REPORT

IMPACT ON SOCIETAL RISK

PROPOSED DEVELOPMENT 132 WENTWORTH AVE, PAGEWOOD

LEDA HOLDINGS PTY LTD

PREPARED FOR: **Nick Mullins**
Development Manager
Leda Holdings

DOCUMENT NO: **21441-RP-001**
REVISION: **0**
DATE: **29-Apr-2020**

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

DOCUMENT REVISION RECORD

Rev	Date	Description	Prepared	Checked	Approved	Method of issue
A	24-Apr-20	Issued to client for comments	J. Polich	O Alim	G Peach	Email [PDF]
0	30-Apr-20	Final issue	J. Polich	O Alim	G Peach	Email [PDF]

Title: **Report** **Impact on Societal Risk** **Proposed development 132 Wentworth Ave, Pagewood**	**QA verified:** **H de Vries** **Date: 29-Apr-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
ha	Hectare
HIPAP	Hazardous Industry Planning Advisory Paper
QRA	Quantitative Risk Assessment
SEPP	State Environmental Planning Policy

1. INTRODUCTION

1.1. Background

Leda Holdings Pty Ltd (Leda) has submitted a development application (DA 2019/79) for an industrial unit development at 132 Wentworth Ave Pagewood. The development site is in the vicinity of the Botany Industrial Park (BIP). A publicly available Quantitative Risk Assessment (QRA) report prepared by Sherpa Consulting Pty Ltd (Sherpa) presents the individual and societal risk around the BIP. (The report is referred to as 'BIP QRA 2018' Ref.1).

The Department of Planning, Industry and Environment (DPIE) advised that land use safety planning and risk aspects of the proposal were generally addressed for individual fatality, escalation / property damage and injury risk by the *SEPP33 review,* prepared by Pinnacle 31 January 2020 (Ref 2).

However DPIE has advised Leda that a more detailed assessment of the impact of the proposal on societal risk presented in the BIP QRA 2018 report is also required. This can only be undertaken using the BIP QRA software model which is retained by Sherpa on behalf of the BIP. Leda retained Sherpa to undertake the societal risk modelling and provide a supplementary report for submitting to the DPIE.

Consent from the BIP has been obtained by Sherpa to use the BIP QRA 2018 model for assessing the risk impact of population changes associated with industrial developments in the vicinity of the BIP.

1.2. Study objectives and scope

The overall study objective is to determine the effect on the societal risk of the proposed development. The study scope covers:

- the change in population associated with proposed development only. All other populations remain as per the BIP QRA 2018.
- estimation of population density for the development based on land area and parking space numbers provided by Leda.
- a sensitivity study is also provided to examine the impact on societal risk if higher populations occur at the proposed site.

1.3. Exclusions and limitations

This assessment is limited solely to assessing the change in societal risk as a result of the proposal for 132 Wentworth Ave, Pagewood, compared to the societal risk presented in the BIP 2018 QRA report. No other changes or developments (compared to the population data used in the BIP QRA 2018) are accounted for.

The assessment does not contain advice as to the acceptability or otherwise of the proposed development from a risk perspective. The planning authority will use the results in the assessment as an input to making this decision.

2. ASSESSMENT

2.1. Proposed development description

The site is located at 132 Wentworth Ave, Pagewood as shown in Figure 2.1.

The site is approximately 150 m north of the nearest BIP boundary, and approximately 270 m from the nearest process equipment.

The site occupies a total area of 18,540 m^2 with surrounding sites characterised predominantly by industrial developments. The proposed land use remains industrial, i.e. there is no rezoning associated with the proposal. The proposal includes small industrial units and a storage facility, and will have 242 car spaces.

2.2. Population definition for proposed development

The proposed development site is located in an area with an estimated day time population density of approximately 41.5 to 51 people/hectare and a night time population of zero in the BIP QRA 2018. (See 2018 BIP QRA, Appendix 8, Figure A8.1, Ref.1 as reproduced in APPENDIX A).

The potential population density has been assessed as 130.5 people/hectare. This is based on 242 people (i.e. equivalent to number of car spaces) evenly spread over 1.85 hectares. The cases assessed to determine the potential impact on societal risk are summarised in Table 2.2 and cover:

- Case 1 – anticipated maximum population density day time (130.5 people/hectare) with a 20% allowance for night time.
- Case 2 (sensitivity case) – anticipated maximum population density day time (130.5 people/hectare), with a 100% allowance for night time.
- Case 3 (sensitivity case) – maximum population density that will not result in exceedance of HIPAP 10 incremental societal risk criteria. This case has been developed by iteration to approximate a 'limiting' population case for the development site. It is double the anticipated maximum population density Case 1.

2.3. Assessment of risks from the BIP

HIPAP 10 *Land Use Safety Planning* (Ref 3) specifies risk criteria for new development in the vicinity of potentially hazardous facilities (e.g. the BIP) and also provides guidance for application of the criteria. The quantitative risk criteria are the same as those specified in HIPAP 4 *Risk Criteria For Land Use Safety Planning* (Ref 4).

The applicable quantitative fatality risk criteria are summarised in Table 2.1.

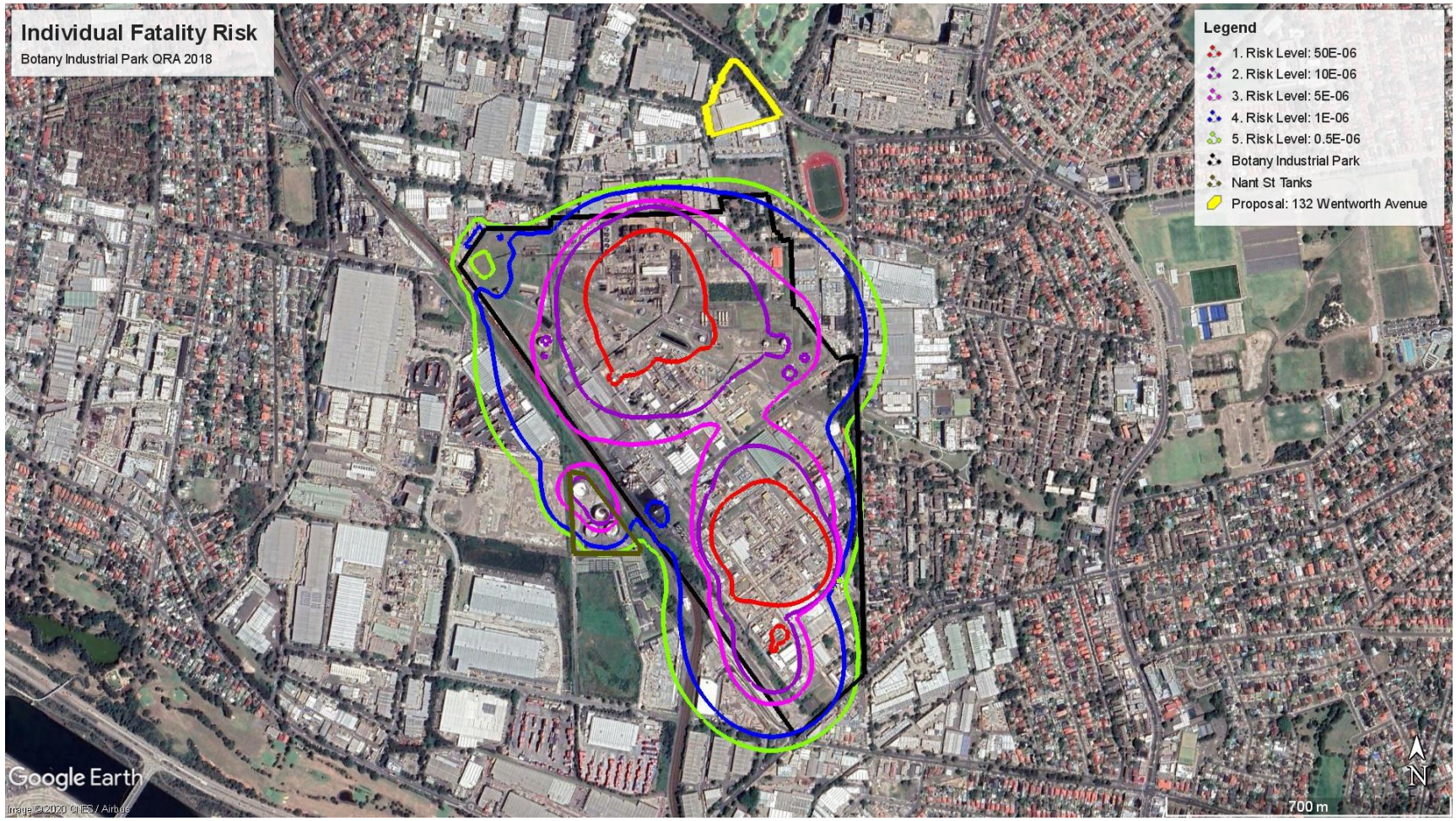
Table 2.1: Applicable HIPAP 10 criteria

Risk type	HIPAP 10 guidance	Assessment
Individual fatality risk	Individual fatality risk levels for industrial sites at levels of 50 in a million per year should, as a target, be contained within the boundaries of the site where applicable	The proposed development does not involve hazardous chemicals and is not a source of risk, and does not affect the overall risk levels in the area, i.e. does not generate a risk contour (Pinnacle Ref 2).
	An industrial development should not be exposed to levels of risk above 50 in a million per year	The proposed development is outside the BIP QRA 2018 individual fatality risk contours. Hence the risk at the proposed industrial development site is below 50 $x10^{-6}$ per year as required by HIPAP 10 for industrial land uses (Pinnacle Ref 2). This is shown in the individual fatality risk contours reproduced in Figure 2.1.
Societal risk	Where a development proposal involves a significant intensification of population in the vicinity of such a facility, the change in societal risk needs to be taken into account even if individual risk criteria are met.	Assessment of societal risk due to proposed intensification of population and comparison against HIPAP 10 societal risk is provided in Section 2.4 to 2.7 of this report. This uses the BIP QRA 2018 model 'Approved Development' case as a basis. It is noted that the societal risk from the BIP as per the BIP QRA 2018 for the 'approved development' case: • is in the 'ALARP' region for N < 1000 • for the 'population case, the maximum number of people 'N' affected already exceeds the HIPAP 'N limit' i.e. the maximum N is limited to 1000. The results graph was extrapolated past the 'N limit' of 1000 to show this.

Table 2.2: Population definition

		Definition			Area (ha)	Number (Total)	
Case ID	**Case Description**	**Density/ha**	**Pop Day**	**Pop Night**		**Pop Day**	**Pop Night**
Case 1	D 242 people N 20% pop (maximum anticipated population)	130.5	100% of day	20% of day	1.85	242	48
Case 2	D 242 people N 100% pop (maximum anticipated population, additional night time)	130.5	100% of day	100% of day	1.85	242	242
Case 3	D 484 people N 100% pop (limiting population case)	261	100% of day	100% of day	1.85	484	484

Figure 2.1: Individual fatality risk contours, BIP QRA 2018



2.4. Societal risk assessment

Societal risk is a measure of the probability of incidents affecting an actual person/population. In accordance with the HIPAP 10 requirement, 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.

HIPAP 10 provides the following evaluation guidance for societal risk:

- 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.

The following assessments of societal risk were undertaken:

- Incremental societal risk from the proposed development (i.e. the proposed development population only).
- Impact on the cumulative societal risk due to the proposed development (i.e. the proposed development population plus populations already included in the BIP 2018 QRA model).

2.5. BIP QRA 2018 societal risk profiles

For the 2018 BIP QRA Figure 9.8, two societal risk profiles were included. These were:

1. *Current Development* – this refers to the societal risk profile assessed for populations on existing developments which were based on the latest 2016 census data (residential) and journey to work data (employment).
2. *Approved Development* – this refers to the societal risk profile assessed for *Current Development* plus conservatively set population estimates for developments that have been approved around the BIP, but were not yet occupied or were likely to have been occupied after the collection data of the 2016 census. These include:
    - BIP subdivision on Denison Street and Corish Circle
    - Bunnings Warehouse on Denison Street (opposite the BIP)
    - Meriton redevelopment of the former British-American Tobacco site adjacent to Westfield Eastgardens.

The approved developments are now occupied or partially occupied so the *Approved Development* societal risk case is used as the basis for assessing the impact of the proposed development.

2.6. Impact on cumulative societal risk

The cumulative societal risk profile was compared against the 2018 BIP QRA Approved Development societal risk profile. The cumulative societal risk comparison is presented in Figure 3.1 (Cases 1 and 2) and Figure 3.2 (Case 3) .

Overall, as summarised in Table 2.3, the assessment demonstrates that the proposed development for the anticipated maximum population density day time / night time (Cases 1 and 2) has little impact on the cumulative societal risk reported in the BIP QRA 2018.

Case 3 has more effect and a small increase in the curve at N > 1000 can also be observed for Case 3.

Table 2.3: Impact on Cumulative societal risk

Case ID	Case Description	Density/ha	Comments
Case 1	D 242ppl N 20% pop	130.5	Very small increase in curve in region of N approximately 100 to 300
Case 2	D 242ppl N 100% pop	130.5	Very small increase in curve in region of N approximately 100 to 300
Case 3	D 484ppl N 100% pop	261	Small increase in curve in region of N approximately 100 to 1000 Small increase in N>1000

2.7. Incremental societal risk from the proposed development

The incremental societal risk reflects the societal risk profile for the proposed development population only.

The incremental societal risk for the highest population, i.e. Case 3 only, is presented in Figure 3.3.This population results in an incremental societal risk that remains just within the negligible region and approaches the ALARP region. Effectively this is the upper limit where development ‘should not be precluded’ on the basis of incremental societal risk as per HIPAP 10.

Developments with lower populations (e.g. Cases 1 and 2 with 130.5 people / hectare as per the proposed maximum anticipated development population), will also remain in the negligible region and should not be precluded on the basis of incremental societal risk.

3. CONCLUSION

Overall the results show:

- The maximum anticipated population for the development proposal (130.5 people / hectare, Cases 1 and 2) does not significantly affect the cumulative societal risk for the Approved Development societal risk case presented in the BIP QRA 2018 as shown in Figure 3.1.
- The incremental societal risk for the development proposal (130.5 people / hectare) remains in the 'negligible' region of the societal risk graph.
- A limiting population case where the incremental risk approaches the ALARP area, and the impact on cumulative societal risk curve becomes more noticeable (including at N >1000) corresponds to approximately doubling the maximum anticipated density (i.e. to 261 people / hectare) as per Figure 3.2 and Figure 3.3.

Figure 3.1: Comparison against BIP QRA 2018 Approved Development case – Cases 1 and 2

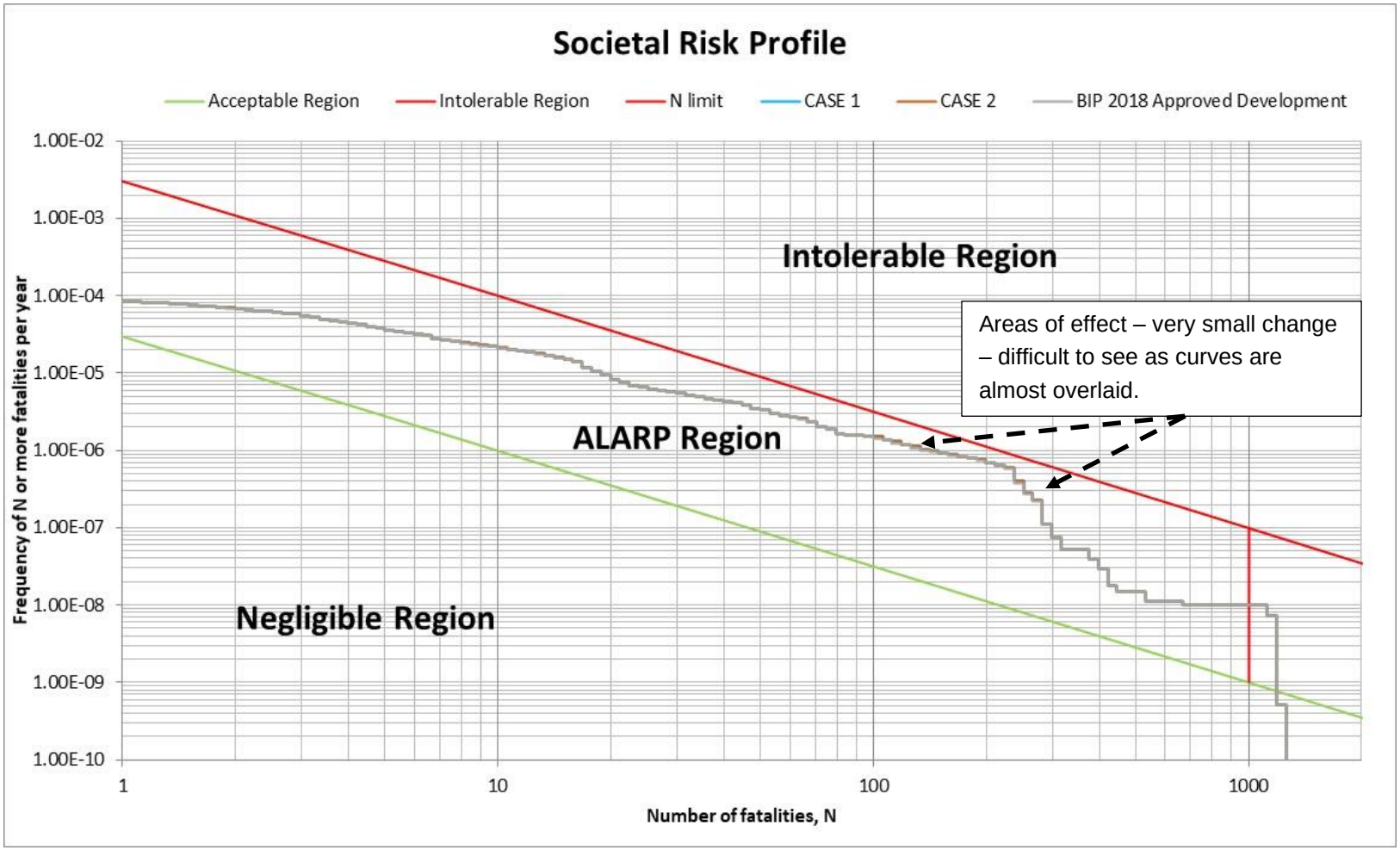


Figure 3.2: Comparison against BIP QRA 2018 Approved Development case – Case 3

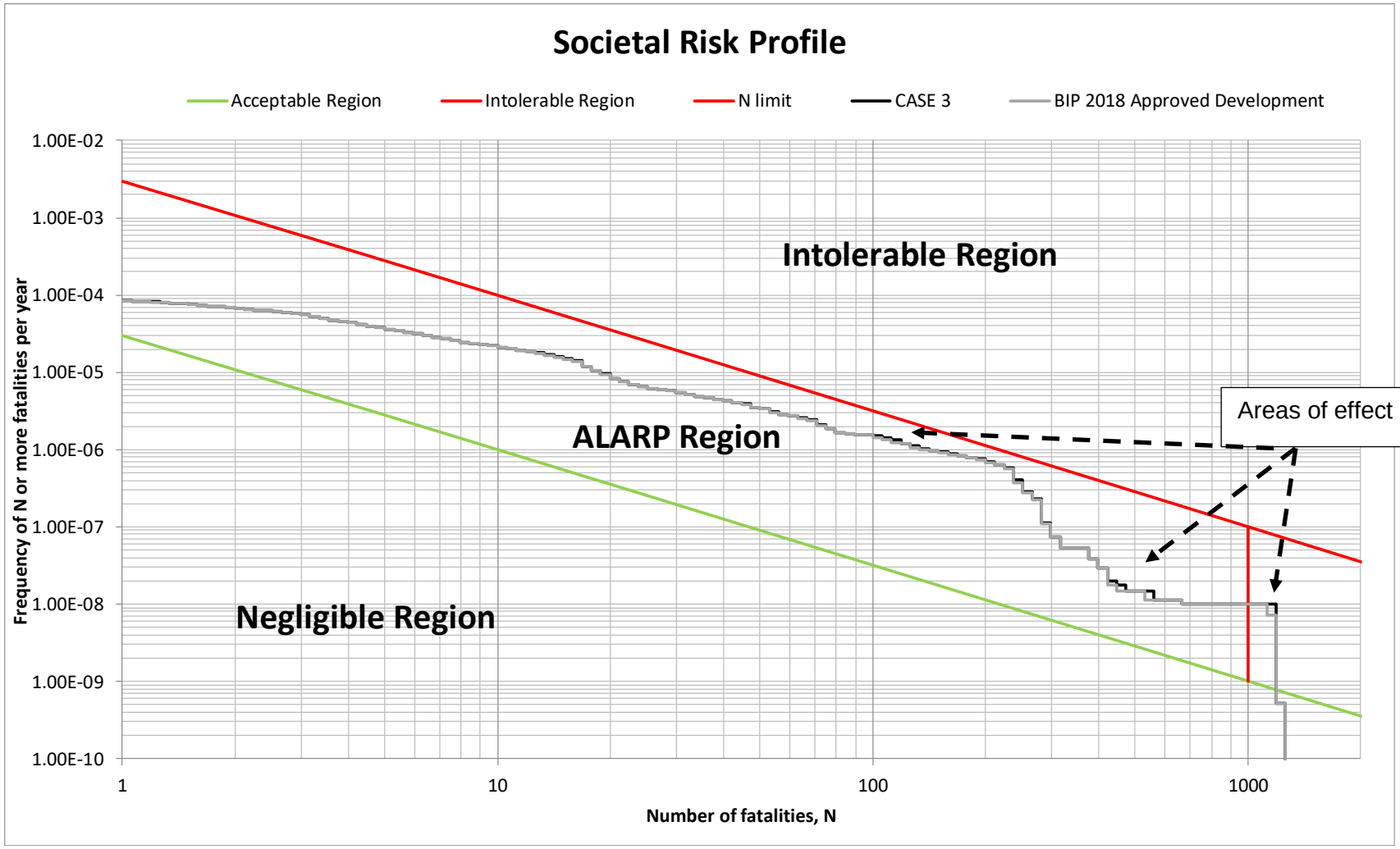
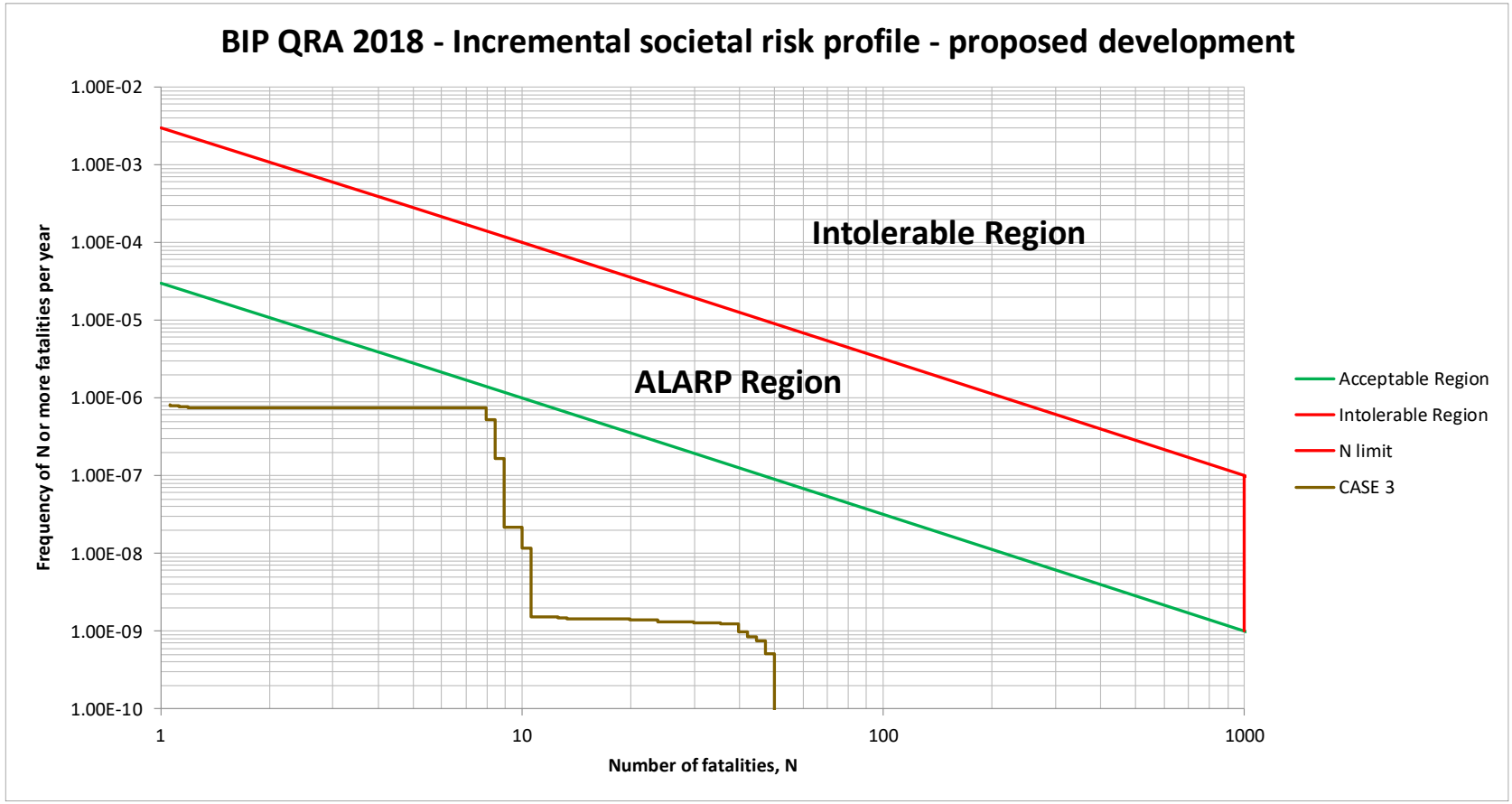
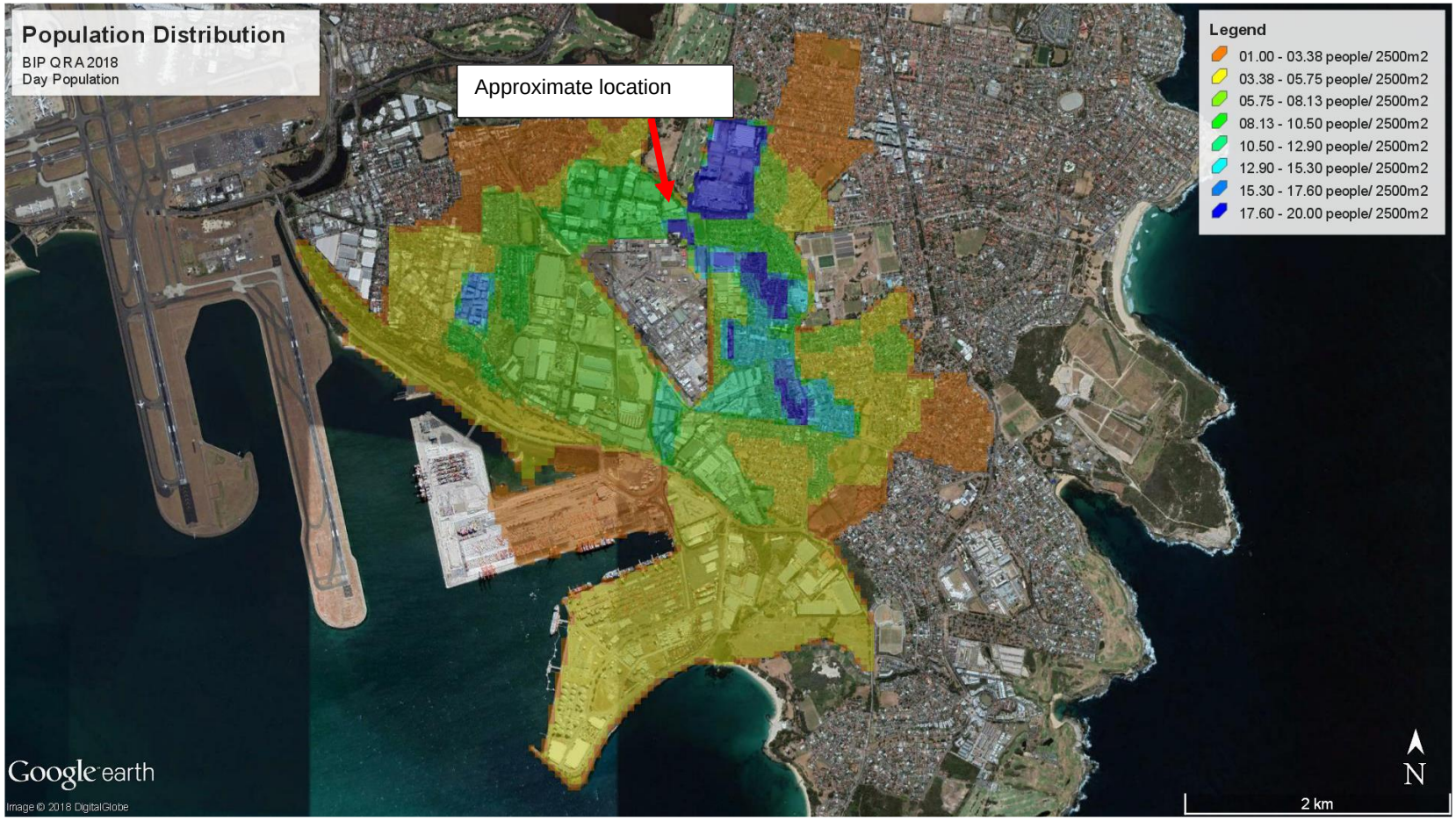


Figure 3.3: Incremental societal risk profile – Proposed development



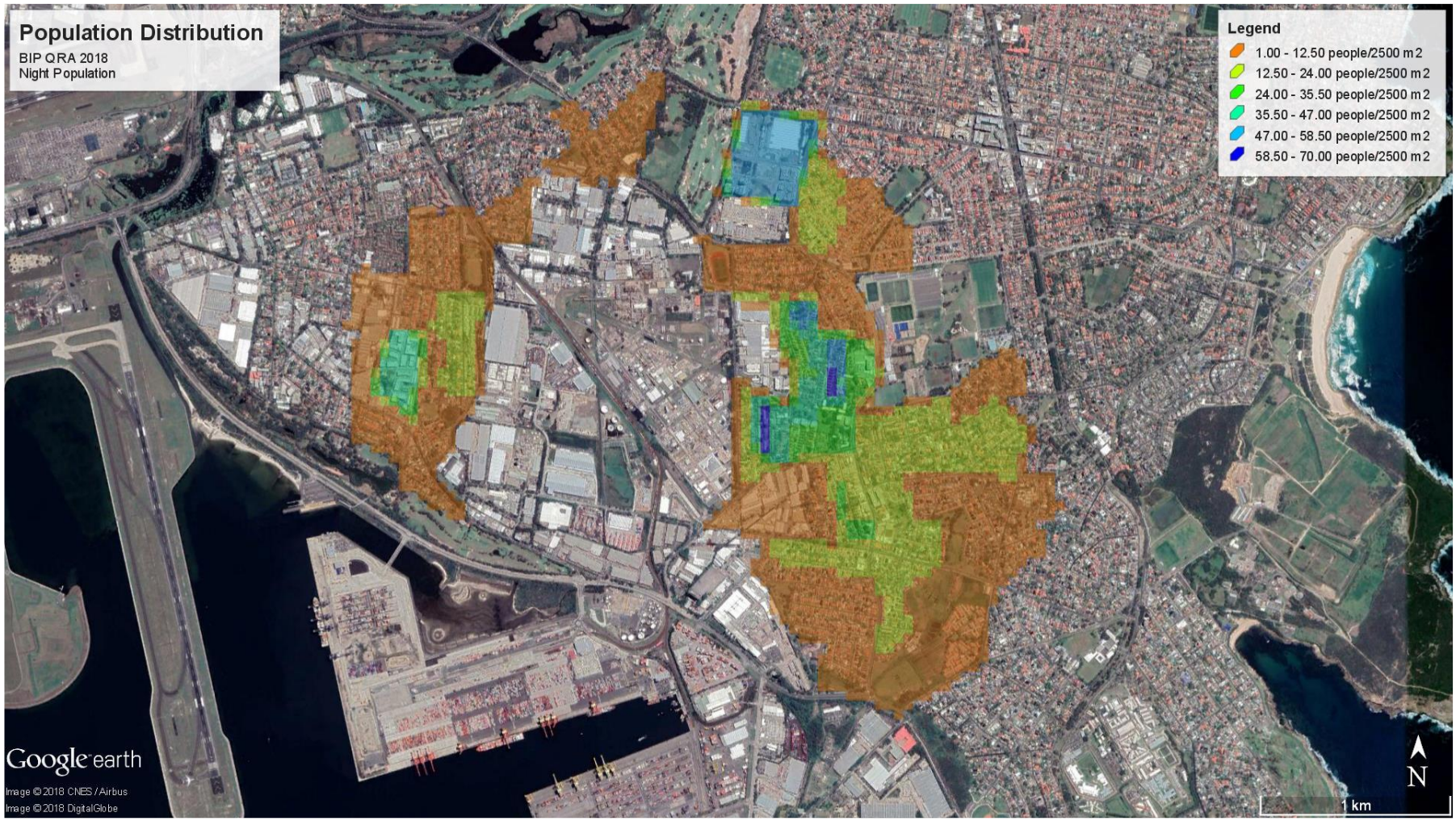
APPENDIX A. POPULATION DENSITY IN BIP QRA 2018

Day time



Note: 10.5 – 12.90 people / 2500 m^2 as per legend equals 41.5 to 51 people / hectare.

Night time


Population Distribution
BIP QRA 2018
Night Population
Legend
1.00 - 12.50 people/2500 m2
12.50 - 24.00 people/2500 m2
24.00 - 35.50 people/2500 m2
35.50 - 47.00 people/2500 m2
47.00 - 58.50 people/2500 m2
58.50 - 70.00 people/2500 m2
Google earth
Image © 2018 CNES / Airbus
Image © 2018 DigitalGlobe
N
1 km

APPENDIX B. REFERENCES

1 Sherpa Consulting Pty Ltd (2018): Botany Industrial Park Quantitative Risk Assessment (QRA) Report, Document Number: 21158-RP-001, Rev 1.

Webpage https://www.planning.nsw.gov.au/-/media/Files/DPE/Reports/quantitative-risk-assessment-2018-botany-industrial-park-report-2020-01-24.pdf?la=en

2 Pinnacle Risk Management *SEPP33 review, DA 2019/79* 31 January 2020

3 NSW Department of Planning and Environment (2011): Hazardous Industry Planning Advisory Paper No 10 – Land Use Safety Planning.

4 NSW Department of Planning and Environment (2011): Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning.