APPENDIX J

LAND USE PLANNING SAFETY REQUIREMENTS REPORT

RISK ADVICE

LAND USE SAFETY PLANNING IMPLICATIONS

SSD APPLICATION – CENTRAL SYDNEY INDUSTRIAL ESTATE INCORPORATING DOWNER SUSTAINABLE ROAD RESOURCE CENTRE

VE PROPERTY PTY LTD AND DOWNER EDI WORKS PTY LTD

PREPARED FOR: **VE Property Pty Ltd And Downer EDI Works Pty Ltd**

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Sherpa Consulting Pty Ltd (ABN 40 110 961 898)
Phone: 61 2 9412 4555
Web: www.sherpaconsulting.com

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Title: **Risk Advice** **Land Use Safety Planning Implications** **SSD Application – Central Sydney Industrial Estate Incorporating Downer Sustainable Road Resource Centre**	**QA verified:** **J Polich** **Date: 02-Sep-2020**

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ABBREVIATIONS

ALARP	As Low As Reasonably Practicable
BIP	Botany Industrial Park
DA	Development Application
DPIE	(NSW) Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
FHA	Final Hazard Analysis
HIPAP	Hazardous Industry Planning Advisory Paper
IN	Industrial (land use)
LEL	Lower Explosive Limit
LEP	Local Environment Plan
LGA	Local Government Area
LUSS	Land Use Safety Study
QRA	Quantitative Risk Assessment
SEARS	(DPIE) Secretary's Environmental Assessment Requirements
SSD	State Significant Development

1. SUMMARY

1.1. Background

The former Shell refinery at Clyde, NSW has been converted to a fuel storage facility known as the Viva Energy Clyde Terminal ('Clyde Terminal'). This is owned and operated by Viva Energy Australia Pty Ltd (Viva Energy). A large portion of the western part of the site (approximately 35 hectares) is no longer required for Terminal operations. A subdivision of the western portion of the Terminal site is proposed. The land would remain zoned for industrial land use only.

VE Property Pty Ltd (an entity distinct from Viva Energy) retained Sherpa Consulting Pty Ltd (Sherpa) to assist to determine whether the proposed subdivision is compatible with the risk imposed by Terminal site operations, hence whether the subdivision can be supported from a risk perspective.

This review was carried out in consultation with Viva Energy. Risk profile information for the Clyde Terminal is not available in the public domain. Viva Energy provided the most recent risk profile to Sherpa and consented to its use for the risk review.

1.2. Initial risk review status

The initial risk review for VE Property (December 2019) covered the overall subdivision with no specific development proposal identified. The conclusions of the initial review (as per Section 6 of this report) were that:

- the individual fatality risk to the subdivided area was acceptable for industrial land uses.
- societal risk would remain in the negligible region provided night time populations were restricted.

Viva Energy agreed the risk basis for the review and supported these conclusions. i.e. that industrial land uses with restricted night time populations could be developed in the area immediately to the west of the Clyde Terminal boundary.

1.3. Stage 1 Downer Development proposal

Since the initial risk review was completed, a specific development has been proposed. The State Significant Development (SSD) Central Sydney Industrial Estate proposal includes:

- The staged subdivision of the western area of Lot 100 DP 1168951 into eight new industrial lots.
- Preparing the lots via earthworks and civil works for future re-development (by future applications).
- Stage 1 (Sustainable Road Resource Centre). Downer EDI Work Pty Ltd (Downer) will occupy the newly created Lot 6 (the part of the subdivision closest to the Clyde

Terminal boundary). Stage 1 includes construction and operation by Downer of the following facilities on Lot 6:

- RAP processing operations.
- Asphalt plant.
- Reconomy facility.
- A modern bitumen product manufacturing plant.

The Department of Planning Industry and Environment (DPIE) Secretary's Environmental Assessment Requirements (SEARs) for the proposal relevant to land use safety planning risks and consultation with Viva Energy are shown in Table 1.1.

1.4. Compatibility of Stage 1 Lot 6 Downer development

The proposed Downer facility is industrial. Whilst it operates 24 hours a day it will have a limited night time population.

This development is consistent with the findings of the initial risk review, as both day and night populations (4 people per hectare day time / 2 – 3 people per hectare night time), even allowing for some future increases, are well below the base case population densities assessed over the whole SSD area (29 people per hectare day time / 4 people per hectare night time), that allow societal risk to remain within the negligible area.

A 'high' population sensitivity case doubling the base case populations (i.e. to 59 people per hectare day time / 8 people per hectare night time) in the whole SSD area including the Downer Lot 6 development demonstrates that cumulative societal risk will still remain in the negligible area.

1.5. Viva Energy input to SSD proposal including Downer Lot 6 Stage 1

On the basis of the information provided by Downer to Viva Energy (APPENDIX A) in relation to the purpose of the facility, the proposed layout and the various supporting activities, Viva Energy believes the proposed SSD (which includes the Stage 1 Downer development on Lot 6):

- will not impact the fuel terminal or pipelines associated with the fuel terminal from a land use safety risk perspective as the proposed Downer facilities are approximately 200 m from the fuel storage tanks and is also well separated from any pipelines; and
- is compatible with the terminal offsite risk profile.

As a facility closely located to the Clyde Terminal, there is potential for the Downer facilities to be affected by the consequences of a major incident at the Clyde Terminal. Viva Energy and Downer have agreed that appropriate emergency planning will be undertaken to prepare for and mitigate the impact of an emergency at the Clyde Terminal.

Table 1.1: SEARs addressed in this report

Government Agency	Requirement	Section of the report where the SEARs is addressed
DPIE	Consultation and agreed actions between Viva Energy and the Applicant regarding potential impacts to and from the Clyde fuel terminal and any high-pressure fuel pipeline connected to this terminal.	Section 1.5 of this report. Note: There are no high pressure fuel pipelines (Viva or Downer) connected to the Downer development. There are pipelines within the Clyde Terminal and connecting to other locations. however these are not in proximity to Downer Lot 6.

2. INTRODUCTION

2.1. Scope and objectives

The overall objectives of the study were:

Stage 1:

1. Identify the most recent Quantitative Risk Analysis (QRA) study to use as the basis for assessment of the land use safety planning implications of the subdivision.
2. Agree with Viva Energy that the appropriate QRA model version and input assumptions are used.
3. Confirm that Viva Energy agrees to use the resulting risk information to inform the study for VE Property.

Stage 2:

4. Determine whether the proposed development complies with the applicable NSW risk criteria for land use planning including examining the Downer Stage 1 proposal.
5. Advise any potential constraints that may apply to the proposal to ensure compliance with the risk criteria can be achieved.
6. Prepare a report for VE Property covering the assessment of the land use safety planning implications of the subdivision for VE Property and for use in the SSD Application/EIS.

Stage 3

7. Update the review to explicitly cover the SSD Proposal (including the Stage 1 Downer development for Lot 6).

Note that emergency planning considerations are also relevant but outside the scope of this study.

2.2. SSD Application - Subdivision details incorporating the Downer Facility

The proposed subdivision in relation to the Clyde Terminal is shown in Figure 4.1.

The overall estate eastern boundary has been located to ensure that separation distances from the flammable and combustible tanks and bunds at the Clyde Terminal to any future offsite protected places will comply with the requirements of AS1940:2017 *Storage and handling of flammable and combustible liquids.* (i.e. the distance to the subdivision boundary from hydrocarbon areas is at least equal to the required separation distance from tanks or bunds to offsite protected places).

A description of the SSD scope is provided in APPENDIX A.

2.3. Exclusions

This report addresses the societal risk implications of the new population in the SSD including Downer Lot 6 Stage 1, hence the overall suitability of the development in this location adjacent to the Clyde Terminal. The following exclusions apply:

- This report does not address any risks from the Downer development that may be posed to surrounding land uses. This is addressed separately via a standalone Preliminary Hazard Analysis report covering the specifics of the operations proposed for Stage 1.
- Rezoning is not part of the SSD subdivision, therefore a change from IN3 to IN2 is not accounted for in the SSD area and is not covered by this report. Any future rezoning would require additional assessment.

3. QRA BASIS

3.1. Risk criteria

Hazardous Industry Planning Advisory Paper (HIPAP) 10 *Land Use Safety Planning* (Ref (1)) published by the NSW Department of Planning and Industry and Environment (DPIE), specifies qualitative and quantitative risk criteria for new developments in the vicinity of potentially hazardous facilities such as the Clyde Terminal. The HIPAP 10 criteria are identical to those specified in HIPAP 4 *Risk Criteria for Land Use Safety Planning.*

Quantitative risk criteria are given both for individual risk and societal risk and these are used to assess the risk implications to the proposed subdivision. Individual risk criteria are shown in Table 3.1, and societal risk criteria are shown in Figure 3.1.

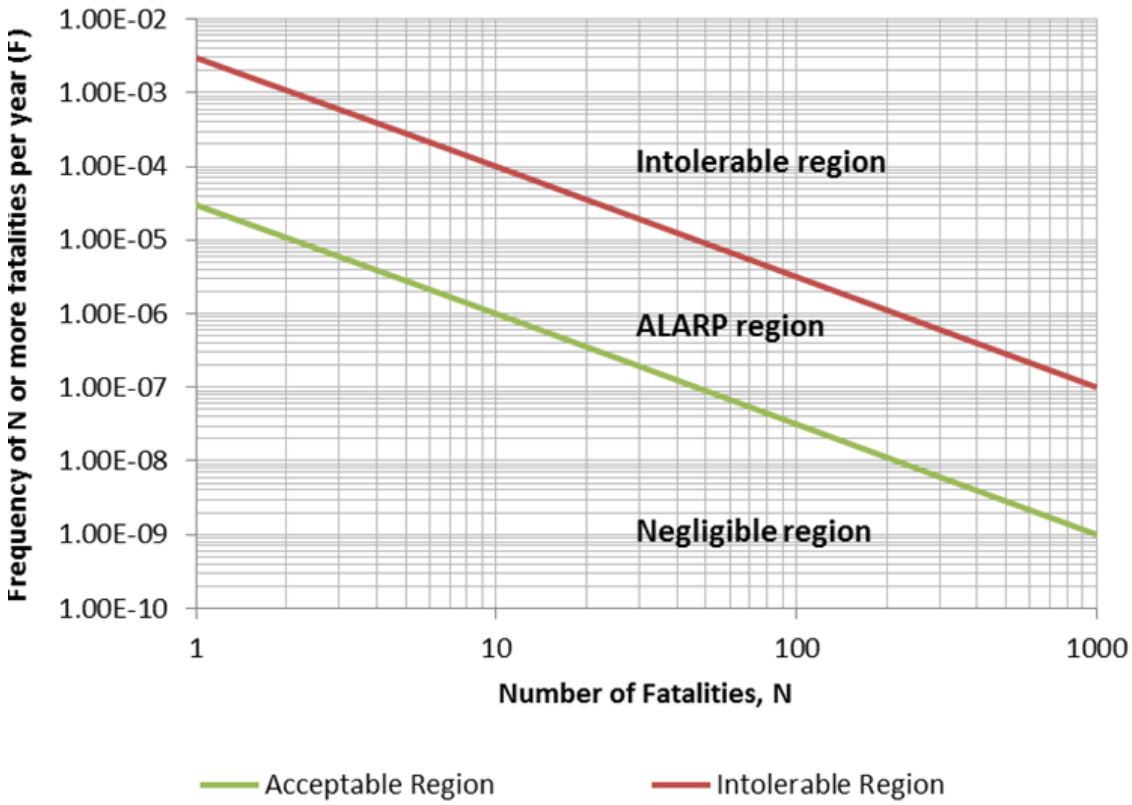
The SSD is industrial land use hence the applicable individual fatality risk criterion is that risk should be below 50 x 10^{-6} per year.

Table 3.1: Risk assessment criteria (HIPAP 10)

Description and land use	Criteria (per year)	Assessed in study?
Individual fatality risk		
Hospitals, child-care facilities and old age housing (sensitive land uses)	0.5 x 10^{-6}	Yes
Residential developments and places of continuous occupancy such as hotels and tourist resorts (residential land use)	1 x 10^{-6}	Yes
Commercial developments, including offices, retail centres and entertainment centres (commercial land use)	5 x 10^{-6}	Yes
Sporting complexes and active open space areas (recreational land use)	10 x 10^{-6}	Yes
Target for site boundary (i.e. to remain within Clyde Terminal boundary, and risk at SSD to be below this)	50 x 10^{-6}	Yes
Injury risk		
Heat radiation exceeding 4.7 kW/m^2 (residential and sensitive uses)	50 x 10^{-6}	No – no residential land uses
Explosion overpressure exceeding 7 kPa (residential and sensitive uses)	50 x 10^{-6}	No – no residential land uses
Toxic concentrations exceeding a level which would be seriously injurious to sensitive members of the community following a relatively short period of exposure (residential and sensitive uses)	10 x 10^{-6}	No – not applicable as hydrocarbon fuels are not acutely toxic

Description and land use	Criteria (per year)	Assessed in study?
Toxic concentrations exceeding a level which would cause irritation to eyes or throat or other acute physiological responses in sensitive members of the community (residential and sensitive uses)	50 x 10^{-6}	No – not applicable as hydrocarbon fuels are not acutely toxic
Risk of property damage and accident propagation		
Heat radiation exceeding 23 kW/m^2 (neighbouring potentially hazardous installations or at land zoned to accommodate such installations)	50 x 10^{-6}	Yes
Explosion overpressure exceeding 14 kPa (neighbouring potentially hazardous installations or at land zoned to accommodate such installations)	50 x 10^{-6}	Yes

Figure 3.1: Societal risk criteria (HIPAP 10)



3.2. Clyde Terminal risk profile

The Clyde Terminal has been subject to several QRA studies that have analysed the offsite risk for different purposes. The most recent studies are not available in the public domain (as they were prepared for uses that do not require public release), hence were not directly available for use in this assessment. Viva Energy provided the most recent

risk profile to Sherpa and consented to its use for the purpose of the risk review of the SSD including the Stage 1 Lot 6 Downer development.

Societal risk was assessed in the Camellia Land Use Safety Study (LUSS) prepared for DPIE, which used an older revision of the Clyde QRA model (Ref (2)). The risk model in the LUSS has been superseded so these results whilst publicly available are no longer valid.

3.3. QRA model used

The initial risk review in 2019 was based on a quantitative risk assessment (QRA) model developed for the Clyde Terminal conversion project Final Hazard Analysis (FHA) (Ref (3)).

A further revision of the QRA has been developed for the Clyde Terminal Major Hazard Facility (MHF) Safety Case 2020 update (Ref (4)). The2020 risk results are slightly lower than the 2019 risk results and do not change the conclusions of the initial risk review. The 2020 QRA has been used to update the SSD risk review in relation to the Downer proposal.

With the agreement of Viva Energy, the subdivision was assessed using the most recent 2020 QRA. This was developed in commercially available software Riskcurves version 9 as follows:

1. The QRA model developed for the 2020 Safety Case was used as the basis. Report ref: *Clyde Terminal Major Hazard Facility Safety Case Chapter 5 -Appendix 1 Quantitative Risk Assessment Viva Energy Australia Ltd doc no: 21429-RP-001. Rev: 3 date: 31-Aug-2020.* (Ref (4)).
2. Assumptions regarding population densities and societal risk modelling parameters have been retained from the data used in the LUSS as these were previously agreed with DPIE.

3.4. Scope of facilities included in QRA

The QRA model used for the subdivision risk assessment includes only the Viva Energy Clyde Terminal facilities.

No other facilities (e.g. Paramatta Terminal JV, SITA, pipelines outside the Clyde Terminal boundary) are included, as the maximum consequence distance from these does not affect the proposed area for subdivision.

4. INDIVIDUAL RISK RESULTS

4.1. Risk contours

Individual fatality risk results for the Clyde Terminal extracted from the 2020 QRA are shown in relation to the proposed subdivision in Figure 4.1.

The fatality risk contours for any land use do not extend over the proposed subdivision area, so any type of land use proposed within the proposed subdivision area would meet the individual fatality risk criteria.

4.2. Compliance with HIPAP 10 individual risk criteria

A summary of compliance of risk levels in the subdivision area against the relevant HIPAP 10 criteria is given for all relevant individual risk criteria in Table 4.1.

All criteria are met. The risk at the Viva Energy boundary is below 50 $x10^{-6}$ per year. The risk level to the industrial Downer development is therefore below 50 $x10^{-6}$ per year as required.

Figure 4.1: Individual fatality risk results (from 2020 QRA) in relation to the subdivision

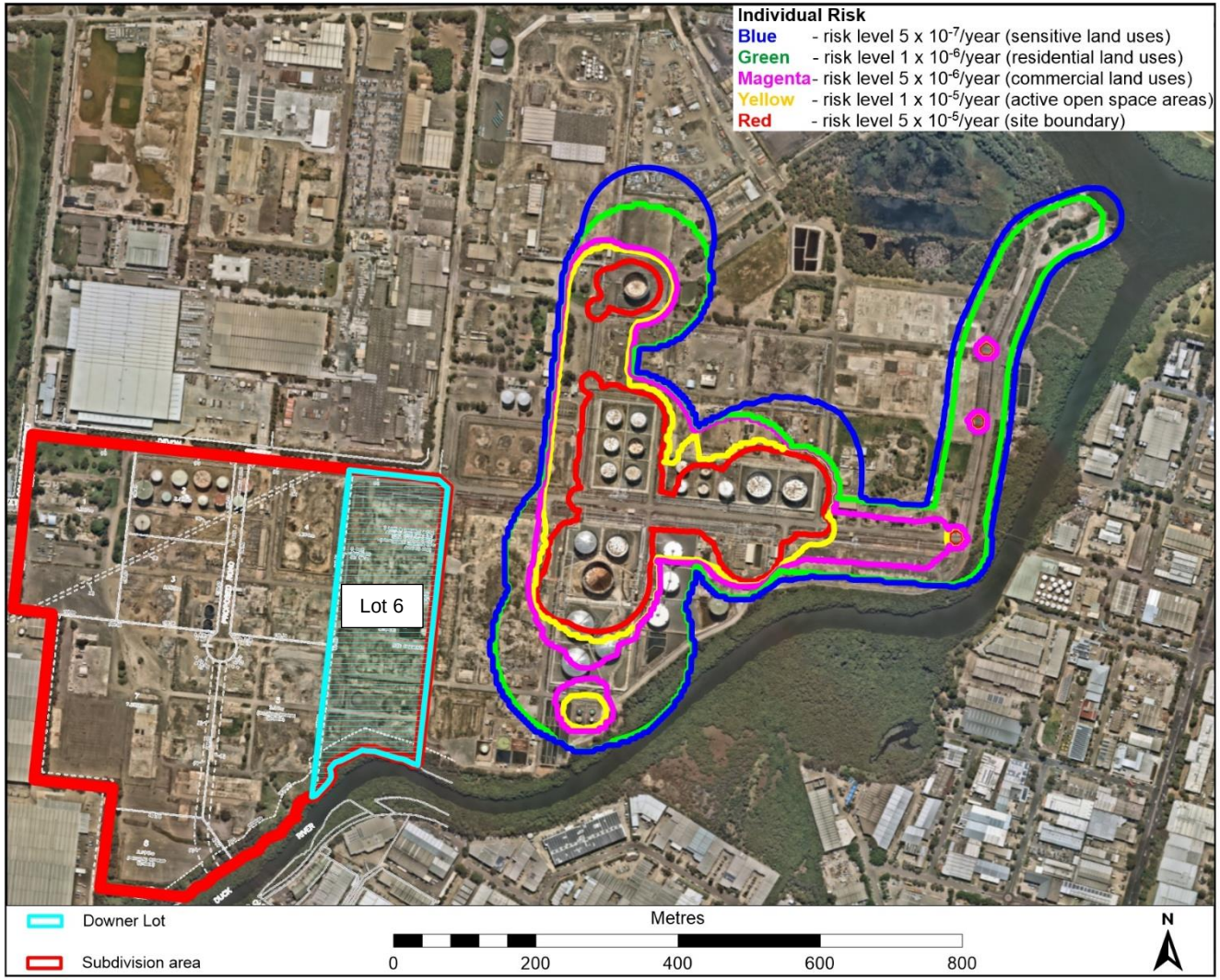


Table 4.1: Assessment of individual risks from Clyde Terminal on subdivision (all criteria)

Risk profile	Suggested criteria (HIPAP10)	Assessment	Reference
Individual fatality risk	Individual fatality risk levels for industrial sites at levels of 50 x 10^{-6} per year should, as a target, be contained within the boundaries of the site where applicable	The individual fatality risk at the 50 x 10^{-6} per year level is contained within the Clyde Terminal boundary post subdivision. The risk posed by the Terminal at the proposed subdivision boundary is less than 0.5 in a million per year.	Figure 4.1
Damage and propagation (heat radiation)	Incident heat flux radiation at neighbouring potentially hazardous installations or at land zoned to accommodate such installations should not exceed a risk of 50 x 10^{-6} per year for the 23 kW/m^2 heat flux level.	As per the FHA report (Ref (3)) the heat radiation damage and propagation risk at the 50 x 10^{-6} per year level is contained within the Clyde Terminal boundary post subdivision. (This contour has not been updated in the 2020 QRA however the conclusion will remain the same as the risk results are slightly lower).	-
Damage and propagation (explosion overpressure)	Incident explosion overpressure at neighbouring potentially hazardous installations, at land zoned to accommodate such installations or at nearest public buildings should not exceed a risk of 50 x 10^{-6} per year for the 14 kPa explosion overpressure level.	As per the FHA report the explosion overpressure damage and propagation risk at the 50 in a million per year level is contained within the Clyde Terminal boundary post subdivision. (This contour has not been updated in the 2020 QRA however the conclusion will remain the same as the risk results are slightly lower).	-

Notes:

1) toxic exposure criteria are not relevant as there are no toxic release scenarios at the Clyde Terminal.
2) '1 x 10^{-6} per year' is the same as 1 in a million per year, i.e. 50 x 10^{-6} per year is equivalent to 50 in a million per year

5. SOCIETAL RISK

5.1. Overview

In accordance with the HIPAP 10 requirements, where a development proposal involves a significant intensification of population in the vicinity of a potentially hazardous facility, the change in societal risk needs to be accounted for, even if individual risk criteria are met.

The following societal risk assessments were undertaken:

- Impact to cumulative societal risk due to the total SSD subdivision.
- Incremental societal risk from only the estimated population on total SSD subdivision area.

The societal risk profiles were evaluated against the HIPAP 10 societal risk criteria. In the context of HIPAP 10:

- Provided the incremental societal risk lies within the negligible region, development should not be precluded.
- If incremental risks lie within the ALARP (As Low As Reasonably Practicable) region, options should be considered to relocate people away from the affected areas.
- Finally, if there is still a significant portion of the societal risk plot within the ALARP region, the proposed development should only be approved if benefits clearly outweigh the risks.

5.2. Risk affected area

The societal risk depends on the impact of consequences on the populated area, and so it is important to understand which consequences impact the proposed subdivision.

Gasoline tank overfill scenarios resulting in a large flammable vapour cloud (i.e. 'Buncefield events') have the largest consequence distances of all scenarios in the QRA. These events can occur if the overfilled tank contains volatile flammable material, resulting in significant vapour formation coinciding with stable, very low wind weather conditions. If this cloud contacts an ignition source a large fire or damaging explosion can occur.

Typically, the type of low wind, stable atmospheric conditions that lead to cloud accumulation occur at night or early morning. From a QRA perspective, this means that night-time populations in the vicinity of a fuel terminal can strongly influence the societal risk level.

The extent of the largest consequence event as it affects the subdivision area is shown in Figure 5.1. This extends approximately 250 m west into the subdivision and represents the area within which new populations within the subdivision would affect the

societal risk levels. This extends onto proposed Lot 6 (to be occupied by the new Downer facility) and onto parts of Lots 4 and 5.

Outside the limit of this area there will be no effect from any populations in the subdivision area on societal risk.

Figure 5.1: Worst case consequence area (vapour cloud from tank overfill)

5.3. Zoning

The subdivided area will remain IN3 Heavy Industrial (as per the current zoning of the Clyde Terminal site). The proposal does not require re-zoning.

Land uses for IN3 are defined in the Parramatta Local Environment Plan (LEP). An extract is given in Figure 5.2.

Typically, the items listed as 'permitted with consent' would be 'industrial' and 'low density' land uses from a land use safety planning risk criteria perspective. However, there are a number of land uses permitted with consent in IN3 that may result in high or more sensitive populations in the vicinity of the Clyde Terminal as highlighted in yellow in Figure 5.2:

- Pubs and medical centres (particularly if any overnight / 24 hours usage is allowed) may not be compatible neighbours.
- Warehouse and distribution centres with 24 hour operations and large night time populations may not be a compatible use.

Figure 5.2: Extract from Parramatta Local Environmental Plan 2011

Current version for 8 November 2019 to date (accessed 12 November 2019 at 17:04) Land Use Table Zone IN3

Zone IN3 Heavy Industrial

1 Objectives of zone

- To provide suitable areas for those industries that need to be separated from other land uses.
- To encourage employment opportunities.
- To minimise any adverse effect of heavy industry on other land uses.
- To support and protect industrial land for industrial uses.
- To allow a wide range of industrial and heavy industrial uses serving the Greater Metropolitan Area of Sydney and beyond.
- To ensure that opportunities are not lost for realising potential foreshore access on land that is contaminated and currently not suitable for public access.

2 Permitted without consent

Nil

3 Permitted with consent

Agricultural produce industries; Building identification signs; Business identification signs; Depots; Freight transport facilities; General industries; Hardware and building supplies; Hazardous storage establishments; Heavy industries; Horticulture; Kiosks; Medical centres; Offensive storage establishments; Oyster aquaculture; Pubs; Roads; Rural supplies; Sawmill or log processing works; Take away food and drink premises; Tank-based aquaculture; Timber yards; Warehouse or distribution centres; Water storage facilities; Any other development not specified in item 2 or 4

4 Prohibited

Agriculture; Air transport facilities; Airstrips; Amusement centres; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Centre-based child care facilities; Commercial premises; Community facilities; Eco-tourist facilities; Educational establishments; Entertainment facilities; Exhibition homes; Exhibition villages; Farm buildings; Forestry; Function centres; Health services facilities; Helipads; Highway service centres; Home-based child care; Home businesses; Home industries; Home occupations; Home occupations (sex services); Industrial retail outlets; Information and education facilities; Jetties; Marinas; Mooring pens; Moorings; Open cut mining; Pond-based aquaculture Port facilities; Registered clubs; Research stations; Residential accommodation; Respite day care centres; Rural industries; Signage; Tourist and visitor accommodation; Water recreation structures; Water supply systems; Wharf or boating facilities; Wholesale supplies

5.4. Population cases

5.4.1. Overall SSD

For the purposes of this assessment, based on advice from DPIE provided to Sherpa when preparing the LUSS, and work previously carried out in other areas (for example in the vicinity of the Botany Industrial Park (BIP) in Sydney), 'warehouse and distribution' type occupancies are likely to be the highest density population in IN3 zoned areas. Therefore representative densities for this land use have been used as the starting point for the societal risk assessment of the overall SSD as per Table 5.1.

The potential future land use allowed for in the LUSS is shown in Figure 5.3.

The following approach was adopted for the societal risk assessment:

- Typical 'warehouse and distribution' population density assumed for subdivision area as a base case as representing the higher densities likely to be present in IN3 zoned areas.
- For all other areas outside the Clyde Terminal boundary (and also outside the SSD area), the assumed populations in the societal risk model remain consistent with the Camellia LUSS and associated Strategic Masterplan (Ref (5)) as per Table 5.2.
- A series of sensitivity cases around the density in the subdivision area only were undertaken as per Table 5.1.

Table 5.1: Population summary data for overall SSD area

SSD Population Case	Density day (people per ha)	Density night (people per ha)	Comments
Base: Typical 'warehouse and distribution' population density	29	4	Storage and distribution land uses in industrial areas in Sydney – see APPENDIX B. Upper end of data for typical IN3 land uses. **Note:** this is the same density as for IN2 population data provided by DPIE to Sherpa for use in the Camellia LUSS. Refer to Table 5.2
Sensitivity cases:			
1. High	59	8	Double base 'typical' population, day and night
2. Low	8	1	Same density as most industrial uses in IN3 (TNO Green Book and LUSS, see Table 5.2)
3. 'Extra high'	90	18	Triple base 'typical' day population, i.e. consistent with transport and logistics operations as per Appendix B. Assume 20% present at night.
4. 'High night' population	29	29	Assume same population for day time and night time (e.g. 24 hrs operation) - 'warehouse and distribution' density for day and night

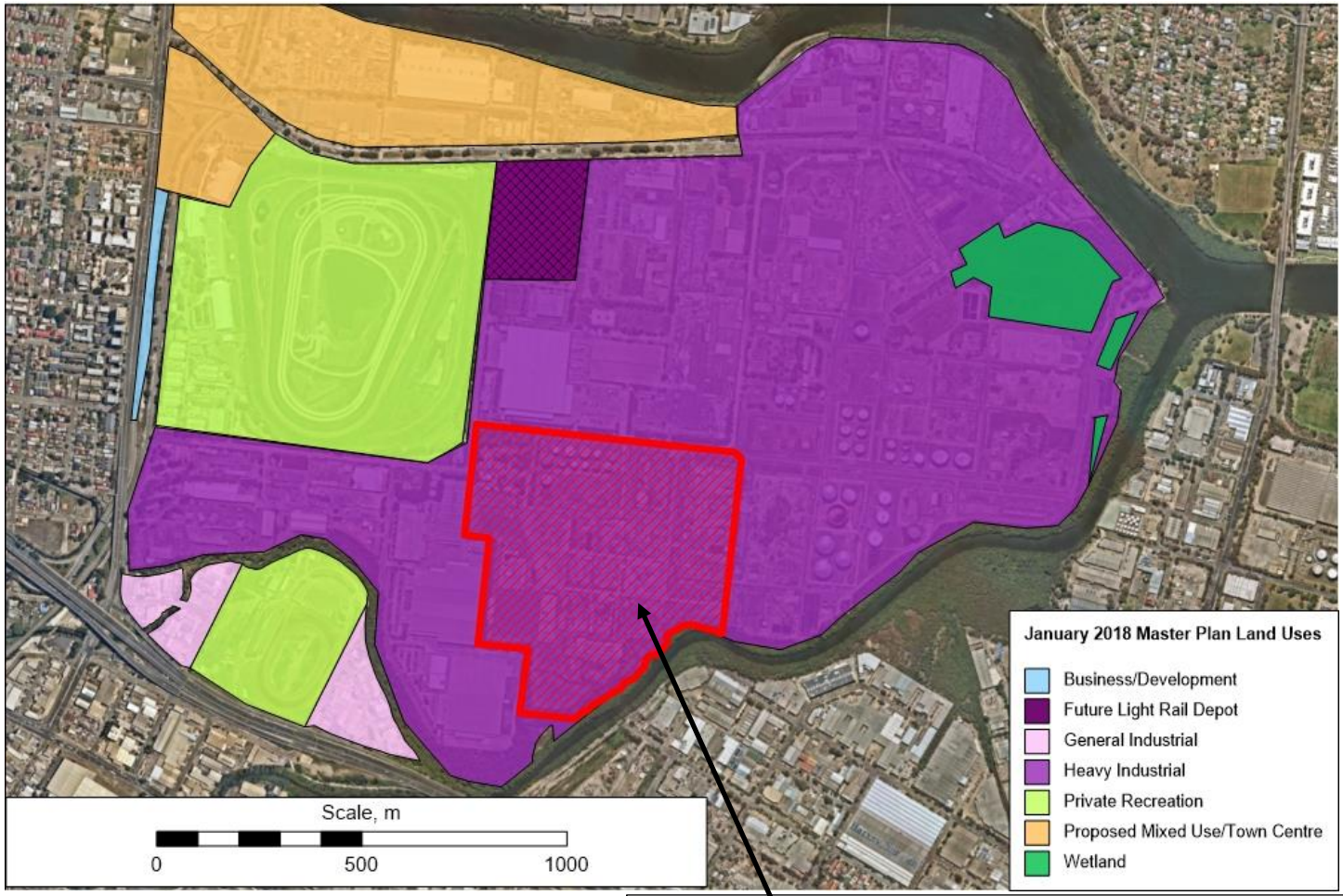
5.4.2. Stage 1 Lot 6 Downer development

Downer estimate that the new facility will have approximately:

- 27 people on site during day time operations over the total site area of 7 hectares i.e. 4 people per hectare
- approximately 16 people on site during night time operations over the total site area of 7 hectares i.e. 2 – 3 people per hectare

Therefore the estimated population associated with the Stage 1 Downer proposal for Lot 6, even allowing for some future increases is well below the Base Case population (29 people per hectare day / 4 people per hectare night) considered for societal risk assessment for the overall SSD area as per Table 5.1.

Figure 5.3: Future land use (as per LUSS / Master Plan)



SSD site remains zoned heavy industrial (IN3) – populations typical of storage and distribution uses assumed.

Table 5.2: Population summary, LUSS / Master Plan, adopted for Clyde Terminal QRA

Zone ID	Zone Description	2018 Master Plan Land use descriptor as per Figure 5.3	Daytime density (people per ha)	Night time density (people per ha) note 2	Remarks
IN2	Light industrial	General industrial	29	4	Typical density
IN3	Heavy industrial	Heavy industrial Future Light Rail Depot	8	2	Societal risk model excludes Clyde Terminal – risk source set to zero population (note 1)
E2	Environmental conservation	Private recreation Wetland	0	0	Minimal population (river edge, mangroves)
-	-	Business / Development	0	0	Not included. Too far away to be affected by Clyde Terminal
-	-	Proposed Mixed Use / Town Centre	0	0	Not included. Too far away to be affected by Clyde Terminal
-	The river	-	0	0	Minimal population (river, mangroves, small area of warehousing) within worst case consequence area so minimal effect on risk
-	Area south of river	-	0	0	

NOTES:

1. Night time density is 14% of daytime density for IN2.
2. No distinction between indoor and outdoor population exposures, ie no mitigation measures accounted for. This should make minimal difference in this case as heat radiation effects which can be mitigated against by being indoors are largely within Terminal boundary. For explosions / areas within LEL envelope no mitigation for being inside.

5.5. Societal risk results

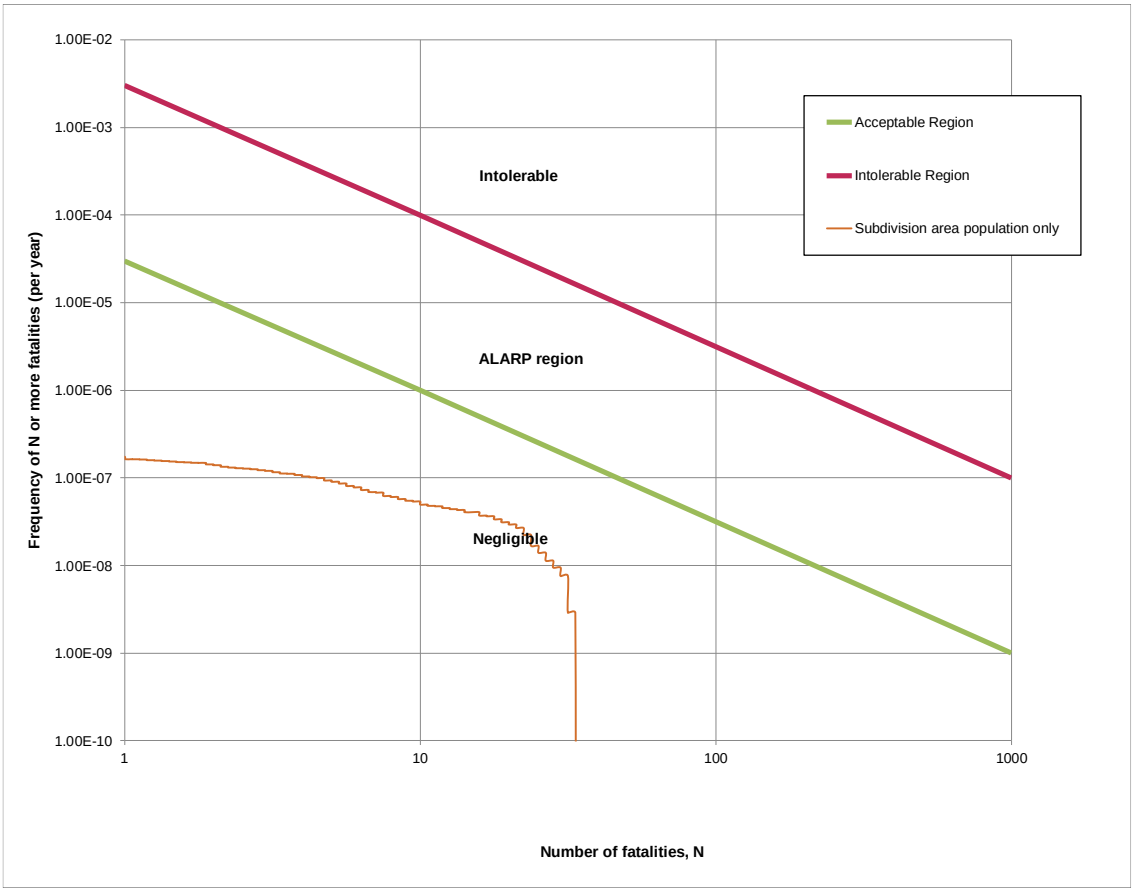
5.5.1. Incremental societal risk

Incremental societal risk reflects the societal risk profile for the new population only (i.e. does not account for cumulative effects with any existing population affected by a risk).

As per requirements of HIPAP 10, the incremental societal risk is compared against the HIPAP societal risk criteria. The incremental societal risk lies within the negligible region as per Figure 5.4 for the Base case: typical warehouse and distribution.

This will increase in the same way as the cumulative societal risk with increasing populations.

Figure 5.4: Incremental societal risk profile ('typical warehouse and distribution' density in SSD area).



5.5.2. Cumulative societal risk

The cumulative societal risk from the Clyde Terminal including the effect of population density change in the proposed subdivision area only (i.e. no change in other areas compared to the LUSS) is shown in Figure 5.5. Populations in all other areas surrounding the Clyde Terminal remain as per the LUSS.

There is a clear increase in societal risk with increasing population density in the SSD area. The increase in risk is very sensitive to the assumed night-time population as can be seen by comparing the Base: 'typical' case with the Sens 4: 'high night' case.

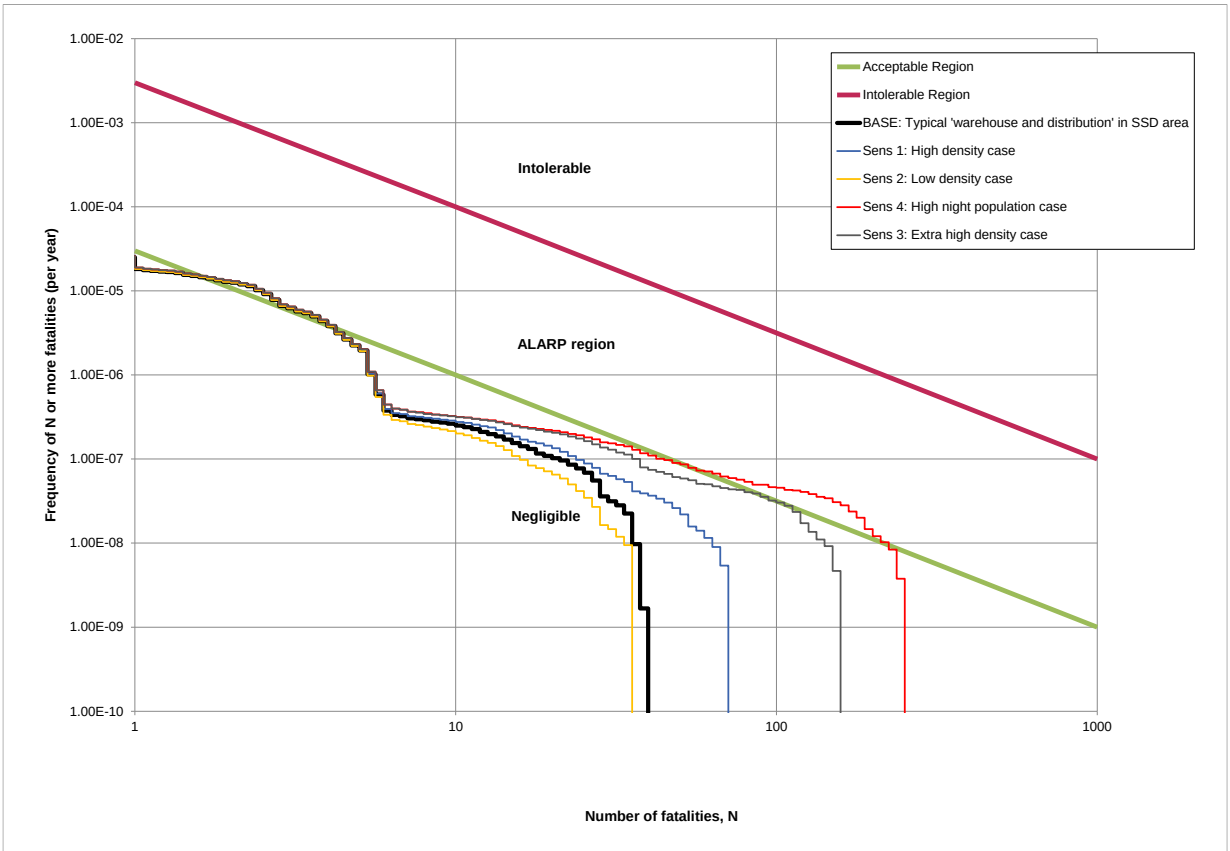
In summary the cumulative societal risk remains in the negligible area except for:

- a very small excursion into the ALARP area at N < 5 which is unaffected by the population in the subdivision area (i.e. the curve dos not change in this region for any of the SSD cases).
- when the night-time population exceeds a density of approximately 18 people per hectare (i.e. Sens 3. 'extra high' case), the curve extends into the ALARP area from N > 80 people.

These results demonstrate that the typical day time densities for IN3 land uses area are acceptable from a societal risk perspective.

A 'high' population sensitivity case doubling the populations (i.e. to 59 people per hectare day time / 8 people per hectare night time) in the whole SSD area including the Downer Lot 6 development demonstrates that cumulative societal risk will still remain in the negligible area. This case also leaves some margin between the position of the societal risk curve and the ALARP region. This means that, even accounting for a much higher population than anticipated for the land uses in the SSD area, there is still some margin for increases in population in other areas outside the SSD to also occur, without the cumulative societal risk encroaching into the ALARP area.

Figure 5.5: Societal risk profiles – effect of population density in subdivided area



5.5.3. Societal risk implications Stage 1 Lot 6 Downer development

The estimated population associated with the Stage 1 Downer proposal for Lot 6 is well below the Base Case day and night time populations considered for societal risk assessment for the overall SSD area as per Table 5.1.

Therefore the Downer Lot 6 proposal is acceptable from both an incremental and cumulative societal risk perspective.

6. CONCLUSIONS

Overall the study indicates that:

- The land use safety planning risks to the SSD proposal on an individual fatality risk basis are compliant with all HIPAP 10 individual risk criteria.
- Societal risk would also remain in the 'negligible' zone', i.e. compliant with HIPAP 10 risk criteria, provided that daytime populations are consistent with typical populations in IN3 land uses, and high night-time populations (i.e. exceeding 18 people / hectare at night) do not occur in the risk affected area shown in Figure 5.1. This area extends over all of Lot 6 and parts of Lots 4 and 5 in the SSD. Populations in other lots on the SSD area do not affect the societal risk.
- Identified land uses that are permitted with consent in IN3 that may be of concern (due to their potentially high night-time population) are pubs, medical centres (if they allow overnight stays) or warehouse and distribution centres with 24 hour operations and large night time populations.

Specifically, the Downer Stage 1 Lot 6 proposal (Sustainable Road Resource Centre) is an industrial land use with estimated population densities for both day and night populations (4 people per hectare day time / 2 – 3 people per hectare night time) well below the base case population densities assessed over the whole SSD area (i.e. 29 people per hectare day time / 4 people per hectare night time). A 'high' population sensitivity case doubling the populations (i.e. to 59 people per hectare day time / 8 people per hectare night time) in the whole SSD area including the Downer Lot 6 development demonstrates that cumulative societal risk will still remain in the negligible area.

It should also be noted that this assessment is restricted only to the specific proposed subdivision (in the context that it remains zoned IN3) including Downer's Stage 1 Lot 6 development. Any future change to other zones (even if still remaining industrial, e.g. to IN2) would require further assessment.

7. REFERENCES

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3. —. *Clyde Terminal Conversion Project Clyde Site Final Hazard Analysis Viva Energy Australia Ltd, .* Rev: 4 Date: 10-10-2018 . Doc No: 20874-RP-002.

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APPENDIX A. PROJECT DESCRIPTION

29 June 2020

PO Box 1563
Warriewood
NSW 2102

ABN 45 162 835 083

Central Sydney Industrial Estate SSD – standard project description for use in independent technical studies

1 PROJECT OVERVIEW

1.1 Existing activities

1.1.1 Viva Energy

State significant development 5147 was approved in 2015 comprising conversion of the former Oil Refinery at Clyde into a finished petroleum product import, storage and distribution terminal.

Works were approved to improve terminal efficiency and to consolidate the operational footprint including demolition and clearing of the old refinery. The Western Area lands were identified as future surplus industrial land for future reuse. The project will be on this land (the site).

State significant development 9302 was lodged in 2018 for the Western Area Remediation Project (WARP). This application has been determined and will result in the remediation and issuance of site audit certification of the site. The activities described in Section 1.2 will progressively occur on remediated areas once they are certified as appropriate for development.

1.1.2 Downer asphalt, reclaimed asphalt pavement and Reconomy operations

Reclaimed asphalt pavement (RAP) is asphalt which is removed from road and other surfaces during maintenance and reconstruction of those surfaces and requires crushing and/or screening to size to allow recycling into new asphalt.

Downer EDI Works Pty Ltd (Downer) operates a facility in Camellia that receives RAP from road construction and maintenance projects and processes these materials by crushing and screening to produce up to 235,000 tonnes per annum (tpa) of recycled road products. A large portion of this processed material is transported to Downer's Unwin Street site (the Rosehill site) for use in manufacturing asphalt.

Downer's lease at the Camellia site is coming to an end and Downer is seeking to more closely integrate RAP processing and asphalt production on a single site along with its other sustainable road product ventures.

The Rosehill site comprises:

- Asphalt plant, workshop and offices (subject to many consents since 1993 and most recently DA/115/2007/A).
- Reconomy facility (DA/1069/2016) – a recycling facility that receives material from the sweeping of Sydney's road network, cleaning of drainage systems and non-destructive excavation for washing and separating. This material is then repurposed for various activities including the manufacture of asphalt. Over 95% of the material is re-used and diverted from its traditional landfill disposal.

The Rosehill site is subject to compulsory acquisition by the NSW Government for use by the Sydney Metro West project. Loss of continuity of operations at the Rosehill site would have adverse consequences for the Government due to the significant compensation which would arise and delays in government road programs due to the loss of more than 25% of the road product manufacturing capacity in Sydney. Transport for New South Wales is working closely with Downer to avoid such disruption, but seeks possession of the site in early 2022.

1.2 Proposed activities

The application proposes:

- The staged subdivision of the western area of Lot 100 DP 1168951 into eight new industrial lots.
- Prepare the lots via earthworks and civil works for future re-development (by future applications).
- Stage 1 (Sustainable Road Resource Centre) – occupy the newly created Lot 6 and construct and operate the following on the lot:
  - RAP processing operations.
  - Asphalt plant.
  - Reconomy facility.
  - A modern bitumen product manufacturing plant.

These project components are described below.

1.3 Subdivision and lot preparation

VE Property Pty Ltd (VEP) proposes the staged development of the Central Sydney Industrial Estate on lands known as the Western Area of the former Oil Refinery at Clyde. Stage 1 of the development will comprise the Sustainable Road Resource Centre, to be operated by Downer, described in the following section.

VE Property proposes the following on the site:

- The staged subdivision of the site into eight lots. Development of the lots for new industrial uses (in accordance with current zoning), which will be subject to future applications.
- Earthworks/filling to bench the lots to form a flat pad in the northern half of the site then gradually grading down to towards Duck River in the southern half of the site.
- Construction of a new public access road running south from an intersection with Devon Street, providing access to those lots that don't front onto Devon Street, in accordance with Parramatta Council specifications.
- Implementation of erosion and sediment controls to manage water quantity and quality over the lots until they are sold and developed, when permanent water management infrastructure will be installed.
- The extension of key municipal services to suit the needs of each of the lots comprising:
  - Potable water – potentially construction of a ring main linking the main under Colquhoun Street to the main under Durham Street (subject to separate approval by Sydney Water).
  - Wastewater (sewer) – extension of the rising main along Devon Street and minor sideline extension of the gravity sewer along Colquhoun Street (subject to separate approval by Sydney Water).
  - Electricity – supply may be required to each lot from the high voltage line along Devon Street (subject to separate approval by Endeavour Energy).
- A 30 m riparian corridor along Duck River.
- Development of Lot 6 (Stage 1) for the land uses described below.

1.4 Stage 1 –Sustainable Road Resources Centre

1.4.1 Overview

The conceptual Stage 1 layout is shown in Figure XX. Stage 1 will be aligned north-south as per the Lot 6 orientation and will comprise the separate facilities described in the following sections.

1.4.2 Site preparation and construction

Site preparation (civil works) will take approximately 30 weeks and will comprise:

- Site establishment – installation of site office, generator and toilet.
- Earthworks/filling - to bench the lot to form two flat pads, one in the northern third of the lot and the other in the southern two thirds of the lot.
- Drainage – stormwater management structures will be constructed.
- Services – water, sewer, electrical, gas and telecommunications services will be installed.
- Footings and slabs – after the ground surface is prepared, footings will be excavated/piled and filled with concrete in areas where structures will require stabilisation, and concrete building pads will be poured.
- Pavement areas of Lot 6 requiring extra stabilisation and strengthening (eg heavily trafficked areas) will be paved with concrete and remaining areas will be paved with asphalt.
- Barriers – aluminium, concrete and/or water filled plastic barriers will be installed in areas where traffic must be separated from pedestrian areas and/or to prevent vehicles crossing lanes/protect structures.
- Line marking and signage – lines will be marked on internal roads and speed limit and other signs will be erected.

The Stage 1 components will be constructed simultaneously and some activities will overlap with the civil works. Construction of the Stage 1 components will typically comprise:

- Construction of concrete foundations including piled foundations for certain plant.
- Construction of frames for sheds.
- Erection and installation of plant.
- Installation of tanks and silos.
- Wall and roof cladding
- Stormwater connection.

1.4.3 Asphalt plant

A fixed Ammann Universal HRT Stationary asphalt plant will be constructed on Lot 6, which will produce up to 550,000 tpa of asphalt and will comprise:

- Cold feed bins to receive aggregate, sand and RAP.
- Conveyors to transport aggregates to a dryer.
- Conveyors to transport RAP to a mixer.
- Hot aggregate storage bins.
- Hot RAP storage bins.
- A mixer for mixing materials in weighted proportions.
- A batch tower with a screen deck for sizing the hot aggregates.
- Weigh hoppers for aggregates, bitumen, lime baghouse fines and RAP weighing.
- Enclosed bucket elevator for elevating the heated aggregates to the top of the batch plant.
- Hot bitumen storage tanks with bitumen pumped from these to the batch plant.
- Lime filler silo to receive lime and pneumatic conveyors to convey lime to the batch plant.
- Fabric filter baghouse for cleaning exhaust gases from the dryer.
- Fan and stack for exhausting the gases from the baghouse.
- Recycled filler silo for storage of baghouse reclaimed fines and pneumatic conveyors to convey recycled filler to the batch plant.
- Control room containing plant switchboard and controls.
- Soap spray station for lining truck trays with an anti-stick film.

The asphalt plant is 41 m high at its tallest point.

The asphalt manufacturing process will comprise drying and mixing aggregates and combining them in specified quantities with heated bitumen and a filler and discharging the resulting 'hot' and 'warm' mix into trucks. Operation of the asphalt plant will comprise:

- Delivery of virgin aggregates and sand from offsite, tipped into an underground hopper and transferred via conveyor for temporary storage in one of 16 vertical silos. Virgin aggregates and sand are then transferred to the cold feeder bins via conveyor. Reclaimed aggregates, sand and glass produced by the on-site Reconomy facility and processed RAP is temporarily stored in above ground storage bays, then transferred to the asphalt plant cold feeder bins by front end loader.
- Imported filler material will be pneumatically pumped into silos from tankers and bitumen will be stored in heated/insulated tanks at approximately 160˚C.
- Aggregates in the cold feeder bins will be metered by belt feeders into the rotary dryer.
- Filler will be pneumatically conveyed and bitumen pumped into a weigh hopper then discharged into a pugmill mixer for mixing with aggregates. Exhaust emissions will be drawn off into a bag house for treatment with recovered fines reused in the asphalt process.
- Asphalt will be transferred to hot asphalt storage bins.
- The inside of the truck bodies are sprayed with bitumen release agent at the spray station (truck spray gantry), then trucks drive below the hot storage bins and are loaded. Pre-mix (cold mix asphalt) can be loaded into trucks as required.

1.4.4 Reclaimed asphalt pavement facility

As Downer's lease at the Camellia site is coming to an end, it is proposing to relocate the RAP operations to Lot 6.

Up to 250,000 tpa of RAP will be cold planed from pavements with specialist equipment and transported in tip trucks (truck and trailers or semi-trailers) to the site. It will then be stored on gravel hard stand areas.

The RAP plant will be inside an approximately 12 m high shed that will be enclosed on the north, west and south sides. The east side will be open so the front-end loader can feed the RAP plant and remove the finished products.

The RAP will be crushed and screened on an as required basis for use in the onsite production of asphalt (as a substitute for aggregates and bitumen) or for export for pavement materials. Up to 90,000 tpa of RAP will be stored on site at any one time on a 10,000 m^2 stockpile area. Stockpiles will be a maximum 10 m high.

1.4.5 Bitumen products plant

A next generation, co-located bitumen emulsion plant is proposed on Lot 6 to produce approximately 15,000 tpa of bitumen products for use in onsite asphalt production and export offsite. This investment would mark a first for Downer to have not only a combined blending facility but also situating the investment on the same site as its asphalt and Reconomy plant.

The bitumen products plant will comprise:

- Maximum 6 m high shed with roller door access on the southern side containing:
  - 150 t emulsifier and emulsion additives store containing up to 150 intermediate bulk containers.
  - 65 kilolitre (kl) kerosene store.
  - 65 kl diesel store.

- Office and toilet.

- An additional 8 m high shed for the overflow storage of emulsifier and emulsion additives.
- Maximum 6 m high toner additive storage shed with roller door access on the southern and western sides.
- Two 80 kl 12 m high (total 160 t) bitumen tanks.
- Four 80 kl 12 m high warm emulsion and seven 60 kl 12 m high cold emulsion tanks (total 740 t).

1.4.6 Reconomy facility

Downer proposes to replicate the Reconomy facility from the Unwin Street site at Lot 6. The facility will process up to 40,000 tpa of road sweepings, gully waste and mud from non-destructive excavation, and will comprise:

- Receipt of incoming material into handling pits adjacent to the resource recovery plant. The handling pits will be impermeable and partially sunk into the ground.
- Material will be separated during the recovery process and temporarily stockpiled adjacent to the recovery plant at the separation points and removed as required. Recovered aggregates will be beneficially reused almost immediately in the adjacent asphalt plant and will require an external storage bay as a collection point prior to transport to the asphalt plant by front end loader.

The Reconomy facility will comprise:

- Conveyors.
- Hoppers.
- Trommel.
- Log washer.
- Clarifier.
- Water tanks.
- Water pumps.
- Centrifuge.
- Screen deck (with vibrator).
- Wash screens (with vibrator).
- Eddy current separator.
- Hydrocyclone and ferromagnetic separator.

The maximum height of fixed equipment will be 8 m and an in-ground pit will be 2 m below ground surface.

Downer intends to beneficially reuse the recovered aggregates and sand (approximately 20,000 tpa) in asphalt production and application to road surfaces. The proposed beneficial reuse of recovered aggregate and sand will reduce the use of virgin aggregate and sand from quarries in NSW. Recovered plastics, toner cartridges, glass and rubber are also likely to be incorporated into the production of asphalt, replacing filler and/or aggregate.

Downer does not propose to reuse the recovered organic material in the production of asphalt. The recovered organic material will be transported to an approved composting facility for beneficial reuse. Recovered metals will be transported to an appropriate metal recycling facility for beneficial reuse.

Any remaining recovered material which cannot be directly reused in the asphalt plant could be transported to recycling facilities near the site.

There will be a water recycling plant to treat water used during the process and a storage tank for future re-circulation of treated water or disposal as trade waste. The water loss factor for the

resource recovery plant is low due to a portion of the incoming waste material being wet or semi-dry.

1.4.7 Ancillary infrastructure, hours of operation and employment

The Sustainable Road Resources Centre will also comprise the following ancillary infrastructure to facilitate the above land uses:

- 33 car parking bays.
- 25 truck parking bays.
- Site offices.
- Laboratory.
- Workshop building.
- Weighbridges.
- Stormwater management infrastructure.
- Services and utilities including an electrical substation.
- Landscaping, fencing and signage.

The Sustainable Road Resources Centre is proposed to operate 24-hours a day, seven days a week, 365 days a year. This reflects the demand for asphalt to be provided at night due to government demands that road works minimize interference with traffic.

Construction and operation of the Sustainable Road Resources Centre will employ the personnel over the shifts summarised in Table 1.

Table 1 Construction and operational personnel

Component	Role	Shift	Personnel
Construction	Civil works	6am-6pm	35
	Asphalt plant	6am-6pm	17
	RAP facility	6am-6pm	14
	Reconomy facility	6am-6pm	13
	Bitumen products plant	6am-6pm	6
Asphalt plant	Laboratory and plant	6am-6pm	10
		6pm-6am	11
RAP facility	Operator	6am-6pm	3
		6pm-6am	2
Bitumen products plant	Operator	6am-6pm	4
Reconomy facility	Manager	7am-5pm	1
	Supervisor	5am-3pm	1
	Operator	7am-7pm	1
		6pm-6am	1
Weighbridge	Operator	6am-2pm	1
		2pm-10pm	1
		10pm-6am	1
Other	Asphalt and RAP facility management staff	8am-5pm	5

APPENDIX B. POPULATION DATA INPUTS

The following data was used to inform the 'typical' warehouse and distribution densities used in the societal risk assessment.

1. 2012 City of Sydney Floor Space and Employment Survey as per below and summarised to develop densities in Table B.1.

The most recent employment data available for the South Sydney area relates to information provided within the City of Sydney Floor Space and Employment Survey, 2012. It notes the following in respect of Work Space Ratio for employment.

	2007			2012		
Space Use Division	Internal Area	Employment	WSR(*) – Density/m2	Internal Area	Employment	WSR (*) - Density/m2
Transport and Logistics	2,007,902	17,413	115.3	1,861,822	16,737	111.2
Storage	1,907,287	4,800	397.4	1,878,604	5,232	359.1

(*) WSR – Work Space Ratio
City of Sydney, Local Government Area Summary Report, 2012, City of Sydney Floor Space and Employment Survey, 2012, Table 10 and 11, Pp 25-26.

A more recent Employment Lands Study for the City of Sydney, carried out in 2013 by SGS Economics and Planning, (albeit considering uses that are closer to the Sydney CBD and are therefore likely to be more intensive) found an employment density in the IN1 General Industrial zoned land in southern Sydney to provide for approximately 75 jobs/hectare or 1 job per 133 m2 of floor space (SGS).

Table B.1: Population density for storage and transport activities

Space Use Division	2012 City of Sydney Floor Space and Employment Survey			
	Internal area (m2)	Employment (people)	Calculated density (people/m2)	Calculated density (people/ha)
Storage	1,878,604	5,232	0.00278505	27.8
Transport and logistics	1,861,822	16,737	0.00898958	89.8

2. 2016 Census around Botany Industrial Park (BIP). This is another area where industrial development is changing from heavier industrial and intensifying around a potentially hazardous facility i.e. moving towards storage and logistics uses, industrial units etc. Note that the maximum density location (41 people / hectare) includes small industrial units and some commercial type uses so is not representative and is well in excess of the densities advised by DPIE for use in the Camellia LUSS.

Transport NSW TZP2016 Employment Projections

TZ	Description	Area (m2)	Employment (2016)	Population (Day time)	Pop Density (people per 2500m2)	Pop Density (people per ha)
400	Orica Australia	1388925	3052	0	0.0	0.0
401	Discovery Cove Industrial Park	1175009	2741	2741	5.8	23.3
402	Caltex Sydney Terminal	803974	781	781	2.4	9.7
406	Botany William St	410737	476	476	2.9	11.6
408	Botany Industrial Area	1724401	2930	2930	4.2	17.0
421	Bonnie Doon Golf Club	941517	187	187	0.5	2.0
422	Pagewood_Wentworth Av and Page St	605693	440	440	1.8	7.3
423	Eastgardens Shopping Centre	300664	3479	0	0.0	0.0
424	South Point Shopping Centre	512840	1041	0	0.0	0.0
425	Matraville Public School	270005	181	181	1.7	6.7
428	Port Botany Business Park_West	347920	917	917	6.6	26.4
429	Military Rd	1275115	2521	2521	4.9	19.8
430	Port Botany_Southern Container Terminal	1180796	1721	1721	3.6	14.6
624	Matraville_Eastern Rd and Beauchamp Rd	527346	187	187	0.9	3.5
625	Matraville	405871	1672	1672	10.3	41.2
627	Matraville_Menin Av and Flinders St	686839	278	278	1.0	4.0
628	Port Botany Business Park_East	454679	293	293	1.6	6.4
629	Matraville High School	1339005	426	426	0.8	3.2
640	South Sydney High School	852112	740	740	2.2	8.7
645	Heffron Park	789884	25	25	0.1	0.3
				16516		
				Max	10.3	41.2
				Min	0.0	0.0