 3, Condition 24 of the existing site development approval (SSD_6664) construction works would be undertaken during standard hours which are:

- Monday to Friday 7am to – 6 pm;
- Saturday 8am – 1pm; and
- No works on Sundays and Public Holidays.

Works may occur outside these hours provided they are inaudible at sensitive receivers.

Construction noise impacts are therefore anticipated to have a negligible impact on sensitive receivers.

14.4 Operation Noise Assessment

14.4.1 Amenity Period Noise Assessment

The results of the noise modelling undertaken to assess the potential impact of the Project against the amenity noise criteria are detailed in the following three tables for the day, evening and night time periods. It is noted that the assessment of temperature inversion does not apply during the day-time period.

Table 52 Noise Contribution at Representative Receiver Locations During Daytime Operations

Receiver	Criterion[1]	Neutral		Temperature Inversion (F-Class, 3˚C/100 m)		3 m/s Source to Receiver Wind	
		Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance	Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance	Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance
R1	60	25	-	*Assessment of temperature inversion does not apply during the day time period.*		30	-
R2	60	30	-			33	-
R3	60	35	-			39	-
R4	60	34	-			38	-
R5	60	37	-			41	-
R6	60	36	-			39	-
R7	60	28	-			31	-
R8	60	27	-			31	-
R9	57	18	-			24	-
R10	52	16	-			23	-
R11[1,2]	45	26	-			30	-
R12	65	33	-			37	-
R13	70	55				56	

Notes:

1) Refer to Table 47 for Project Specific Criterion

2) In the INP the school classroom criteria is an internal noise level, with an acceptable noise level of 35 dB(A) and a recommended maximum of 40 dB(A). A 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation.

3) The noise impacts on schools are to be assessed during school hours. As there is not a significant variation in noise levels between the day and night operations, the predicted night-time noise levels at the school have been assessed against the school criteria to determine the noise impact.

Table 53 Noise Contribution at Representative Receiver Locations During Evening Operations

Receiver	Criterion[1]	Neutral		Temperature Inversion (F-Class, 3°C/100 m)		3 m/s Source to Receiver Wind	
		Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance	Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance	Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance
R1	47	26	-	30	-	30	-
R2	47	30	-	33	-	33	-
R3	55	35	-	38	-	39	-
R4	55	34	-	37	-	38	-
R5	55	38	-	40	-	41	-
R6	55	36	-	38	-	39	-
R7	55	28	-	31	-	31	-
R8	47	28	-	30	-	31	-
R9	44	19	-	25	-	25	-
R10	42	18	N/A[3]	24	N/A[3]	24	N/A[3]
R11[1,2]	-[3]	27	-	29	-	30	-
R12	65	33	-	37	-	38	-
R13	70	55		56		56	

Notes:

1) In the INP the school classroom criteria is an internal noise level, with an acceptable noise level of 35 dB(A) and a recommended maximum of 40 dB(A). A 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation.

2) The noise impacts on schools are to be assessed during school hours. As there is not a significant variation in noise levels between the day and night operations, the predicted night-time noise levels at the school have been assessed against the school criteria to determine the noise impact.

3) The school has only been assessed when in use.

Table 54 Noise Contribution at Representative Receiver Locations During Night Operations

Receiver	Criterion	Neutral		Temperature Inversion (F-Class, 3˚C/100 m)		3 m/s Source to Receiver Wind	
		Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance	Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance	Predicted Noise Level, $L_{Aeq\ (Period)}$, dB(A)	Exceedance
R1	37	22	-	26	-	27	-
R2	37	26	-	29	-	30	-
R3	52	32	-	35	-	35	-
R4	52	30	-	34	-	34	-
R5	52	34	-	36	-	37	-
R6	52	32	-	35	-	35	-
R7	52	25	-	27	-	27	-
R8	37	24	-	27	-	27	-
R9	37	17	-	22	-	22	-
R10	42	14	N/A[3]	21	N/A[3]	21	N/A[3]
R11[1,2]	-[3]	23	-	26	-	26	-
R12	65	30	-	33	-	34	-
R13	70	52		52		52	

1) In the INP the school classroom criteria is an internal noise level, with an acceptable noise level of 35 dB(A) and a recommended maximum of 40 dB(A). A 10 dB reduction has been assumed between external and internal noise levels based upon a window being open for adequate natural ventilation.

2) The noise impacts on schools are to be assessed during school hours. As there is not a significant variation in noise levels between the day and night operations, the predicted night-time noise levels at the school have been assessed against the school criteria to determine the noise impact.

3) The school has only been assessed when in use.

As can be seen no exceedances of the amenity criteria are expected to occur during either the day, evening or night time periods.

14.4.2 Mayfield Concept Plan Noise Quotas Assessment

Table 55 presents the predicted noise levels against the Mayfield Concept Plan noise quota levels. Exceedances of the Mayfield Concept Plan noise quota are predicted for assessment locations A and B and as such a further detailed review is presented below. When considering these quotes it should be noted that no predicted noise level in this assessment exceeds the overall Mayfield Concept Plan amenity noise criteria.

The exceedance of the noise quota presented in **Table 55** are 1dB for receiver. This exceedances is minor, with a change in noise of 2dB or less not perceptible to the human ear. Furthermore this assessment has factored in meteorological conditions that would enhance noise at the receiver location including prevailing winds blowing at 3m/s from the source to the receiver. For these reasons the exceedance is considered minor.

Table 55 Mayfield Concept Plan Noise Quota Assessment – Reasonable Worst Case Amenity Scenario Assessment

Mayfield Concept Plan Receiver	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Mayfield Concept Plan noise quota, dB(A)	Exceedance	Mayfield Concept Plan overall noise goals, dB(A)	Exceedance
Day					
A	30	47	-	60	-
B	39	51	-	60	-
C	24	42	-	57	-
D	23	39	-	55	-
Evening					
A	30	36	-	49	-
B	39	40	-	50	-
C	25	30	-	44	-
D	24	28	-	37	-
Night					
A	27	30	-	43	-
B	35	34	**1**	43	-
C	22	25	-	45	-
D	21	22	-	37	-

Note: Assessed Meteorological Condition: 3 m/s Source to Receiver Wind

Further assessment was undertaken to determine the source of noise which would lead to exceedance of the quotas presented in **Table 55**. This identified that the source of the exceedance is related to truck movements from the Facility and not the operation of plant and equipment e.g. pumps. Given that truck noise is generally not under the control of Stolthaven for trucks moving to or from the site, it is not considered feasible to implement further mitigation. Despite this Stolthaven would continue to implement ongoing driver inductions with the aim of managing driver behaviour in a manner which results in minimal noise generation.

14.4.3 Intrusiveness Period Noise Assessment

The modelled results for the reasonable worst case intrusiveness scenario (15 minute period) for the day, evening and night scenarios are detailed in the following three tables respectively. The intrusive assessment only applies to residential receiver locations and the results show that no exceedances of the intrusiveness noise criteria are expected to occur at any of the modelled sensitive receivers.

Table 56 Reasonable Worst Case Intrusiveness (15 minute period) – Day Scenario

Period	Criteria, dB(A)[1]	Day											
Assessed meteorological condition		Neutral				Temperature Inversion (F-Class, 3˚C/100 m)				3 m/s source to receiver wind			
		Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)
Receiver		Worst case site noise intensive operations		Worst case truck noise intensive operations		Worst case site noise intensive operations		Worst case truck noise intensive operations		Worst case site noise intensive operations		Worst case truck noise intensive operations	
R1	48	21	-	28	-	*Note that assessment of temperature inversion does not apply during the day-time period.*				26	-	32	-
R2	48	25	-	31	-					28	-	35	-
R3	48	30	-	37	-					34	-	41	-
R4	48	29	-	36	-					33	-	40	-
R5	48	32	-	39	-					36	-	42	-
R6	48	32	-	37	-					36	-	41	-
R7	48	23	-	30	-					26	-	33	-
R8	48	22	-	29	-					26	-	33	-
R9	49	20	-	21	-					26	-	26	-
R10	52	19		19						25		25	

1) Refer to Table 47 for Project Specific Criterion.

Table 57 Reasonable Worst Case Intrusiveness (15 minute period) – Evening Scenario

Period	Criteria, dB(A)[1]	Evening											
Assessed meteorological condition		Neutral				Temperature Inversion (F-Class, 3˚C/100 m)				3 m/s source to receiver wind			
		Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)
Receiver		Worst case site noise intensive operations		Worst case truck noise intensive operations		Worst case site noise intensive operations		Worst case truck noise intensive operations		Worst case site noise intensive operations		Worst case truck noise intensive operations	
R1	43	21	-	28	-	25	-	31	-	26	-	32	-
R2	43	25	-	31	-	28	-	34	-	28	-	35	-
R3	43	30	-	37	-	33	-	40	-	34	-	41	-
R4	43	29	-	36	-	33	-	39	-	33	-	40	-
R5	43	32	-	39	-	35	-	42	-	36	-	42	-
R6	43	32	-	37	-	35	-	40	-	36	-	41	-
R7	43	23	-	30	-	25	-	32	-	26	-	33	-
R8	43	22	-	29	-	25	-	32	-	26	-	33	-
R9	48	20	-	21	-	26	-	26	-	26	-	26	-
R10	51	19		19		25		26		25		25	

1) Refer to Table 47 for Project Specific Criterion

Table 58 Reasonable Worst Case Intrusiveness (15 minute period) – Night Scenario

Period	Criteria, dB(A)[1]	Night											
Assessed meteorological condition		Neutral				Temperature Inversion (F-Class, 3°C/100 m)				3 m/s source to receiver wind			
		Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)	Predicted noise level, $L_{Aeq\ (15\ min)}$, dB(A)	Exceedance, dB(A)
Receiver		Worst case site noise intensive operations		Worst case truck noise intensive operations		Worst case site noise intensive operations		Worst case truck noise intensive operations		Worst case site noise intensive operations		Worst case truck noise intensive operations	
R1	42	21	-	28	-	25	-	31	-	26	-	32	-
R2	42	25	-	31	-	28	-	34	-	28	-	35	-
R3	42	30	-	37	-	33	-	40	-	34	-	41	-
R4	42	29	-	36	-	33	-	39	-	33	-	40	-
R5	42	32	-	39	-	35	-	42	-	36	-	42	-
R6	42	32	-	37	-	35	-	40	-	36	-	41	-
R7	42	23	-	30	-	25	-	32	-	26	-	33	-
R8	42	22	-	29	-	25	-	32	-	26	-	33	-
R9	44	20	-	21	-	26	-	26	-	26	-	26	-
R10	51	19		19		25		26		25		25	

1) Refer to Table 47 for Project Specific Criterion

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14.4.4 Sleep Disturbance

The application notes for the INP recommend that sleep disturbance is assessed based on the emergence of the $L_{A1\ (1\ minute)}$ noise level over the corresponding $L_{A90\ (15\ minute)}$ noise level. Using the INP methodology, the potential sleep disturbance impacts of the Project on residential sensitive receivers was examined. The results of this assessment are shown in **Table 59**, and show that the recommended noise criterion is not exceeded at any residential receiver location.

Table 59 Predicted Noise Levels at Representative Sensitive Receiver Locations during Night-time Operations

Receiver[1]	Criterion	Predicted $L_{A1\ (1\ minute)}$ with 3 m/s Source to Receiver Winds	Exceedance
R1	52	44	-
R2	52	48	-
R3	52	49	-
R4	52	47	-
R5	52	51	-
R6	52	50	-
R7	52	50	-
R8	52	48	-
R9	54	31	-
R10	61	30	

1) Only residential receivers require assessment for sleep disturbance.

14.4.5 Operational Road Traffic Nosie Assessment

An assessment was undertaken of the existing traffic flows on Industrial Drive, combined with the potential traffic that would be generated as a result of the Project during the day and night periods. The resulting increase in traffic was calculated to be approximately 1.3% during the day and 4.4% during the night period.

The traffic noise assessment was undertaken in accordance with the requirements of the RNP. The assessment concluded that traffic noise increases that may occur as a result of the Project are anticipated to be less than 1 dB(A) which is considered an insignificant impact, as described in **Appendix I**. Despite being a negligible exceedance it is noted that Stolthaven undertake driver inductions which include informing drivers of appropriate driving techniques to minimise noise disturbance to nearby receivers. Such measures included minimising truck idling times and switching off engines and minimising compression breaking. No noise complaints have been received by Stolthaven regarding their current operations.

14.4.6 Construction and Operational Vibration

Unlike the criteria applicable to noise emissions, vibration criteria are the same for both the construction and operational phases of this project. The guideline '*Assessing Vibration: a technical guideline*', (DECCW, 2006) has been designed to be used in evaluating and assessing the effects on amenity of vibration emissions from industry, transport and machinery. The guideline is used in assessments of vibration impacts caused by the construction and operation of new developments.

Vibration criteria are set primarily according to whether the particular activities of interest are continuous in nature or intermittent, whether they occur during the daytime or night-time and the type of receiver to be assessed e.g. commercial or residential.

The effects of vibration in buildings can be divided into three main categories:

- Those in which the occupants or users of the building are inconvenienced or possibly disturbed, i.e. human disturbance or discomfort;
- Those in which the integrity of the building or the structure itself may be prejudiced; and
- Those where the building contents may be affected.

Vibration levels at sensitive receiver locations must be controlled so as to prevent discomfort and regenerated noise, and in some extreme cases, structural damage.

The nearest residential receivers are located approximately 500 m from Project site. The existing nearby industrial developments are located approximately 50 m from the Project site, and are neither noise nor vibration sensitive.

At such distances, the risk of discomfort, regenerated noise and structural damage impacting receivers is extremely low and therefore no further assessment of either operational or construction vibration is considered necessary.

14.5 Management and Mitigation Measures

Potential noise and vibration impacts would be managed through the implementation of a CEMP which would be prepared to include reasonable and feasible management and mitigation measures to be put in place during the construction period.

Stolthaven currently has an Operation Noise Management Plan (ONMP) for its Facility. This provides operation noise management protocols to ensure that feasible and reasonable controls to manage potential noise impacts during the operation of the facility are established and maintained. This ONMP has been developed as a sub-plan to the Operation Environmental Management Plan (OEMP) for the Facility.

This report is updated in accordance with the sites operational approval requirements, and identifies requirements for implementation, monitoring and auditing of operational noise. The ONMP also incorporates noise requirements, including the methods for meeting the requirements of the monitoring network developed for the Mayfield Concept Plan.

Prior to the operation of any of the new Project elements associated with Stage 3, the ONMP would be revised and updated in consultation with PON and DP&E.

15.0 Soil and Water

15.1 Existing Environment

15.1.1 Surface Water

The Facility is located in the Port of Newcastle, within the Hunter Estuary, adjacent to the south arm of the Hunter River. It forms part of a Nationally Important Wetland system, (refer **Section 21.1**) and is a fifth order stream as per the Strahler System of stream classification (Department of Primary Industries: Office of Water, 2012). The Hunter River estuary comprises over 100 km of waterways, and its South Arm flows around Kooragang Island. Historical land uses have highly modified the nature of the Hunter Estuary, with a range of sediments and pollutants entering the estuary, impacting on water quality and habitat values.

The Project site sites within the Mayfield Concept Plan area to which the Mayfield Concept Plan Stormwater Management Strategy applies. The strategy includes two main open earth stormwater drains exist on the Mayfield Concept Plan Site, the western and eastern drains. The western drain crosses the Mayfield Concept Plan Site at the north-western end, adjacent to the western boundary of the Facility. A box culvert approximately 220 m in length then conveys stormwater beneath the Facility and the Koppers pipeline to the South Arm of the Hunter River (**Figure 4**).

The undeveloped portion of the Project area on which the proposed tanks would be located has been contoured as part of civil works undertaken for the existing operation, to direct stormwater runoff into the existing western stormwater drain via stormwater quality control devices, prior to leaving the Site. Stormwater leaving the Site is discharged to the western drain primarily via sheet flow. The western drain is directly connected to the Hunter River.

The existing Facility has one licensed surface water discharge point under EPL 20193, with relevant water quality parameters set out in Condition L3.4 of EPL 20193, and a requirement to undertake weekly monitoring during discharge events for a range of parameters (Condition M2.2), as well as continuous volume monitoring during a discharge event (Condition M8.1).

Monitoring of stormwater discharges is undertaken as part of the Site's Stormwater Management Plan to assess the efficiency of stormwater runoff quality controls implemented at the Site. Monitoring of stormwater at the Site consists of visual inspections, as well as water quality monitoring as outlined above. Visual inspections confirm:

- The absence of erosion and scouring around the stormwater pipe discharge outlets;
- Changes in clarity, colour and odour of receiving waterways;
- Presence of debris and rubbish;
- Evidence of stress on flora or fauna;
- Presence of an oily film on water surfaces; and
- Orange/brown coating on banks, water surfaces or substrate (AECOM, 2014).

There are currently six impermeable bunds with liquid tight concrete walls around the Facility's bulk storage area designed to contain any spills onsite and prevent environmental harm. After rainfall events, water from all bunds is sampled and tested before internal transfer to Bund 7 and then release through the Puraceptor on Site according to the Stormwater Management Plan (AECOM, 2014). In order to ensure the quality of stormwater collected from the bunds, the outlet from the bunds is kept closed at all times. The Puraceptor is a water quality and hydrocarbon detector located at the Site's licenced discharge point at the Hunter River. In order to confirm that stormwater measures implemented at the site do not adversely impact on the Hunter River, samples are collected following a rainfall event that result in sufficient stormwater discharge to collect surface water samples (AECOM, 2014). The water samples are analysed prior to discharge for the pollutants indicated in Condition L3.4 of EPL 20193. Once water quality results are obtained for the water in the Puraceptor, water is discharged into the Hunter River via an outfall drain. If water quality is found to be noncompliant with the parameters prescribed in Condition L3.4 it is treated further and then retested until the water is of an acceptable quality to be discharged (AECOM, 2014).

15.1.2 Flooding

A number of studies have been undertaken as part of the site remediation that have investigated flooding and stormwater management on the Site. A stormwater management strategy prepared by Patterson Britton & Partners (2007) indicated that the western drain (located west of the Facility) would not be breached in a 1:100 Annual Reoccurrence Interval (AR) flooding event. Therefore it is reasonable to conclude (in relation to the predictions of the Patterson Britton & Partners report) that the Facility would not be subject to flooding. For further details on the proposed stormwater management system at the Facility, refer to **Section 6.4.4**. Given the low level of flooding risks for the Site, as well as the adoption of standard flood management levels in stormwater design, no further consideration of flooding impacts is considered necessary.

15.1.3 Groundwater

EPL 20193 requires Stolthaven to operate four groundwater monitoring wells (groundwater monitoring wells 49, 50, 50 and 51, otherwise known as EPL monitoring points 1, 2, 3 and 4). At each of these groundwater monitoring wells, Condition M2.2 of EPL 20193 requires quarterly sampling be undertaken for BTEX (benzene, ethylbenzene, toluene and xylene), pH, standing water level and total petroleum hydrocarbons. Two of these groundwater monitoring wells are located upstream from the Facility, with the remaining two located downstream. Groundwater monitoring results are compared against the Site's Groundwater Assessment Criteria as part of the overall Groundwater Management Plan (sourced from the ANZECC (2000) *Australia New Zealand Water Quality Guidelines for Fresh and Marine Waters, 95% Species Protection for Marine Waters Criterion)*. So far monitoring results have not demonstrated any measurable impacts to groundwater as a result of the operation of the Facility, although the monitoring program has not been in effect for sufficient time in order to draw definitive conclusions (AECOM, 2014).

Groundwater monitoring, which has continued since the Facility began operating indicates that the Facility is not contributing to existing pollutant levels when compared to background monitoring results undertaken prior to the commencement of operations. The monitoring program allows Stolthaven to track its obligations:

- As the occupier of the Site, to not cause contamination to the Site, under section 6 of the CLM Act; and
- To continue the ongoing management of the Site which has been previously subject to remediation works, under section 28 of the CLM Act.

As there is currently no Water Sharing Plan that applies to this groundwater source, the existing groundwater monitoring wells operate under licence from the Water Administration Ministerial Corporation under section 113, Part 5 of the *Water Act 1912.*

15.1.4 Contamination and Soils

Soils on the Site have been highly disturbed through past industrial activities and are characterised by fill material of variable thickness underlain by marine and estuarine sediments and Tomago coal measures. Site reclamation was undertaken between 1866 and 1940. Reclamation fill extended from the surface to a depth of approximately 10 m and includes coal washery rejects, copper slag, fly ash, rubble, iron and steel-making slags and process wastes, boiler ash, general waste and building debris from industrial facilities and sand dredged from the South Arm of the Hunter River (SKM, 2004). This fill material arose from previous industrial uses and has since been subject to remediation activities under the CLM Act.

Estuarine sediments of inter-bedded soft to firm clays, silt and sand are located beneath the fill material. These sediments lie above very stiff to hard silt clays at around 15-16 m deep and, in some locations, extend to well below 20 m. Bedrock underlies these sediments.

The Site has been subject to numerous site investigations to determine soil contamination during the decommissioning and remediation phases of the former BHP Steelworks Site. The result of these investigations identified areas of higher contamination which related to the previous activities undertaken as part of the steelworks operations.

PAHs were identified as the only group of contaminants present in the surface fill layer at sufficiently high concentrations to warrant remediation prior to development of the Mayfield Concept Approval Site. High concentrations of VOCs such as BTEX were also identified at greater depths at the Site. Tar-like materials and asbestos materials were also identified at the former steelworks site.

Remediation works have since been completed for the Site as per the requirements of the Voluntary Remediation Agreement No 26025 issued under the former section 26 of the CLM Act on 14 September 2005 (HDC, 2015).

Remediation works for the BHP Steelworks Site are ongoing. Remediation works at the Site were completed over two stages as follows:

- Stage 1 remediation works completed in mid-2008, included:
    - Construction of a three-sided subterranean barrier wall around 49 m deep ad 1.5 km long, reducing flow of groundwater into the Hunter River;
    - Placement of low-permeability capping (10^{-9} m/s) to reduce infiltration of rainwater;
    - Construction of new major stormwater drains at the east and west ends of the Site; and
    - Associated demolition, land forming, surface contouring and environmental works;
- Stage 2 remediation works completed in 2013, included:
    - Placement of low-permeability capping;
    - Land shaping and surface contouring;
    - Drainage; and
    - Recycling of waste concrete and steel.

The bulk of remediation works required at the former BHP Steelworks Site took place in the Stage 1 area, on which the Facility is partially located (HDC, 2015). Capping the Stage 1 area has included the use of a 0.5 m thick layer of Virgin Excavated Natural Material constructed to finished surface levels for remediation in the south-western corner of the Stage 1 remediation area (along the eastern section of the existing Facility). Paved capping was used for the remainder of the Stage 1 area. The paved cap layer is comprised of 300 mm granular site material overlain with 100 mm of 20 mm sized crushed concrete sealed with a bituminous two-coat seal to meet the permeability required by the Voluntary Remediation Agreement No 26025 (HDC, 2014). The paved cap was constructed to a level 400 mm below the finished surface levels, allowing air space for the construction of additional pavement thickness during subsequent project works, as may be required for heavy duty hardstands (HDC, 2014).

Following the completion of the Stage 1 and Stage 2 remediation works, the entire Site is now sealed hardstand (HDC, 2015).

15.1.5 Acid Sulfate Soils

A review of the NSW Acid Sulfate Soil Risk Maps for the Newcastle area was also undertaken. Potential acid sulfate soils (ASS) are waterlogged soil layers rich in iron sulphide, primarily pyrite. They generally occur in low lying coastal areas. When excavation or drainage exposes these soils to oxygen, pyrite becomes oxidised to form sulphuric acid. If this concentration of sulphuric acid is enough to exceed the neutralising capacity of the soil, the soil pH can become acidic. This is then known as Actual ASS. The review of ASS mapping for the Newcastle area identified that:

- There is a high risk of occurrence of ASS in soils at a depth of up to 1 m in the area to the south and southwest of the Mayfield Concept Approval Site;
- There is a low risk of occurrence of ASS in soils at a depth of greater than 4 m in the area south-west of the Mayfield Concept Approval Site; and
- There are no ASS identified at the Mayfield Concept Approval Site.

15.2 Potential Impacts

15.2.1 Surface Water

During the construction of the Project there is potential for sedimentation and erosion to occur as a result of exposed soils. As the construction of the additional 17 tanks would be located within a confined and bunded area, it is expected that potential soil erosion could be managed effectively so as to avoid significant impacts through the use of standard erosion and sediment control measures in the CEMP (refer **Sections 12.3.1** and **15.3**). Standard sediment and erosion controls would generally be undertaken in accordance with Managing Urban Stormwater: Soils and Construction Vol 1 (the ‘Blue Book’) (Landcom, 2004))

Stormwater from the Project would continue to be managed through the existing stormwater management system for the existing Facility. For the new tanks areas, the existing stormwater management systems would be duplicated. Stormwater form the new tanks bund areas and gantry would be directed to a stormwater pit adjacent to the new gantry. Following testing, water would be released through a new Puraceptor located along the western boundary of the site. Both the stormwater storage pit and Puraceptor would be designed to provide adequate storage and treatment of the catchment areas they are servicing.

The increase in throughput during the operation of the Facility may give rise to increased potential for hydrocarbons to be released due to the increase in handling and transfer and transport of fuels. Tank leakage and fuel transfer equipment malfunction or failure can potentially release various fuels into soils and watercourses. The separation of tanks, the pumping facilities and the truck loading gantry by bunds would act to minimise the spread of, and effectively contain, spill of leaked fuels.

The additional 17 tanks would be located in a bunded and sealed tank area to capture any leaks or spills and allow management of stormwater runoff. Another key source of potential fugitive hydrocarbons during the operation of the Project is the truck unloading gantry. The gantry would be covered and bunded to minimise the potential for uncontrolled contaminated runoff in the event of a leak or spill.

All surface water from the tank bunds would be tested and if within the relevant limits of EPL 20193, directed to the Puraceptor prior to discharge to the western drain via a new discharge point, then to the Hunter River. Prior to stormwater leaving the Site, Stolthaven would undertake sampling and testing for a range of parameters as agreed with the EPA and set out in EPL 20193.

In the event that testing of stormwater identifies that it does not meet the water quality criteria set by EPL 20193, a licenced contractor would be engaged to pump out the stormwater storage pits and dispose of the water at a licenced facility.

As the Project would not involve the extraction of surface water from the Hunter River now does it proposed any collection of storm or groundwater for use onsite. The site is current an open hardstand area which is free draining to the western truck drain. The Project will see the impermeable hardstand replaced in part with other impermeable surfaces such as building roofs and storage tanks. Therefore total runoff is expected to be similar to that currently generated by the site. As a result it was not considered necessary to prepare a details site water balance for the Project. All potable water needs of the Facility would be met through mains water supply which is currently connected to the Facility.

15.2.2 Flooding

The Project would be designed to be compatible with the existing stormwater management in a manner which minimises flooding impacts to the 100 year ARI event. Main and minor stormwater drainage at the Site would be designed to 1 in 100 and 1 in 20 year ARIs respectively.

15.2.3 Groundwater

Installation of the additional 17 storage tanks and associated infrastructure would not require excavations to a significant depth. However, excavations would occur through the Site's capping layer to the top of the underlying inert slag (refer **Section 15.2.4**). As groundwater lies at approximately 4m below ground surface, and the estimated depth of excavations is around 2-3 metres, it is unlikely that groundwater would be intersected during the construction of the Project. In the event that groundwater is encountered it would be tested for potential contaminants and disposed of appropriately,

The operation of the Project would require the extension of the current groundwater monitoring network into Lot 36 DP 1191723 and Lot 37 DP 1191723. New groundwater monitoring bores would be licensed under Part 5 of the *Water Act 1912* and amendment made to EPL 20193. The locations of these additional groundwater monitoring bores would be determined in consultation with the EPA. Locations would be chosen to capture data from groundwater both downstream and upstream of the Facility, as per the current scenario.

Based on the experience with the existing terminal there is not expected to be any discernible to underlying groundwater hydrology as a result of the tanks construction. The subterranean barrier if the key factor governing groundwater flows in the vicinity with the aim of minimising flows through adjoining contaminated areas to prevent contaminated groundwater seepage into the Hunter River. The subterranean barrier would not be directly impacted by any of the proposed Project elements. Prior to construction of the Project the Site Auditor would review all relevant detailed designed to ensure they are compatible with ongoing integrity of the subterranean barrier.

Such a monitoring program is considered consistent with the policy principles of the *NSW Water Extraction Monitoring Policy* (Department of Water and Energy, 2007), in that it would be:

- Appropriate for the scale of the works, the level of water extraction, and the nature of the resource management issues that need to be addressed; and
- Consistent with NSW and national standards for water monitoring systems, in relation to design, construction and maintenance.

The extension of this groundwater monitoring program would also assist Stolthaven in meeting its obligations as land occupier under sections 6 and 28 of the CLM Act.

Groundwater monitoring results are compared against the Site's Groundwater Assessment Criteria as part of the overall Groundwater Management Plan (sourced from the ANZECC (2000) *Australia New Zealand Water Quality Guidelines for Fresh and Marine Waters, 95% Species Protection for Marine Waters Criterion)*.

As the Project would not involve the extraction of groundwater (other than the minimal amounts required for groundwater monitoring), it was not considered necessary to prepare a site water balance for the Project.

15.2.4 Contamination and Soils

Potential contamination of soils could arise from:

- Earthworks (including excavation) and installation of stormwater drainage channels, services and access roads;
- Construction of tank foundations;
- Tank leakage and spillage during operation;
- Fuel transfer equipment malfunction/failure; and
- Construction of the pipeline.

The Project would require excavation and removal of the remediation capping to establish the new terminal site. This removal is staged to minimise the area of clay removed during the construction period. A geosynthetic clay liner (GCL) shall be installed in all bunded areas and in areas outside of the bunds where free draining hardstand pavement are not utilised. The GCL exceeds the permeability requirements of the CSMP and is approved by the Site Auditor. The temporary period where the clay is removed, prior to placement of the GCL, is considered temporary works during construction and is approved by the Site Auditor.

Where practical, foundations shall be constructed above the slag layer to avoid excavation in this medium. This includes bulk tank foundations, and pavements.

Excavation works for the first flush pit, truck fill stand retention pit and the API separator may penetrate the existing slag layer subgrade. The existing slag subgrade may contain levels of contamination, which if intercepted or excavated would require management under the *Contaminated Site Management Plan: Intertrade Industrial Park, Closure Area of Former Steelworks Site Mayfield* (HDC, 2014) and Maintenance and Remediation Notice No 20142802. If required, excavated material would be stored separately in appropriately bunded stockpiles or bins. Testing would be undertaken to determine potential contaminants allowing disposal or reuse options to be determine. In accordance with the requirements of the CSMP, Site Auditor approval would be obtained for all works involving the management of contaminated materials.

Similar to the works undertaken for the construction of the existing tanks, a Site Auditor accredited under Part 4 of the CLM Act would be consulted regarding the design and construction methodology proposed for the Project. Prior to the commencement of construction, and also prior to the commencement of operations, Stolthaven would provide evidence to the Secretary of DP&E from the Site Auditor confirming that the construction works would be, and have been, undertaken in accordance with the *Contaminated Site Management Plan: Intertrade Industrial Park, Closure Area of Former Steelworks Site Mayfield* (HDC, 2014) and the Maintenance and Remediation Notice No 20142802 (refer **Section 15.3**).

As part of this process, soil sampling and testing would be undertaken where the surface of the paved cap is breached. Any excavated soils found to be contaminated would be managed according to the existing CSMP. Tank leakage and fuel transfer equipment malfunction or failure can potentially release various fuels into the soils and watercourses. The separation of tanks, the pumping facilities and the truck loading gantry by bunds would act to minimise the spread of, and effectively contain, spill of leaked fuels.

15.2.5 Acid Sulfate Soils

As there are no ASS identified at the Site (refer **Section 15.1**), no additional hazard assessment or mitigation measures for ASS are required for the construction or operation of the Project.

15.3 Management and Mitigation Measures

The existing Surface Water Management Plan and Groundwater Management Plan prepared for the Facility provide a framework to effectively manage the potential pollution of receiving land and waterways through effective stormwater controls, appropriate staff training, and suitable water quality monitoring and testing. These plans for the existing Facility would be updated where relevant to incorporate the Project in consultation with DP&E. The site Surface Water Management Plan would also be updated to incorporate the relevant compliance requirements of the Mayfield Concept Plan Stormwater Management Strategy.

Management of soils during construction, including sediment and erosion controls, would be detailed in the CEMP.

The proposed design and work methods would be provided to the EPA Site Auditor for review and comment prior to any construction works. Evidence of consultation with the Site Auditor would be provided to DP&E. Furthermore, the Site Auditor would confirm that the Project would be constructed to address any risks of harm to human health as a result of volatile vapour ingress.

16.0 Social and Economic

16.1 Existing Environment

The Facility operates as a bulk fuels import, storage and dispatch facility. As has been demonstrated as part of past project approvals and the current Development Consent SSD 6664, impacts on the local community that may result from noise and vibration, traffic, air quality or other environmental aspects have been negligible. Therefore social impacts from the existing operation are considered low.

Economic benefits of the existing Facility spread much further than potential social impacts, with the economic impacts resulting in social benefits. The Facility supports the mining industry by being an important source of energy (fuel) for mining equipment. This means economic impacts currently range from:

- Local – site employees contractors and service providers;
- Regional – transport contractors, mine operators and the supply of fuels to retailers to support private transport; and
- State – The Facility supports the mining industry which is a source of income for the State government through royalties and taxes. It also provides additional security of supply of fuels following the divestment of refining capacity from NSW by major oil companies.

The existing Facility has also offset the operation of the former Shell Terminal at Hamilton. This has meant impacts from the operation of that facility have been removed from a larger residential area, providing positive social impacts.

Overall the existing Facility has had a positive economic impact through the direct generation of a small number of jobs, the use of local contractors for site maintenance and transport, and through the wider economic benefits of providing support to a variety of location industries, notably the mining industry.

16.2 Potential Impacts

The Facility would continue to generate positive economic benefits for Newcastle and the Hunter region through additional capital investment at the Port particularly through the construction phase and flow on effects. The Project would support the development and growth of the Hunter region, through securing fuel supplies to regional businesses, in line with the Regional Economic Development Strategy.

Potential negative social impacts associated with the Project include traffic, noise and vibration, air quality and risks to human health. These have all been assessed separately in this EIS and appropriate mitigation measures have been recommended to minimise impacts to acceptable levels. Due to the Project only generating an additional 12 FTE jobs, any increases in demands for community services and infrastructure are anticipated to be negligible.

The Project would also have positive impact to the travelling public by reducing the total number of kilometres trucks are required to transport fuel. By importing directly into Newcastle significant truck movements would be reduced from Port Botany resulting in subsequent traffic and safety improvements on the MI and regional road network.

With the addition of 12FTE jobs there is likely to be a negligible level of increased demand for services or community infrastructure as a result of the Project. Similarly the Project would utilise the arterial road network for fuel distribution and therefore have a negligible impact on local roads. Consequently there is a limited nexus between the Project and the demand for services or infrastructure that would necessitate development contributions. It is also noted that as part of previous approvals for the existing terminal Stolthaven have paid considerable development contributions to Newcastle City Council despite having a limited impact on local services and infrastructure.

The hazard and risk assessment undertaken for the Project as detailed in **Section 11.0** confirmed that neighbouring business operations would not be placed in a situation of undue risk if the Project was to proceed.

The Project would result in the further development of vacant port land for a port related use, and provide a diversified use of port land in Newcastle. Diversification is seen as a key factor in improving the resilience of economies when responding to economic downturns or corrections.

Stage 3 of the Project would give rise to the employment of an additional 12 extra full time equivalent (FTE) in addition to the existing seven FTE currently employed to run the Facility. In additional to direct employment opportunities at the Facility contractors would be employed to regularly undertake a variety of tasks, including but not limited to:

- Servicing of pumps and equipment;
- Inspections of safety and security systems in accordance with regulatory requirements; and
- Periodic monitoring and reporting in relation to environmental factors in accordance with environmental approval and licence requirements.

The largest generator of employment would be trucking contractors and truck drivers who would frequent the Project regularly to deliver fuels to customers in Newcastle and the wider region.

When considering the potential impact of the Project on the economy, consideration must also be given to the improved efficiencies in fuel delivery to the Hunter region the Project would support. Diversified fuel supplies would also drive competition resulting in improved pricing for end users. Due to the dependency of the economy at all scales on the availability of liquid fuels, the importance of the Project from an economic standpoint cannot by based purely on the number of direct jobs generated.

16.3 Management and Mitigation Measures

The Project has the potential to affect the community as a result of potential traffic, noise and vibration and air quality impacts. This EIS includes a detailed assessment of these potential impacts. Where unacceptable impacts have been identified, mitigation measures have been recommended to reduce impacts to acceptable levels.

The Project has the potential to provide a range of positive social and economic impacts, including:

- Reduced fuel tanker movements from Sydney thereby improving safety and reducing congestion;
- Generation of construction and operational jobs and the flow on benefits for the wider economy; and
- Improved efficiency and security of fuel supply to the Hunter supporting the local, regional and State economies.

Ongoing community consultation has been undertaken as part of the development of the existing Facility. This would continue to be undertaken by Stolthaven during both the construction and operation of the Project.

17.0 Visual Amenity

17.1 Existing Environment

The existing Facility is located on low-lying land adjacent the Hunter River and there are few vantage points that overlook the Site. The industrial area is not readily accessible visually from public thoroughfares or from private residencies. The closest viewing locations to the Site would be from existing industrial lots to the west and southeast of the Facility, and from industrial lots within Kooragang Island's industrial area to the north. In the future, there would also be industrial sites immediately north, east and south of the Facility developed as part of the Mayfield Concept Plan. These neighbouring industrial lots are similarly low-lying, and would obscure views of the Facility from nearby viewpoints. The character of the area within which the site is location is typical of an industrial and Port area.

Along Industrial Drive, land is more elevated; however, views of the Facility are largely obstructed owing to topography, buildings and intermittent vegetation. There are few residential areas from which views to the Facility are possible. The closest area is part of Crebert Street, Mayfield. Views across the Site are only possible from the eastern section of this street. These are further obstructed by trees and the built environment.

17.2 Potential Impacts

17.2.1 Viewpoint Locations

The industrial area is not readily visually accessible from locations outside of the Mayfield Concept Plan area, OneSteel, or industrial areas on Kooragang Island. Consideration of potential visual impacts from the following key locations is provided below:

- Industrial Drive;
- Cormorant Road, Kooragang Island;
- Mayfield residential area (Crebert Street);
- The Hunter River; and
- The surrounding industrial area.

Industrial Drive

Industrial Drive is elevated above the lower lying industrial area along the Hunter River. From the road, intermittent views into the riverside industrial area are possible. However, the former Steelworks Site is largely obstructed from view by a vegetative screen located along Industrial Drive which prevents visual access to the Site. Commuters on Industrial Drive would have minimal glimpses of the Site, however given the offset distances any view of the site from Industrial Drive would make the scale of the Project too small to have any significant impact. Regardless given Industrial Drive is a main thoroughfare used by large vehicles and industrial traffic, it is not considered a sensitive visual receiver.

Cormorant Road, Kooragang Island

Cormorant Road runs parallel to the Hunter River on Kooragang Island approximately 650m from the Facility. The Newcastle Coal Infrastructure Group (NCIG) load loading facility located along the north banks of the Hunter River limits views to the subject site to small open sections between coal loading infrastructure. As there are no public places along this section of Cormorant Road there are no sensitive viewing locations on Kooragang Island that would be impacted by the Project.

Mayfield Residential

Residential areas are the most sensitive to visual changes. The nearest residential areas in Mayfield would be approximately 500m from the Project. The nearest elevated residential area is located in Mayfield over 1500m to the west of the site. These locations have limited visual access to the site and due to the offset distances any views are not of a scale that is considered significant. Viewers at this location have been historically subject to views of industrial areas closer to these locations and the Project fits well in this visual context.

Hunter River

Transitory views toward the Site would be possible from the Hunter River. The river is primarily used by commercial shipping, the vast majority of which services the coal mining industry. To a lesser extent the Hunter River in proximity to the site is also used for recreational boating. However, other sections of the Hunter River are preferred by recreational boaters where there is less potential for interaction with commercial vessels.

The Project would represent part of an established industrial area and, in this part of the river, the industrial landscape forms the visual backdrop to the river's boating and entertainment activities. Any visual impacts to users of the Hunter River are therefore not considered significant.

17.2.2 Surrounding Industrial

The closest viewing locations to the Site are from neighbouring industrial sites (existing and proposed) within the existing industrial area, east and west of the Site. The Site is also seen from industrial lots on Kooragang Island's industrial area.

Neighbouring industrial users are not considered to be sensitive to the proposal's visual impact. Existing and proposed industrial residents form part of the industrial landscape of the area.

17.2.3 Form and Character of the development

The new tanks are to be located immediately to the south of the existing tanks and all new proposed tanks would be the same size, or smaller than the largest tank currently operating at the Facility. **Figure 15** shows an easterly elevation of the proposed new tanks **Figure 16** shows the proposed tanks in the context of the existing Facility and the M7 berth. As can be seen from the illustrations, the Project is of a similar scale and nature to both the existing Facility as well as to the large industrial buildings located to the immediate west.

In order to maintain the tanks at more constant temperature to assist in reducing potential for vapour generation, all tanks would be painted white. A matt finish would be used so there is no reflective effect from the tanks.

A range of floodlighting would be required for security and observation purposes. Lighting would be downward facing and designed to minimise spill from the site. All lighting would be designed in accordance with *Australian Standard 4282 – Control of Obtrusive Effects and Outdoor Lighting.* Much of the internal light would be contained within the Site due to shielding from the tanks. Regardless, a similar level of lighting is currently used on the adjoining OneSteel industrial complex and the Facility lighting would not be out of context in the local industrial area.

The proposed not administration and amenities building would be located at the southern end of the Project site and access directly from Steelworks Road. In order to provide an improved entry appearance, parking associated with the building has been placed to the rear, or northern side where it will be visually shielded from the road.

17.2.4 Summary

In summary, the scale and nature of the Project are not out of character with large industrial development within the local area including OneSteel and is smaller in scale and less intrusive than the coal loading terminal operations at Carrington and Kooragang Island.

In addition, the Project cannot be readily viewed from any sensitive receivers in the local visual catchment. The visual impact from the Project is therefore considered negligible.

Figure 15 Artist Impression No.1 – Aerial Facing West. Source: Aurecon

Figure 16 Artist Impression No.2 – Aerial Facing Southeast. Source: Aurecon

17.3 Management and Mitigation Measures

The design of the Facility would use non-reflective materials and colours where possible.

Lighting design would be provided in accordance with the requirements of Australian Standard *AS 4282 – Control of Obtrusive Effects and Outdoor Lighting.* Lighting would be mounted, screened and directed in such a manner that it does not cause nuisance to surrounding properties or the public road network.

The existing Facility currently operates in accordance with a Landscape Management Plan. This plan would be updated to incorporate the new tanks, bunding, gantry and building areas and identify appropriate treatment to be incorporated into the Facility.

It is noted that management practices such as the appropriate separation, storage and removal of waste would maintain the Facility in a tidy working order. The management of waste is detailed in **Section 19.0**.

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18.0 Greenhouse Gas

18.1 Existing Environment

Greenhouse gases (GHGs) are gases found in the atmosphere that absorb outgoing heat reflected from the sun. The primary GHG is carbon dioxide (CO_2). Different GHGs have different heat absorbing capacities. In order to achieve a basic unit of measurement, each GHG is compared to the absorptive capacity of CO_2, and measurements and estimates of GHG levels are reported in terms of CO_2 equivalent emissions (CO_2-e).

Estimation of the GHG emissions associated with the Facility's operations was undertaken using the emission factors and methods outlined in the National Greenhouse Accounts (NGA) Factors. The NGA Factors provide three types of assessment categories:

- **Scope 1**, which covers direct emissions from sources within the boundary of an organisation, such as fuel combustion and manufacturing processes;
- **Scope 2**, which covers indirect emissions from the consumption of purchased electricity, steam or heat produced by another organisation; and
- **Scope 3**, which includes all other indirect emissions that are a consequence of an organisation's activities but are not from sources owned or controlled by the organisation; that is, emissions associated with the production of fuels, and emissions associated with the transmission and distribution of purchased electricity.

18.2 Potential Impacts

Key ways in which the operation of the Project would generate GHGs are as follows:

- Using electricity to run plant operations such as administration buildings, fuel pumps, and plant lighting (Scopes 2 and 3);
- Delivering and distributing fuels via road and ship tanker (Scope 3);
- Using passenger vehicles to transport staff to and from the Site (Scope 3);
- Combusting fuel which is distributed from the Facility (Scope 3); and
- Passenger vehicles transporting staff to and from site (Scope 3).

The operation of the Project is anticipated to generate the following GHG emissions in addition to those currently generated by the Facility:

- 2,742 MWh of electricity pa (Scopes 2 and 3);
- 11,491 tonnes of CO_2-e pa through the delivery and dispatch of fuels by diesel powered truck (Scope 1);
- 64,767 tonnes of CO_2-e pa through the delivery of fuels by diesel powered ship (Scope 1);
- 79.3 tonnes of CO_2-e pa through the movement of staff to and from the Facility (Scope 1); and
- 309,825 tonnes of CO_2-e pa through the consumption of fuels by end users (Scope 3).

Overall, an additional 388,905 tonnes of CO_2-e would be either generated by the Project or by fuel users utilising the Project, per annum. These emissions are in addition to those currently generated by the Facility. The current GHG emissions from the Facility, as well as the additional GHG emissions from the Project are outlined in **Table 60**.

Despite these calculated figures, this is considered a conservative approach to eh assessment for the following reasons:

- Fuel provided to customers from Stolthaven's terminal would be otherwise provided from other sources therefore the Project would not in itself be generation an increase in fuel consumption and therefore GHG emissions. Therefore the largest component of the calculated GHG emissions (Scope 3 emissions) are not directly attributed to the Project and would occur regardless of the Project proceeding;
- Through the direct import of fuels to Newcastle the Project eliminates ship GHG emissions from the additional distance ships would otherwise be required to travel to Sydney, and more significantly would

reduce GHG emissions from the large number of tankers that would otherwise service the Hunter region from Sydney.

Therefore when considering these points qualitatively, the Project may infact have a positive GHG emission outcome for the fuel supply network.

Table 60 Greenhouse Gas Emissions Summary

Activity	Estimated GHG Emissions (t CO_2-e/year)		
	Current	Proposed	Total Operational Scenario
Electricity consumption	1,018	2,742	1,723
Fuel consumption – delivery and dispatch (truck)	4,268	11,491	7,223
Fuel consumption – delivery (ship)	24,764	64,767	40,003
Fuel consumption – staff commuting	46	79	33
Fuel consumption by end users	179,946	309,825	129,879
Total GHG emissions	**210,043**	**388,905**	**178,862**

t CO_2-e/year = Tonnes of carbon dioxide equivalent per year

While the Project would contribute to an increase in GHG emissions, the scale of these emissions in the broader context of GHG emissions from the transport sector and from Australia as a whole is not considered significant. As shown, the total emissions of the Facility operating at the proposed throughout were estimated to increase by 0.179 Mt CO_2-e per year, equating to approximately 0.033 % of the total 2013 Australian emissions (549.446 Mt CO_2-e) and 0.64 % of the total 2013 Australian transport emissions (27.895 Mt CO_2-e). The greatest contributor to emissions was the end user consumption of the supplied fuel (73% of the increased GHG emissions associated with the proposed modification).

The relationship between GHG concentrations and climate change is very complex and nonlinear. As such, the effect of the emission of this amount of GHGs on the environment or climate change cannot be estimated. The Project represents a very minor source of GHG emissions, both in terms of the economic sector emissions and Australia's national emissions. As such, the Project is not expected to have a significant impact on the environment.

18.2.1 GHG Emissions Context

The assessment of GHG emissions and the calculation of total Scope 1, 2 and 3 emissions associated with the Project as detailed in **Table 60** need to be considered in the context of the wider fuel supply chain. In particular the following factors should be considered:

- The largest proportion (almost 80%) of the of the total Project GHG emission as detailed in **Table 60** are Scope 3 emissions associated with the consumption of fuels by end users. The Project is not introducing any significant new consumers of fuel, rather it is using the Project to service the existing demand for fuel. Therefore these emissions are predominantly already being generated and are not directly attributable to the Project;
- Delivery and dispatch by truck from the Project would service mainly customers in the Hunter region who are currently being serviced by delivery from fuel terminal in Port Botany (Sydney). By displacing fuel deliveries from Port Botany with fuel deliveries from the Port of Newcastle the total number of kilometres travelled annually to provide fuel to the region would be significantly reduced. This would therefore see a net reduction in these emissions across the wider fuel supply network; and
- In a similar manner ships that would otherwise have to travel to Sydney would directly access the Port of Newcastle reducing the total travel distance for delivery to Australia. This would further reduce GHG emissions from the collective fuel supply industry.

For these reasons the Project is considered to represent an improvement in GHG emissions from the fuel supply industry in NSW.

18.3 Management and Mitigation Measures

The Project would be servicing the existing fuel demand with the region and would therefore not be introducing and new significant sources of fuel use and therefore additional GHG generation from the use of fuels. The Project would also allow a significant number of tanks kilometres for fuel tankers servicing the Hunter region to be reduced. This would therefore reduce GHG generation from this source. It is therefore concluded the the Project is expected to have a negligible impact as a result of GHG emissions.

Under the existing Development Consent, Stolthaven is required to maintain an Energy Efficiency Plan. This plan includes measures for the recording of energy use and benchmarking this against the throughput of the Facility. This plan would be updated to incorporate the elements of the Project and its setup and operation would be undertaken to monitor and improve the efficiency of the Project throughout its operation. For example, through identify plant or equipment that may not be functioning correctly or using excessive power and identify it for maintenance or replacement.

Should the Project receive development consent, the Energy Efficiency Plan would be updated to include all elements of the Project and to describe how measures to reduce and mitigate energy use and greenhouse gas emissions can be applied across the entire Project.

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19.0 Waste

19.1 Existing Environment

Given that the Facility primarily operates as a storage facility and does not involve the refining of fuels, and given the low level of personnel employed at the Facility, the existing Facility does not produce significant volumes of waste. Waste streams generated by the operation of the Facility, their classification and approximate quantities, as identified as part of the Phase 1 Environmental Assessment (AECOM, 2011), are provided in **Table 61**.

Table 61 Existing Facility Waste Streams

Waste Stream	Classification	Approximate quantity
Oily water within retention pits	Liquid waste	Depends on rain events and water quality criteria. Storage provided for 50 m^3 from gantry and 50 m^3 from roadways.
Sludge from stormwater retention pits	Solid waste	Approximately 1 tonne per annum.
Absorbents used to clean small spills	Industrial waste	Depends on the number of clean up events required.
Ablutions waste	Solid/Liquid	Approximately 1.3 tonnes per annum.
Domestic and putrescible waste	Inert waste	<1 tonne per quarter.
Vegetation from landscaping maintenance	Inert waste	<1 tonne per quarter.

The handling and final disposal of these wastes has been determined based on regulatory guidelines and industry standards. Waste management would be in line with the operation of the existing Facility, and in accordance with the relevant management plans.

19.2 Potential Impacts

Construction

Wastes that would be generated during the construction of the tanks would be primarily associated with materials used in the packaging of plant and equipment delivered to the Site. The sources of waste and indicative quantities are provided in **Table 62**.

Table 62 Construction Waste

Source	Estimated Quantity (tonnes)
Surplus construction waste such as: - Scrap metal - Asphalt - Timber formwork - Spent Erosion and Sediment control materials - Fencing - Soil. **Approx Total**	 <0.1 <0.1 <0.1 <0.1 <0.1 <0.2 **<0.7**
Wastes from toilets and bathrooms[1]	145
Office waste such as paper, ink cartridges, toner and cardboard	2
Waste from construction personnel including putrescibles and recyclable wastes	2
Packaging Waste including: - Plastics - Timber pallets - Metal wires - Cardboard	6

1. *Projected waste water quantity is based on NSW Department of Health's general allowance of 200L of water per person per day*

Operation

The volume of waste expected to be generated during the operation of the Facility is outlined in **Table 63**.

Overall the Project is not expected to significantly increase the waste generated at the Facility. However the addition of 17 operational storage tanks and an extended stormwater management system would result in increased levels of sludges, oily water and dirty absorbents being generated at the Facility. The addition of around 12 full time equivalent staff would also result in a minimal increase in the onsite generation of ablutions waste as well as domestic and putrescible wastes.

Table 63 Operational Waste

Waste Stream	Classification	Approximate Annual Generation Amount
Oily water within retention pits	Liquid waste	Depends on rain events and water quality criteria. Storage provided for 75 m^3 from gantry and 75 m^3 from roadways subject to detailed design).
Sludge from stormwater retention pits	Solid waste	Approximately 2.5 tonnes per annum.
Absorbents used to clean small spills	Industrial waste	Depends on the number of clean up events required.
Ablutions waste	Solid/Liquid	Approximately 3 tonnes per annum.
Domestic and putrescible waste	Inert waste	<1 tonne per quarter.
Vegetation from landscaping maintenance	Inert waste	<1 tonne per quarter.

19.3 Management and Mitigation Measures

The waste strategies developed for the existing Facility would be updated to incorporate the Project. This can be summarised as the application of the waste hierarchy where the following would be employed, in order of preference:

Avoidance – The generation of wastes from the Facility would be avoided where possible.

Reduce – Reduce resource consumption, procure materials with less packaging and implement practices to reduce waste.

Reuse – Where feasible, materials would be reused onsite. However, due to the limited waste streams generated onsite, reuse options may be limited.

Recycling – Paper, cardboard, glass and plastics would be available for recycling. A bin would be placed adjacent to the office which would be collected by a waste management contractor on a regular basis.

Disposal – Disposal of wastes would be minimised where possible. Putrescibles wastes from the office would be sent to landfill, with other wastes generally diverted for recycling.

The CEMP would contain measures for the management of waste generated during the construction of the Facility. The Facility's existing Waste Management Plan would be updated to include the Project elements and additional waste that may be generated during construction

20.0 Heritage

20.1 Existing Conditions

20.1.1 Indigenous Heritage

A search of the National Parks and Wildlife Service Register of Aboriginal Sites (now known as the OEH Aboriginal Heritage Information Management System (AHIMS)) database was carried out as part of the Environmental Impact Statement entitled Development of a Multi-Purpose Terminal and Remediation of the Closure Area, BHP Newcastle Steelworks (URS, 2000). No indigenous heritage sites were identified through that search and therefore it was presumed that any indigenous value would have been removed or destroyed during previous reclamation, construction, operational and remediation activities associated with the BHP steelworks site.

20.1.2 Non-Indigenous Heritage

The Site forms part of a larger industrial area which was purchased by BHP in 1896 for the establishment of an industrial complex for steel production. Following the closure of BHP in 1999 and works associated with the remediation program to address site contamination issues, heritage buildings across the BHP Closure area were demolished removing heritage buildings in close proximity to the Site.

Non-indigenous heritage database searches were undertaken in August and September 2015, including searches of the following heritage registers:

- Schedule 5 of the *Newcastle LEP 2012*;
- The register of World Heritage Properties;
- The register of National Heritage Places;
- The register of Commonwealth Heritage Places;
- The former statutory Register of the National Estate; and
- The NSW State Heritage Register.

These database searches confirmed that the Site does not contain any listed non-indigenous heritage items. Furthermore, no lots directly adjoining the Site contain heritage items. The nearest heritage item to the Site is the Mayfield East Public School which is located approximately 500 m to the southwest of the Site at its nearest point. The Mayfield East Public School is located on the southern side of Industrial Drive.

20.2 Potential Impacts

Construction activities for the Project would be within the area capped as part of recent remediation activities. This area was also heavily disturbed as part of the construction of the existing Facility. The chance of the Project impacting on any indigenous or non-indigenous heritage items or places is highly unlikely. There is therefore no need to undertake a further archaeological assessment as per Schedule 3, Condition 2.1(k) of the Mayfield Concept Plan.

During operations an increase in heavy vehicle road traffic would occur as a result of the increased transportation of fuels by road. No listed non-indigenous heritage items are located such that they may be impacted as a result of increased road traffic. The risk of any operational impacts to listed non-indigenous heritage items is considered negligible.

As no indigenous cultural heritage values are identified, there is no requirement to obtain an Aboriginal Heritage Impact Permit under section 90 of the *National Parks and Wildlife Act 1974*. Furthermore, no consultation with Aboriginal persons is considered necessary under Part 8A of the *National Parks and Wildlife Regulation 2009* and the *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (Department of Environment, Climate Change and Water, 2010).

20.3 Management and Mitigation Measures

No specific management measures are considered necessary to manage potential impacts to indigenous and non-indigenous heritage items.

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21.0 Ecology

21.1 Existing Environment

The northern section of the Site is adjacent to the south arm of the Hunter River, forming part of the Kooragang Nature Reserve and constituting a Nationally Important Wetland. The Site is located around 2.2 km of the Hunter Wetlands National Park, which also forms the Ramsar-listed Hunter Estuary Wetlands. These wetlands are important for migratory and Australasian wetland species, including species protected under the Agreement Between the Government of Japan and the Australian Government for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA) and the Agreement Between Australia and the People's Republic of China for the Protection of Migratory Birds and Their Environment (CAMBA).

Since 2011 the Site has undergone extensive remediation. The Site has been cleared of all vegetation, filled, and covered with a capping layer to stabilise contaminated soils.

21.2 Potential Impacts

The Project would not have a significant effect on native flora and fauna. The Site has been highly disturbed by clearing for historic industrial activities and following remediation contains no vegetation as the entire Site is either hardstand or contains infrastructure related to the Facility. Therefore there is no habitat value for native species. Given the Project would not result in vegetation clearing, no assessment under the *Framework for Biodiversity Assessment is required* (Office of Environment and Heritage, 2014). No noxious weeds have been identified on the Site. Should a weed infestation occur, the Site Management Plan contains adequate measures to fulfil Stolthaven's duties as an occupier of land under the *Noxious Weeds Act 1993*.

The Project incorporates measures to reduce offsite effects in particular the prevention of accidental hydrocarbon release into the environment. Therefore it is considered unlikely that the Project would impact the Hunter River marine environment or related native flora and fauna in the areas surrounding the Site. Further consideration of specific ecological impacts is provided below.

21.2.1 Riparian Systems

Construction works have the potential to create erosion with sediment transported offsite where it can enter nearby waterways. Increased sedimentation can affect the quality of watercourses, leading to increased turbidity and algal formation, and ultimately decreased oxygen availability and species depletion. However it is considered that standard mitigation measures in the CEMP would be sufficient to prevent erosion and sedimentation from occurring during construction works (refer **Section 15.3**). As such, the construction of the Project would not affect the quality of Hunter River or the greater Hunter Estuary Wetlands.

During both the construction and operation of the Project, no controlled water discharges are proposed to enter into the Hunter River. Furthermore, construction would not encroach into the bed of the Hunter River. The project therefore does not have the potential to alter the geomorphology, hydraulic regime or species habitats within the Hunter River or any part of the greater Hunter Estuary Wetlands.

Accidental spills or leaks during fuel product transfer and storage (eg tank farm leakage or spill at the wharf) have the potential to impact on the quality of the Hunter River. As tides flow toward upstream environments, this may also impact on the greater Hunter Estuary Wetlands and the species habitat contained within. However the Facility would continue to be operated with various levels of incident control and spill containment, making it highly unlikely that such an event could occur, let alone cause significant impacts to the environment. For further details on proposed incident control and spill containment measures, refer to **Section 11.0**. As no watercourses are likely to be affected by the construction or operation of the Project, no further ecological assessment of those watercourses is required.

21.2.2 Groundwater Dependent Ecosystems

A search of the Groundwater Dependent Ecosystem Atlas (Bureau of Meteorology) showed that the closest groundwater dependent ecosystem (comprised of riparian vegetation) lies around 700 metres to the north-west of the Site, and the closest downstream groundwater dependent ecosystems (also vegetation) are around 3 km east of the Site at Stockton, including:

- Coast Tea Tree/ Old Man Banksia coastal shrubland on foredunes of the Central and lower North Coast;
- Grey Mangrove low closed forest;

- Red Bloodwood/ Smooth-barked Apple heathy woodland on coastal sands of the Central and lower North Coast;
- Scribbly gum/ Wallum banksia/ Prickly-leaved Paperbark heathy coastal woodland on coastal lowlands; and
- Smooth-barked Apple/ Blackbutt/ Old Man Banksia woodland on coastal sands of the Central and Lower North Coast.

However the *Risk Assessment Guidelines for Groundwater Dependent Ecosystems* (NoW, 2012) identifies the following ecosystems in the vicinity of the Site as having a high potential to be classified as groundwater dependent:

- Coastal wetlands of NSW;
- Hunter River south channel;
- Kooragang Nature Reserve; and
- Hexham swamp.

Other ecosystems, including rivers, springs, wetlands and vegetation which are reliant on groundwater in addition to rainfall may be classified as inflow dependent ecosystems.

According to the *NSW State Groundwater Dependent Ecosystems Policy* (Department of Land and Water Conservation, 2002), key threats for groundwater dependent ecosystems include contamination and over-extraction. For groundwater dependent ecosystems in coastal areas in particular, the quality and quantity of groundwater are vulnerable to both existing and future developments (Department of Land and Water Conservation, 2002).

Although the existing groundwater monitoring network at the Facility would be extended to accommodate the project, the relatively small amounts of groundwater that would be extracted for monitoring purposes, would not result in drawdown of aquifers and the Project would not disrupt groundwater levels, flows and recharge. In addition the Project would not involve the clearing of any riparian vegetation, and would therefore not result in the loss of any habitat or decreased habitat connectivity.

As a result the Project is unlikely to impact on these groundwater and inflow dependent ecosystems.

21.2.3 Matters of National Environmental Significance

In addition to State-based approvals, actions that may significantly affect matters of NES require assessment and/or approval from the Commonwealth under the *EPBC Act 1999*. The EPBC Act lists nine matters of NES that must be addressed when assessing the environmental impacts of a proposal. A summary of these matters is provided in **Table 11**, and in **Section 7.1.1** where it is concluded that the Project would not have a significant impact on any matters of NES, and that a referral to the DoE is not necessary.

21.3 Management and Mitigation Measures

The impacts of the Project on biodiversity would be sufficiently managed with the mitigation measures outlined in **Sections 25.0**. No additional mitigation measures are considered necessary to manage ecological impacts.

22.0 Cumulative Impacts

The Mayfield Concept Plan took into consideration the impacts of a Bulk Fuels Terminal with characteristics similar to the Project. It is considered that the cumulative impacts determined by the Concept Plan provide a conservative assessment of the potential cumulative impacts resulting from the Project. As the Facility is the sole operator in the Mayfield Concept plan area, there are no cumulative impacts with other premises in the Concept Plan area.

Cumulative Impacts with Other Bulk Liquid Storages

Similarly the Facility is the only bulk fuel storage facility in the Mayfield Area. The other primary fuel storage facilities in Newcastle are the:

- BP Fuel Storage Facility located at Carrington approximately 1.5 km to the southeast;
- Caltex Storage Facility located approximately 3.4 km to the south; and
- Park Fuels located approximately 2.4km to the east on Kooragang Island.

The former Shell Storage Facility located approximately 2.7 km to the southwest. The Shell facility is no longer in operation.

Potential Cumulative Impacts with other Hazardous Industries

In relation to cumulative hazard and risks in associating with other hazardous or potentially hazardous industries, an analysis of potential cumulative impact is included in the PHA as described in **Section 11.0.** Although there are other hazardous facilities in the Port of Newcastle, for example Orica on Kooragang Island, they are separated by offset distances which limit the potential for incidents at one facility to trigger incidents at another. As detailed in **Section 11.0** risk contours for the Project are confirmed to the immediate Project area and do not overlap any other hazardous industry site even under the sensitivity analysis.

The potential cumulative hazard impacts of the Project combined with Orica's Kooragang Island also requires consideration. Several submissions made in response to the EIS for the existing Facility questioned the cumulative risk of a fuel facility and an ammonium nitrate facility. The hazard assessment summarised in **Section 11.0** included an assessment of the potential for such an incident which confirmed the probabilities are insignificant.

Potential Cumulative Construction Impacts with Mayfield Berth No. 7

Mayfield Berth No. 7 is currently schedule to begin construction early in 2016. Initially, marine side works would be required to undertake dredging and steel piling to create the berth. As these works are distinct from the landside activities required by the Project, there is limited scope for cumulative impacts.

As the Project would require formal approvals and preconstruction planning and tendering prior to any construction works, it is likely that M7 works will be largely complete by the time the Project could start construction. If there was some overlap during the construction stages for Mayfield Berth No. 7 works may result in some cumulative noise impacts. Berth construction activities would be further away from the nearest sensitive receivers in Mayfield (approx. 1100m) than the construction works. Berth construction works would be shielded from sensitive receivers by the existing Facility which would act as a barrier to noise.

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23.0 Residual Risk Analysis

23.1 Methodology

This risk analysis for the Project is based on a process adapted from the Australian Standard *AS/NZS ISO31000:2009 Risk management – principles and guidelines*. The process is qualitative and based on the residual risk matrix. Residual environmental risk is assessed on the basis of the significance of environmental effects of the Project and the ability to confidently manage those effects to minimise the risk of harm to the environment.

The significance of environmental effects is given a numerical value between one and five, based on:

- The receiving environment (its sensitivity and values);
- The level of understanding of the type and extent of impacts; and
- Likely community response to the environmental consequences of the Project (refer to **Table 64**).

The manageability of environmental effects is similarly given a numerical value between one and five based on the complexity of mitigation measures, the known level of performance of the safeguards proposed, and the opportunity for adaptive management (refer to **Table 65**).

Table 64 Significance of Effects

No	Significance	Receiving Environment
5	Extreme	Undisturbed receiving environment, type or extent of impacts unknown, substantial community concern.
4	High	Sensitive receiving environment, type or extent of impacts not well understood; high level of community concern.
3	Moderate	Resilient receiving environment, type and extent of impacts understood; community interest.
2	Minor	Disturbed receiving environment; type and extent of impacts well understood; some local community interest.
1	Low	Degraded receiving environment; type and extent of impacts fully understood; uncontroversial project.

Table 65 Manageability of Effects

No	Significance	Mitigation Measures
5	Complex	Complicated array of mitigation measures required; safeguards or technology are unproven; adaptive management inappropriate.
4	Substantial	Significant mix of mitigation measures required; past performance of safeguards is understood; adaptive management feasible.
3	Straightforward	Straightforward range of mitigation measures required; past performance of safeguards is understood; adaptive management feasible.
2	Standard	Simple suite of mitigation measures required; substantial track record of effectiveness of safeguards; adaptive management unlikely to be required.
1	Minimal	Little or no mitigation measures required; safeguards are standard practice; adaptive management not required.

Table 66 Residual Risk Matrix

Significance of Effects	Manageability of Effects				
	5 Complex	4 Substantial	3 Straightforward	2 Standard	1 Minimal
1 Low	6 Medium	5 Low/Medium	4 Low/Medium	**3 Low**	**2 Low**
2 Minor	7 High/Medium	6 Medium	5 Low/Medium	4 Low/Medium	**3 Low**
3 Moderate	8 High/Medium	7 High/Medium	6 Medium	5 Low/Medium	4 Low/Medium
4 High	**9 High**	8 High/Medium	7 High/Medium	6 Medium	5 Low/Medium
5 Extreme	**10 High**	**9 High**	8 High/Medium	7 High/Medium	6 Medium

23.2 Analysis

The analysis of residual environmental risks for issues related to the Project is shown in **Table 67**.

This analysis indicates the environmental risk profile of the Project based on the assessment of environmental effects, the identification of appropriate mitigation measures and the Summary of Mitigation Measures provided in **Section 25.0**.

Table 67 Residual Risk Profile

Issue	Initial Risk Rating (No Controls)			Residual Risk Rating (Controls in Place)
	Significance of Effects	Manageability of Effects	Risk Score	Residual Risk
Hazard and risk	Moderate	Standard	Low/Medium	Low/Medium
Air quality	Minor	Standard	Low/Medium	Low/Medium
Traffic and transport	Minor	Standard	Low/Medium	Low/Medium
Noise and vibration	Minor	Minimal	Low	Low
Soil and water	Minor	Minimal	Low	Low
Social and economic	Minor	Minimal	Low	Low
Visual amenity	Minor	Minimal	Low	Low
Greenhouse gas	Low	Minimal	Low	Low
Waste	Low	Standard	Low	Low
Heritage (indigenous and non-indigenous)	Low	Minimal	Low	Low
Ecology	Low	Minimal	Low	Low

23.3 Conclusion

The above residual risk analysis indicates that the Project, including appropriate mitigation measures as outlined in this EIS, would give rise to predominately low and low/medium residual risks in relation to the identified environmental issues.

Part G – Environmental Management and Monitoring

This Part provides a description of the environmental management and monitoring measures that would be implemented during the Project, and the environmental management frameworks within which these measures would be implemented.

24.0 Environmental Management

24.1 Environmental Management and Monitoring Plan

24.1.1 Objectives

The key objectives of the environmental monitoring and management of the existing Facility and Project are to:

- Prevent, reduce and effectively manage potential impacts to the environment resulting from operation and maintenance of the Facility;
- Promote environmental awareness amongst Stolthaven employees and contractors to ensure that operations and maintenance of the Facility are conducted with due diligence to the environment; and
- Include information covering those controls established to minimise environmental impacts from the operation of the Project.

24.1.2 Outline Construction Environmental Management Plan

As part of the construction of the existing Facility as approved in the original Project Approval, Stolthaven prepared a CEMP to provide environmental controls for construction activities. This CEMP included key components from Stolthaven's lead contractor as well as Stolthaven specific controls and systems. The CEMP included the following elements:

- An environmental risk assessment;
- Environmental incident / complaint management procedure;
- A reference list of applicable project environmental documentation including client and contractor environmental plans and procedures;
- Sediment and Erosion control plan;
- Greenhouse Gas Management Plan;
- Contaminated Site Management Plan;
- Noise Management Plan;
- Soil and Water Management Plan;
- Archaeological Management Plan;
- Air Quality Management Plan;
- Waste Management Plan;
- Traffic Management Plan; and
- An Audit and Update Schedule.

The CEMP was prepared in consultation with key agency stakeholders including the EPA, Government Property NSW, NCC, NOW and PON with evidence of consultation provided to DP&E. Following review, DP&E issued its approval for the commencement of construction works.

A similar process would be implemented for the Stage 3 CEMP as part of the current Project. The CEMP would be updated as necessary and reviewed by DP&E prior to the commencement of any construction works and would include the mitigation measures consistent with the outcomes and findings of this EIS.

24.1.3 Outline Operation Environmental Management Plan

In accordance with Condition 1, Schedule 4 of Development Consent SSD 6664, the Facility is required to operate under an Environmental Management Strategy. Stolthaven's Operational Environmental Management Strategy fulfils these requirements and contains a suite of documents including:

- Environment, Health and Safety Management System;
- Safety, health, environment and quality policies;
- Accident and incident reporting system;
- Stormwater and Drainage Management Plan (as per Condition 10, Schedule 3 of SSD 6664);
- Water Management Plan (as per Condition 11, Schedule 3 of SSD 6664);
- Operation Traffic Management Plan (as per Condition 13, Schedule 3 of SSD 6664);
- Fire Safety Study (as per Condition 15, Schedule 3 of SSD 6664);
- Emergency Plan (as per Condition 16, Schedule 3 of SSD 6664);
- Utilities and Services Plan (as per Condition 18, Schedule 3 of SSD 6664);
- Operational Noise Management Plan (as per Condition 26, Schedule 3 of SSD 6664);
- Air Quality Management Plan (as per Condition 33, Schedule 3 of SSD 6664);
- Energy Efficiency Plan (as per Condition 34, Schedule 3 of SSD 6664); and
- Landscape Management Plan (as per Condition 35, Schedule 3 of SSD 6664).

The Operational Environmental Management Strategy was prepared in consultation with key agency stakeholders including the EPA, Government Property NSW, NCC, NOW and PON with evidence of consultation provided to DP&E. These plans would be reviewed for the Project in consultation with DP&E and other relevant stakeholders.

24.1.4 Environmental Auditing and Reporting

The environmental reporting requirements of Stolthaven's existing operation are currently undertaken in accordance with Development Consent SSD 6664 and EPL requirements. It is likely that these requirements would remain the same under a new Development Consent issued for the Project, and under the amended EPL for the Project. Stolthaven would therefore continue to undertake the following:

- Conduct an annual review of construction and/or operations and consistency against the conditions of approval (or as per timing otherwise specified by DP&E);
- An independent environmental audit one year from the commencement of operations and every 3 years thereafter (or as per timing otherwise specified by DP&E); and
- Annual environmental reporting to the EPA in accordance with the requirements of EPL 20193.

It is noted that operations under the existing Development Consent SSD 6664, began in November 2013. As such, the first annual review and audit reporting requirements were triggered in November 2014, and the 2015 reporting is underway (refer ENVIRON, 2015 and AECOM, 2014 and 2015).

25.0 Summary of Mitigation Measures

The following summary of mitigation measures provides a summary of the environmental management and monitoring that would be undertaken as part of the Project.

Stolthaven commits to the updating of environmental management and monitoring plans prepared as part of the original Project Approval, as modified, with the environmental mitigation measures detailed in **Table 68**. Where applicable, management plans for the Facility would be amended and used for the management of the Project. Additionally, where monitoring and management plans specified by the Concept Plan Approval are required, these would supersede site specific management plans in accordance with the Concept Plan Approval.

Table 68 Summary of Mitigation Measures

Environmental Aspect	Commitments and Mitigations
Management plan	- A Construction Environmental Management Plan will be prepared for the construction of the tanks. The CEMP will be prepared in consultation with DP&E. - Stolthaven will undertake updates to its existing operational environmental management plans in consultation with DP&E.
Hazards and risks	- The site Fire Safety Study will be updated in consultation with Fire and Rescue NSW and necessary measures implemented prior to the operation of any Stage 3 element. - The existing site Emergency Plan will be revised and updated in consultation with PON and to the satisfaction of DP&E prior to the operation of any Stage 3 elements. - Stolthaven will consult with PON regarding the update of the Port Emergency Response Plan. No operation of any Stage 3 elements will occur prior to the Port emergency Response Plan be updated to the satisfaction of PON. - Stolthaven will undertake a Hazard Audit in accordance with the requirements of Schedule 3, Condition 2.28 of the Mayfield Concept Plan Approval.
Air quality	- The CEMP will include measures for the management of dust generation and combustion emissions during the construction phase. - The Facility will be operated in accordance with the existing Air Quality Management Plan as updated to include the Project. This update will be undertaken in consultation with DP&E. - A vapour recovery system will be designed to recover >98 per cent of the hydrocarbon content from the waste vapour stream generated by loading road tankers. - The Project will be undertaken in accordance with the requirements of the air quality model and monitoring program, and meteorological monitoring details in Schedule 3, Conditions 2.11, 2.13 and 2.15 of the Mayfield Concept Plan Approval.
Traffic and transport	- A Construction Traffic Management Plan will be prepared for the Project to manage construction traffic impacts. - The existing Traffic Management Plan will be updated to incorporate the Project in consultation with PON, Newcastle City Council and RMS. - Measures identified to manage potential traffic impacts include: • An induction process for drivers; • Entry and exit conditions; and • Approved operational access and egress routes via Steelworks Road to the Industrial Highway - The Project will comply with the requirements of the Mayfield Concept Plan Traffic Management Plan and Traffic Monitoring Review Plan prepared in accordance with Schedule 3, Conditions 2.5 and 2.10 of the Mayfield Concept Plan Approval.
Noise and vibration	- Construction noise and vibration impacts will be managed through the implementation of a CEMP which will be prepared to include reasonable and feasible management and mitigation measures to be put in place during the construction period. - The current site Operational Noise Management Plan (ONMP) will be reviewed

Environmental Aspect	Commitments and Mitigations
	and updated in accordance with the Project operational approval requirements, including requirements for implementation of management measures, monitoring and auditing of operational noise. The ONMP will also incorporate noise requirements in regards to managing noise as per the Mayfield Concept Plan Approval. - The ONMP will be revised and updated in consultation with PON and DP&E. - The Project will comply with the requirements of the Mayfield Concept Plan Noise Verification Monitoring Program prepared in accordance with Schedule 3, Condition 2.20 of the Mayfield Concept Plan Approval.
Soil and Water	- The existing Surface Water Management Plan and Groundwater Management Plan prepared for the Facility, will be updated, where relevant and in consultation with DP&E, to incorporate the Project. - Management of soils during construction, including sediment and erosion controls, will be detailed in the CEMP. - The proposed design and work methods will be provided to the EPA Site Auditor for review and comment prior to any construction works. Evidence of consultation with the Site Auditor will be provided to DP&E. - The Project will be undertaken in accordance with the requirements of the Mayfield Concept Plan Stormwater Management Strategy prepared in accordance with Schedule 3, Condition 2.21 of the Mayfield Concept Plan approval.
Visual	- The Facility will be constructed from non-reflective materials and painted white where possible. - Lighting design will be in accordance with the requirements of Australian Standard AS 4282 – Control of Obtrusive Effects and Outdoor Lighting. Lighting will be mounted, screened and directed in such a manner that it does not cause nuisance to surrounding properties or the public road network. - The existing Landscape Management Plan will be updated to incorporate the new tanks, bunding, gantry and building areas and identify appropriate treatment to be incorporated into the Facility.
Greenhouse Gas	- The existing Energy Efficiency Plan will be updated to include all elements of the Project and include measures to reduce and mitigate energy use and greenhouse gas emissions across the entire Project.
Waste	- The waste strategies developed for the existing Facility will be updated to incorporate the Project. This can be summarised as the application of the waste hierarchy where the following will be employed, in order of preference: • *Avoidance* – The generation of wastes from the Facility will be avoided where possible. • *Reduce* – Reduce resource consumption, procure materials with less packaging and implement practices to reduce waste. • *Reuse* – Where feasible, materials will be reused onsite. However, due to the limited waste streams generated onsite, reuse options may be limited. • *Recycling* – Paper, cardboard, glass and plastics will be available for recycling. A bin will be placed adjacent to the office which will be collected by a waste management contractor on a regular basis. • *Disposal* – Disposal of wastes will be minimised where possible. Putrescibles wastes from the office will be sent to landfill, with other wastes generally diverted for recycling. - Waste strategies will be met through the extension of the Facility's existing Waste Management Plan for operations and as part of the CEMP for waste generated during construction.

Part H – Project Justification

This Part provides the justification for the Project according to biophysical, economic, social and ecologically sustainable development principles. Justification for the Project is also provided in relation to the EP&A Act.

26.0 Justification for Consent

26.1 Biophysical, Economic and Social Considerations

26.1.1 Biophysical Factors

The potential biophysical effects associated with the Project were assessed in **Part F** of this EIS. The assessment of the biophysical environment examined terrestrial ecology, surface and groundwater quality and soils. This EIS concludes that the residual risk associated with these potential impacts on these elements is low, after appropriate mitigation and management measures are implemented. The Project is therefore justifiable in terms of the biophysical elements of the environment.

26.1.2 Sociocultural Factors

The potential effects of the Project on social and cultural values and aspects that affect them were examined in **Part F.** The assessment presented in this EIS regarding heritage (indigenous and non-indigenous), traffic and transport and visual amenity indicates that, provided appropriate mitigation and management measures as outlined in the summary of mitigation measures are implemented, the Project would have a minimal negative implications for sociocultural factors. As detailed in **Part F**, the Project would operate within the relevant air quality and noise criteria. The Project is considered to be justifiable on social and cultural grounds.

26.1.3 Economic

The Project would provide economic benefits to the local, regional and State economies. The additional throughput would provide economic benefit to customers in the Hunter region through introducing greater competition in the fuel market, and a more efficient and diversified fuel source which is expected to result in lower fuel prices and improved security of supply. The Project is therefore considered to be justifiable from an economic perspective. The additional fuel supply directly to the regional market would also provide added security of supply to customers.

26.2 Ecologically Sustainable Development

Schedule 2 of the EP&A Regulation establishes four primary principles of ecologically sustainable development (ESD): the precautionary principle; intergenerational equity; biological diversity and ecological integrity; and valuation and pricing of environmental resources. The EPBC Act specifies a fifth principle for consideration, which involves decision-making processes. The application of these principles to the assessment of the Project is discussed below.

26.2.1 Precautionary Principle

The precautionary principle outlines the need to prevent environmental degradation whether a risk to the environment has been scientifically demonstrated or not. The identification of potential impacts to the environment through detailed specialist studies undertaken as part of this EIS has enabled the Project to be designed to avoid significant environmental impacts, and has allowed appropriate environmental management measures to be developed to manage potential impacts so that significant adverse environmental outcomes are avoided. Conservative modelling scenarios were considered as part of the modelled air quality, noise and traffic impacts which all indicated the Project could operate without significantly impacting on the environment or community.

26.2.2 Intergenerational Equity

The principle of intergenerational equity puts an onus on society to ensure that the health, diversity and productivity of the environment are maintained, if not enhanced, for the benefit of future generations. The Project would have minimal effect on the health of either the environment or communities, as air emissions would be managed within acceptable levels. Direct importation of fuel into Newcastle would reduce fuel trucks traveling to the Hunter from Sydney reducing congestion and reducing risks associated with large numbers of fuel trucks on

the road network. As the Site is a previously cleared portion of land, the diversity and productivity of the Site would not be adversely affected by the Project.

26.2.3 Biological Diversity and Ecological Integrity

This principle requires the maintenance and conservation of a full and diverse range of plant and animal species. As outlined above, the Site is a previously cleared, highly modified area that is currently devoid of any native flora and fauna, therefore ecological impact arising from the Project would be negligible.

26.2.4 Valuation and Pricing of Environmental Resources

The Intergovernmental Agreement on the Environment (IGAE) and POEO Act require improved valuation, pricing and incentive mechanisms to be included in policy making and program implementation. In the context of environmental assessment and management, this would translate to environmental factors being considered in the valuation of assets and services. A monetary value could not be placed against the greater proportion of the environmental attributes which may be affected. Rather the approach taken on this Project was to manage the environmental impact by identifying appropriate safeguards and including the cost of implementing these safeguards in the total Project cost. This approach allows the value and price of environmental resources and their protection to be accurately reflected.

26.3 The Objects of the Environmental Planning and Assessment Act 1979

This EIS has been prepared having regard to the objects of the EP&A Act, which are set out in section 5 of the Act as follows:

a) to encourage:

- *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages of the purpose of promoting the social and economic welfare of the community and a better environment,*
- *the promotion and co-ordination of the orderly and economic use and development of land;*
- *the protection, provision and co-ordination of communication and utility services;*
- *the provision of land for public purposes;*
- *the provision of co-ordination of community services and facilities,*
- *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,*
- *ecologically sustainable development, and*
- *the provision and maintenance of affordable housing.*

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

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

The Project is generally compatible with these objects, as it complements the current VRA No 26025 and CSMP that apply to the Site, and is thus in keeping with the proper management, development and conservation of the resources and built landscapes of the Site. The Project would also benefit social, economic, community and environmental welfare by providing infrastructure which is required to meet the current and predicted fuel demands of the Hunter region whilst reducing dependence on liquid fuels transported by truck from Sydney. The selected location is ideal for the Project, as it maximises the use of existing port infrastructure without creating a disproportionate demand on resources and utilities. There are also other potential environmental benefits from the Project, as it would facilitate the distribution of biodiesel, a renewable fuel, throughout the Hunter region.

The Project is compatible with the Site's zoning under the Three Ports SEPP. In using existing port related infrastructure to maximise efficiency, the Project promotes economic use and development of land which is currently unused. This Project is in keeping with the ordered and coordinated development of this land, as its operations are one of the land uses nominated as part of the Concept Plan to develop this area.

The Project would not create an undue demand on existing communication and utility services, and would provide for the increased distribution of fuels in the Hunter region.

The Project is unlikely to create significant environmental risks for any threatened species, populations, or communities.

Section 26.2 outlines how the Project complements the principles of ESD. The Project would assist the Hunter region meet its current and future energy needs with minimal environmental impact, whilst also facilitating the distribution of renewable fuels.

With the closest residential area located over 500 m away from the Site, it is not anticipated that the Project would have a significant impact on residential areas that could affect housing availability or pricing.

Stolthaven also initiated contact with the community during the planning and assessment phase of this Project.

26.4 Justification Summary

The Project would be undertaken in association with an existing fuel terminal and would support improved efficiencies and access to fuels for customers in the Hunter Valley and ultimately northern NSW. The Project makes use of the existing terminal in close proximity to existing infrastructure such as wharf facilities and heavy vehicle transport routes. The Project would allow additional throughput to come through the Port of Newcastle with minimal construction or environmental impacts.

Importantly, increasing the throughput of the existing terminal would offset fuels currently being imported into the Hunter Valley, primarily from Sydney, by road tanker. This would result in a reduction of heavy vehicle movements required to supply the region. There are also flow-on safety and congestion reduction benefits associated with a reduction of heavy vehicles.

The Project would continue to help alleviate some of the infrastructure demands that are currently being placed on the Hunter region as the need for fuels, including sustainable fuels, grows. Due to the importance of liquid fuels to the local and regional economy, a secure and efficient fuel supply alone justifies the Project proceeding.

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Part I – EIS Findings

This Part summarises the Project, its alternatives, justifications, and sustainability and provides the concluding statements for the EIS.

27.0 Concluding Statement

27.1 The Project

In addition to the ongoing operation of the existing Facility, Stolthaven proposes to construct and operate 17 additional fuels storage tanks for a variety of fuel types (petroleum, diesel, ethanol and jet fuel), and the increase in annual throughput to a maximum of 3,500 ML.

The Project would see the use of the Facility's existing pump, pipe and gantry infrastructure and ship receipt, and truck dispatch activities during the construction period. In doing so, Stolthaven would be able to continue servicing customers throughout the Hunter Valley with diesel and biodiesel supplies as an alternative to fuels trucks from outside the region. Once new Project elements become operational all fuel products would be imported through Mayfield Berth 7. At no stage would flammable fuels be imported through Mayfield Berth 4.

The increase in fuel storage type and capacity would allow the facility to better service local existing and new fuel supply customers, which would ultimately service end-market household, transportation and business customers. The addition of jet fuel storage capacity also has the potential to support aviation routes servicing the Hunter Valley in the long-term.

27.2 Alternatives

The potential Project alternatives include:

- Do-nothing;
- Use an alternative site in the Port of Newcastle for the importation of fuels; or
- Use an alternative site outside the port of Newcastle for the importation of fuels.

None of these alternatives provide the benefits of the current Project. Specifically, none of the alternatives would allow for the Project to be developed:

- In association with an existing terminal;
- On a highly modified site; and
- In close proximity to end users, deep water Port access and transportation routes.

Following consideration of the possible alternatives, the Project represents the most suitable outcome for stakeholders. With the recommended measure in place and potential impacts managed to appropriate levels, the Project provides better outcomes for the environment and the community compared to the alternatives.

27.3 Justification for the Project

The Project is justified as it has been shown that it would provide economic benefits to the local, regional and State economies, in particular through providing improved efficiencies and access to fuels for:

- Mining and an increasingly diversifying range of industries in the Hunter Valley;
- Local established customers and new customers requiring fuel supply and storage; and
- Local household transport and business operations through the provision of petroleum fuels.

The Project would also create additional storage capacity for jet fuel, with the ultimate aim of supporting aviation routes to and from the Hunter region. These benefits can be provided in an environmentally responsible manner and in accordance with the principals of ESD. This can occur through the use of an established facility with minimal environmental impacts as demonstrated in this EIS. The Project is therefore considered to be justifiable.

27.4 Sustainability of the Project

The assessment of potential environmental impacts concluded that due to the highly modified nature of the Site, and with the proposed management measures in place, impacts from the Project would be minor and that the Project can be undertaken in a sustainable manner.

27.5 Conclusion

The Project includes the increase in storage capacity by the addition of 17 additional fuels storage tanks for a variety of fuel types (petroleum, diesel, ethanol and jet fuel), and the increase in annual throughput to a maximum of 3,500 ML.

The Site is located wholly on land leased from the Port of Newcastle. The additional fuel throughput would see the use of an existing Facility maximised. It is ideally suited to the increased throughput due to its port access, road transport access and immediate proximity to existing port and terminal infrastructure.

The Project would support the alternative supply chain for a range of fuel types within the Hunter region, and would be operated by a company that has a proven track record in managing environmental impacts.

This EIS has fully considered the beneficial and adverse effects of the Project, with full consideration of the principles of ESD. With the implementation of environmental mitigation measures outlined in this EIS, it is unlikely that significant adverse impacts would occur at the Facility or within the surrounding environment.

Part J References

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