QUANTITATIVE RISK ASSESSMENT

AMERICA’S CUP PROPOSAL

RISK IMPLICATIONS, WYNYARD QUARTER

PANUKU DEVELOPMENT AUCKLAND

PREPARED FOR:  M Twose
                Panuku Development
                Auckland

DOCUMENT NO:  21206-RP-001
REVISION:  0
DATE:  08 Jan 2018
DOCUMENT REVISION RECORD

<table>
<thead>
<tr>
<th>REV</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>PREPARED</th>
<th>CHECKED</th>
<th>APPROVED</th>
<th>METHOD OF ISSUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>22 Dec 2017</td>
<td>Draft for comment</td>
<td>J Polich</td>
<td>-</td>
<td>-</td>
<td>MS Word</td>
</tr>
<tr>
<td>B</td>
<td>05-Jan-2018</td>
<td>Final draft for approval</td>
<td>J Polich</td>
<td>G Peach</td>
<td>G Peach</td>
<td>MS Word</td>
</tr>
<tr>
<td>0</td>
<td>08-Jan-2018</td>
<td>Issued as Final</td>
<td>J Polich</td>
<td>G Peach</td>
<td>G Peach</td>
<td>PDF</td>
</tr>
</tbody>
</table>

RELIANCE NOTICE

This report is issued pursuant to an Agreement between SHERPA CONSULTING PTY LTD ('Sherpa Consulting') and Panuku Development Auckland which agreement sets forth the entire rights, obligations and liabilities of those parties with respect to the content and use of the report.

Reliance by any other party on the contents of the report shall be at its own risk. Sherpa Consulting makes no warranty or representation, expressed or implied, to any other party with respect to the accuracy, completeness, or usefulness of the information contained in this report and assumes no liabilities with respect to any other party’s use of or damages resulting from such use of any information, conclusions or recommendations disclosed in this report.

Title:
Quantitative Risk Assessment
Wynyard Quarter
America’s Cup Proposal
Risk Implications, Wynyard Quarter

QA Verified:
G Chan
Date: 08-Jan-2018
CONTENTS

1 INTRODUCTION .................................................................................................................. 4
  1.1 Background .................................................................................................................. 4
  1.2 Study Requirement ..................................................................................................... 5
  1.3 Scope and Methodology .............................................................................................. 5
  1.4 Exclusions and Limitations ....................................................................................... 5

2 AMERICA’S CUP DEVELOPMENT OPTION .................................................................. 7
  2.1 Wynyard Basin proposal ............................................................................................. 7
  2.2 Ferry and Fishing Industry Relocation Facility (FFIRF) .............................................. 8

3 RISK REVIEW .................................................................................................................. 9
  3.1 Review of QRA Basis .................................................................................................. 9
  3.2 Risk Affected Area .................................................................................................... 11

4 RISK REVIEW ................................................................................................................ 13
  4.1 Review against individual risk criteria ........................................................................ 13
  4.2 Societal Risk ............................................................................................................. 15
  4.3 Requirement for risk reduction .................................................................................. 20
  4.4 Recommendations .................................................................................................... 20

TABLES

Table 4.1: PROPOSED LAND USES, HIPAP 4 RISK ACCEPTABILITY 16
Table 4.2: Revised Populations 18

FIGURES

Figure 2.1: Wynyard Basin ................................................................................................. 7
Figure 2.2: Ferry and fishing industry relocation facility (FFIRF) ....................................... 8
Figure 3.1: Bulk Liquids Terminals Individual Fatality Risk Contours ................................. 11
Figure 3.2: Sanford Individual Fatality Risk Contours ......................................................... 12
Figure 3.3: Cumulative Toxic Injury Risk Contours .............................................................. 12
Figure 4.1: Fatality Risk Contours in relation to Wynyard basin ........................................ 13
Figure 4.2: Societal Risk .................................................................................................. 19
1 INTRODUCTION

1.1 Background

Sherpa Consulting Pty Ltd (Sherpa) was retained by Sea+City Projects Ltd (now Panuku Development Auckland as the successor council organisation and landowner of Wynyard Point) in 2010 to provide independent risk consultancy services for the Sea+City development in the Wynyard Quarter, Auckland, New Zealand.

The QRA included three bulk liquids tank terminal sites in the Wynyard Quarter (operated by Stolthaven (formerly Marstel) Terminals Ltd, BST and Shell) as well as the Sanford fish processing facility. The main output of the initial project was a Quantitative Risk Assessment (QRA) covering the existing industries in the area. (Final Quantitative Risk Assessment Summary Report Risk Profile June 2010 doc ref 20359-QRA-006 Rev 0 29 July 2010).

An addendum for the QRA was also prepared in 2011 covering Stolthaven’s acquisition of the Shell site lease and relocation of Stolthaven’s toxic products to the former Shell site (Quantitative Risk Assessment Wynyard Quarter Addendum December 2010 Risk Profile Incorporating Marstel Relocation to Former Shell Site doc ref 20359-QRA-009 Rev 0 11 Aug 2011).

The relocation project gave greater separation distances from hazardous industry to the Sea+City development future population, hence reducing the risk profile. The 2011 QRA addendum included a land use planning guidance table to assist the planning authorities with determining whether future development proposals that may arise would be compatible with the residual risk levels from the facilities. Broadly the guidance stated:

As risk levels are concentrated around the bulk liquids terminals north of Jellicoe St, no residential or sensitive development should occur north of Jellicoe St. As individual fatality risk criteria are set with regard to lower population densities, it is also recommended that populations be minimised, hence development should be restricted to low density non-hazardous commercial or industrial uses in this area. Emergency planning provisions should also be in place.

A review of large events was also carried out (Quantitative Risk Assessment, Wynyard Quarter, Major Events, Societal Risk Implications doc ref 20515-001 Rev 0 30 Aug 2011) and various recommendations were made to restrict public access to Wynyard Point in areas north of Jellicoe St for large events in Silo Park or North Wharf.

Sherpa has been advised that the existing planning regime applying to the Wynyard precinct generally identifies sensitive activities located north of Jellicoe Street (including large scale events) as a non-complying activity. Marine and port related activities are generally provided for on land and within the coastal environment north of Jellicoe Street. These include activities such as boat building and maintenance.
To address risk, part of the overall focus of the planning provisions is to require that “new activities, buildings and works to be designed, located, and managed to avoid unacceptable levels of risk”.

1.2 Study requirement
Auckland will be hosting the 36th America’s Cup (AC36) in 2021 and propose to use part of the Wynyard Quarter precinct area north of Jellicoe Street for this purpose, and also for the purpose of relocating some existing marine, fishing and vehicle ferry activities.

Some aspects of the proposal may not fit the description of minimising population and restricting development to low density populations. Panuku Development Auckland (Panuku) has retained Sherpa to review the risk implications of the proposed America’s Cup development in the Wynyard Quarter area and provide a report for use in the assessment process.

1.3 Scope and methodology
The scope of Sherpa’s risk review included:

- High level review of the 2011 Addendum QRA basis and assumptions to confirm whether any significant changes have occurred and whether the risk profile from the 2011 Addendum can be still regarded as representative of the bulk liquids facilities risk levels. This was carried out with input from the bulk liquids facilities operators.

- Confirmation of areas outside which population changes will have no significant effect on the societal risk profile. This is based on the $1 \times 10^{-9}$ per year individual fatality risk contour from the 2011 Addendum QRA. This contour (which is well below the values normally used for land use planning individual fatality risk contours) is selected as the frequency ($f$) is below the relevant societal risk acceptability criteria at the high number of people ($N$) portion of the societal risk ($fN$) acceptability curve.

- Review of the America’s Cup proposal locations against relevant individual risk criteria.

- Preliminary assessment of the change in societal risk associated with the proposal.

1.4 Exclusions and limitations
The scope of Sherpa’s review of risk implications has been limited by Panuku to the Wynyard Basin proposal as this is Auckland Council’s preferred option for the provision

---

1 Auckland Unitary Plan, Wynyard Precinct: Policy 26
of AC36 bases and infrastructure. Assessment or comparison of risk levels for alternative options is not within the scope of the review.

The likely significance of any identified changes to the facility operations is noted in Section 3 of this report.

No updates have been made to the base QRA model, ie the assessment is based on the 2011 QRA model. The only changes that have been made are to populations to assess the effect of the proposal on societal risk.

Also note that the assumption is that the bulk liquids facilities continue normal operations for the period of the America’s Cup which is 2019 to 2021 (although Stolthaven will be decommissioning their facility from mid-2021 to end-2022, and BST by 2025 prior to the expiry of their respective leases in 2022 and 2025).
2 AMERICA’S CUP DEVELOPMENT OPTION

2.1 Wynyard Basin proposal

Panuku developed a number of options for the America’s Cup. In December 2017, Auckland Council selected Wynyard Basin (shown in Figure 2.1) as their preferred option. This involves:

- Construction of 3 single boat bases (Bases 6, 7 and 8) along the southern part of Wynyard Wharf across Brigham St from the bulk liquids facilities. The bases are on top of some of the import pipelines supplying the bulk liquids terminals from the wharf. These bases will accommodate approximately 60 – 100 staff, will not accommodate events and will not be accessible to the general public.

- Construction of all larger double boat bases at Halsey Wharf. These will accommodate approximately 100 – 150 staff, will host events (approximately 300 guests) and will be partly accessible to the general public.

- Superyacht mooring in sheltered waterspace behind new breakwaters between Wynyard Wharf and Halsey Wharf.

- Relocation of the existing Sealink ferry and seaplane base at the south end of Wynyard Wharf will be required to accommodate the Wynyard Basin proposal.

**FIGURE 2.1: WYNYARD BASIN**
2.2 Ferry and Fishing Industry Relocation Facility (FFIRF)

To accommodate the Wynyard Basin development, the Sealink facilities as well as some fishing boats from Halsey Wharf are proposed to be relocated to a new facility in the area shown in Figure 2.2.

FIGURE 2.2: FERRY AND FISHING INDUSTRY RELOCATION FACILITY (FFIRF)

NOTE: locations approximate only
3 RISK REVIEW

3.1 Review of QRA Basis

The overall review of the QRA basis did not identify anything indicating that the 2011 QRA results are no longer applicable. This was confirmed by BST and Stolthaven as set out below following a meeting on 14 December 2017. Specific review areas are discussed below. Therefore the 2011 QRA is an adequate basis for assessing the risk implications of the America’s Cup proposal.

3.1.1 BST operations

BST operations remain largely as per the 2011 QRA. The only change is that nitric acid is no longer stored and has been replaced by caustic soda. This will reduce the toxic risk contribution from the BST site compared to the results shown in the 2011 QRA as caustic soda is corrosive and has no potential to generate toxic vapours. However nitric acid may return as a product so no changes are required to be made to the QRA model.

3.1.2 Stolthaven operations

Stolthaven operations remain largely as per the 2011 QRA. Stolthaven Hamer St terminal handles flammables and low toxicity materials, and the Stolthaven Wynyard terminal at the northern end of Wynyard handles toxic flammable monomers as well as other flammables and combustibles.

3.1.3 Pipelines

The import pipelines run along Brigham St or under the wharf to the terminals. The Wynyard Basin proposal locates three bases on the southern part of Wynyard Wharf and these will require a combination of pipeline relocation or building on top of the lines (which may increase risk of impact damage and corrosion potential and reduce access for inspection).

In Sherpa’s view building over the lines introduces an increased risk of compromising the mechanical integrity of the pipelines during the construction period of the bases or operation of the lines with the bases above them. That is, the proposal increases the likelihood of a pipeline failure and leak / potential fire compared to the current arrangement.

Relocation of at least some of the lines (most likely to the western side of Brigham Street to avoid the need to build over them and also maintain access) to avoid building over them has the potential to reduce the risk.

The pipeline risk may change depending on the option selected. This effect has not been quantified in the QRA model.
3.1.4 Dangerous goods transport risk

Overall traffic effects will be assessed as part of the environmental assessment process.

The 2010 QRA specific Dangerous Goods (DG) transport risks in the Wynyard area and concluded that risks associated with DG transport would not have a significant effect on the overall risk profile of the area. Diesel (combustible low hazard material) truck movements have increased since 2010 however throughputs of higher hazard DGs and associated DG truck movements have remained similar to the previous QRA.

In addition, crash records for roads adjacent to the developments site have been obtained from the NZ Transport Agency Crash Analysis System (CAS). The records for the five-year period from January 2012 to December 2016 inclusive have been extracted. These comprise only crashes reported on CAS – those which have had police involvement. The crash history is summarised as follows:

- Full length of Hamer Street and Brigham Street, including their intersections with Jellicoe Street
  - 7 crashes – 5 non injury, 2 minor injury
  - 2 crashes at intersection of Jellicoe / Brigham / Daldy Street due to car failing to give way from Daldy Street
  - 1 pedestrian hit by bus (running heedless of traffic).
- Jellicoe Street / Halsey Street intersection, including Karanga Plaza and Viaduct Events Centre area
  - Crash (non-injury); car hit rear-end of another car slowing for pedestrian.
- Eastern Viaduct, including intersection with Quay / Hobson St
  - A total of 13 crashes – 12 non-injury, 1 minor injury
  - 11 of the 13 located at Quay / Hobson Street intersection; noting that there have been recent improvements (in last 12 months) to pedestrian crossing facilities here
  - 2 located on Eastern Viaduct – both related to driver error and not involving pedestrians.

Overall, given the low number of crashes and the low severity of the crashes over the five year period, DG transport risk is not considered for the America’s Cup proposal.
3.2 Risk affected area

3.2.1 Bulk liquids terminals
Populations in areas outside the cumulative bulk terminals $1 \times 10^{-9}$ per year individual fatality risk contour will not significantly affect the societal risk in the area as this frequency ($f$) is below the acceptability range for societal risk ($fN$) curves for all sizes of population ($N$). The 2011 contours are shown in Figure 3.1.

This means that the developments proposed for Halsey Wharf will have no significant risk implications and only other aspects of the proposal are reviewed.

**FIGURE 3.1: BULK LIQUIDS TERMINALS INDIVIDUAL FATALITY RISK CONTOURS**
(Figure reproduced from QRA 2011 Addendum report, doc ref 20359-QRA-009)

3.2.2 Sanford
The Sanford individual fatality risk contours and cumulative toxic injury risk contours are shown in Figure 3.2 and Figure 3.3. There are no proposed changes to infrastructure in the immediate vicinity of Sanford relating to the Wynyard Basin proposal so fatality risk from Sanford is not reviewed.
FIGURE 3.2: SANFORD INDIVIDUAL FATALITY RISK CONTOURS
(Figure reproduced from QRA 2011 Addendum report, doc ref 20359-QRA-009)

FIGURE 3.3: CUMULATIVE TOXIC INJURY RISK CONTOURS
(Figure reproduced from QRA 2011 Addendum report, doc ref 20359-QRA-009)
4 RISK REVIEW

4.1 Review against individual risk criteria

The Wynyard Basin proposal is shown with the fatality risk contours overlaid in Figure 4.1, in overview and also as a zoomed view.

FIGURE 4.1: FATALITY RISK CONTOURS IN RELATION TO WYNYARD BASIN

Note: the configuration of the bases and marine infrastructure is still subject to change so the overlaid image in Figure 4.1 is slightly different to the version shown in Figure 2.1. This does not affect the risk review.
Table 4.1 tabulates the proposed land uses (Sealink – new location at the FFIRF site, Wynyard Basin Bases) against the relevant HIPAP 4 individual risk criteria. This includes assessment against individual fatality risk (different applicable to different land uses) and toxic injury risk (single criterion applicable only to residential and sensitive land uses).

Note that:

- The proposed America’s Cup bases have been classified as ‘commercial’ type land uses for assessment against the risk criteria on the basis of their relatively high population (compared to industrial populations) and buildings required (rather than recreational / open space), although it is noted that Bases 6, 7 and 8 will accommodate less staff than the larger bases on Halsey Wharf and will not include function spaces. Sherpa has been advised that the existing planning framework also permits marine and port activities within the coastal space (including Wynyard wharf, Halsey Street Extension Wharf and Western Viaduct Wharf) where the bases are proposed to be located.

- Superyachts are regarded as residential as people can stay on them overnight.

- Sealink is commercial (as per previous 2011 assessment).

In summary:

- Risk at the Halsey St facilities is very low and risk in this area is not a significant decision making factor.

- The new location for the Sealink operations complies with relevant HIPAP 4 risk criteria.

- The superyachts along the Jellicoe St / North wharf are located well outside the 1x10^{-6} per year risk contour (applicable residential criterion), however the berths along North Wharf are slightly inside the toxic injury contour from Sanford. Other superyacht berths are outside the toxic injury contour. This is not dissimilar to other land uses around Sanford, with the only difference being that there may be some overnight population on the yachts. It should be noted that being indoors also provides a level of protection against toxic gas exposures. Mitigation measures already in place include ammonia alarms along the North Wharf restaurant area integrated with the fire alarms that directly alert emergency services and defined evacuation procedures for the area (Emergency Evacuation Plan Wynyard Quarter Auckland by Holmes Fire Safety, 25 May 2011 Rev B).

- Risk levels at proposed base 6 (building and outside area) and part of base 7 (outside area) are well above (higher than) the acceptable fatality risk target of 5x10^{-6} per year for commercial uses and will therefore require mitigation (see Section 4.3 Requirement for risk reduction and Section 4.4 Recommendations).
The risk is due to fire events on the Stolthaven Hamer St and BST sites and to a lesser extent pipeline leak and fire risks.

4.2 Societal risk

4.2.1 Populations assumed

Operations:
The QRA included low density industrial populations for areas within the Wynyard Wharf and a specific population for Sealink in its current location. Table 4.2 shows the assumptions made in relation to increased populations for the Wynyard Basin proposal.

All other populations for other areas within the Wynyard Quarter are assumed to remain the same as reported in the original QRA.

Construction:

Note that preliminary estimates of construction population suggests a peak population of 130 over all construction sites (including Halsey Wharf which is outside the risk affected area). This is far lower than the operational populations and will not coincide. Therefore societal risk for the construction period is not explicitly modelled.

4.2.2 Revised societal risk results

The revised societal risk results are shown in Figure 4.2.

Sealink Relocation to FFIRF site:

- The relocation site on Hamer Street results in a slightly higher risk than the current case, largely because the staff (who are present a higher proportion of time than passengers) will be exposed to a higher risk than in their current location. The total societal risk is still well below the intolerable level.

America's Cup Bases Wynyard Basin proposal:

- The societal risk has increased well into the ALARP region (as low as reasonably practicable) with the addition of bases 6, 7, and 8. This is largely due to the area of the bases 6 and 7 within the $50 \times 10^{-6}$ per year risk contour from the sites in the southern area of Wynyard Wharf. Note that these results do not account for any mitigation due to risk reduction measures such as a fire rated building design which would reduce the exposure.

Potential risk reduction is discussed in the Section 4.3.
### TABLE 4.1: PROPOSED LAND USES, HIPAP 4 RISK ACCEPTABILITY

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Location</th>
<th>Land Use Classification (as per HIPAP 4 criteria)</th>
<th>Applicable Risk Criteria Fatality (per year)</th>
<th>Criteria met?</th>
<th>Applicable Risk Criteria Toxic Injury <em>(Note 1, 2) (per year)</em></th>
<th>Criteria met?</th>
<th>Comments and suggested risk reduction measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXISTING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Sea Link Ferry Terminal | Current | Commercial | 5x10⁻⁶ | Yes | - | - | Fairly close to Stolthaven and BST sites. Emergency planning required. Not recommended to increase populations (for example by provision of public walkways, promenades, cafes etc).
| **WYNYARD BASIN PROPOSAL** | | | | | | | |
| Sea Link Ferry Terminal relocation | Option 1 (adjacent to Stolthaven Wynyard Terminal) | Commercial | 5x10⁻⁶ | Yes | - | - | Risk level is around 2x10⁻⁶ per year on land side, less on wharf. As per 2011 recommendation above. Specifically need to consider egress / evacuation from wharf structure if incident occurs at Stolthaven as there is only one egress route.
<p>| Superyachts | Between Wynyard Wharf and Halsey Wharf | Residential | 1x10⁻⁶ | Yes | 10x10⁻⁶ | No | Risk level is around 2x10⁻⁹ per year. Toxic injury contours from Sanford (See Figure 3.3) extends slightly into southern area of superyacht mooring along Jellicoe St / North Wharf |</p>
<table>
<thead>
<tr>
<th>Proposal</th>
<th>Location</th>
<th>Land Use Classification (as per HIPAP 4 criteria)</th>
<th>Applicable Risk Criteria Fatality (per year)</th>
<th>Criteria met?</th>
<th>Applicable Risk Criteria Toxic Injury (Note 1, 2) (per year)</th>
<th>Criteria met?</th>
<th>Comments and suggested risk reduction measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base 6</td>
<td>Southern end of Wynyard Wharf</td>
<td>Commercial</td>
<td>5x10^-6</td>
<td>No</td>
<td>-</td>
<td>-</td>
<td>Risk level exceeds 50 x10^-6 per year over almost half the built area. Building also above pipelines. Major risk contributor is fire scenarios – would need building design (floor, wall and roof) to withstand external fire and also provide egress.</td>
</tr>
<tr>
<td>Base 7</td>
<td>Southern end of Wynyard Wharf</td>
<td>Commercial</td>
<td>5x10^-6</td>
<td>No</td>
<td>-</td>
<td>-</td>
<td>Risk level 50 x10^-6 per year over a small part of the open area. Building also above pipelines. Major risk contributor is fire scenarios – would need building design (floor, wall and roof) to withstand external fire and also provide egress.</td>
</tr>
<tr>
<td>Base 8</td>
<td>Southern end of Wynyard Wharf</td>
<td>Commercial</td>
<td>5x10^-6</td>
<td>Yes</td>
<td>-</td>
<td>-</td>
<td>Risk level approx. 2 x10^-8 per year Building also above pipelines</td>
</tr>
</tbody>
</table>

Notes:
1. Injury risk criteria apply only to residential or sensitive land uses as per HIPAP4.
2. '-' means not applicable to land use
### TABLE 4.2: REVISED POPULATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Area</th>
<th>Hours per day</th>
<th>no of days per year</th>
<th>Prob of presence (annual)</th>
<th>N (Number of people)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sealink</td>
<td>Sealink - passengers + staff</td>
<td>2</td>
<td>312</td>
<td>0.071</td>
<td>70</td>
<td>This is from 2011 Sherpa report. Location is changed.</td>
</tr>
<tr>
<td></td>
<td>Sealink – staff relocated fishing boats to Sealink</td>
<td>8</td>
<td>312</td>
<td>0.285</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>365</td>
<td>0.333</td>
<td>10</td>
<td>This is from 2011 Sherpa report. New population – moved from Halsey Wharf estimated.</td>
</tr>
<tr>
<td>Superyachts</td>
<td>Smaller superyachts southern area along Jellico St / North Wharf</td>
<td>24</td>
<td>182.5</td>
<td>0.500</td>
<td>42</td>
<td>From Oct to April - 6 months 28-45m LOA, 6 people per boat, 7 berths.</td>
</tr>
<tr>
<td></td>
<td>Larger superyachts eastern area along Halsey Wharf</td>
<td>24</td>
<td>182.5</td>
<td>0.500</td>
<td>165</td>
<td>From Oct to April - 6 months 45-65m LOA, average 15 people per boat, 11 berths.</td>
</tr>
<tr>
<td>Bases - Wynyard Basin proposal</td>
<td>Base 6 - Day time</td>
<td>12</td>
<td>365</td>
<td>0.500</td>
<td>100</td>
<td>Meeting, Beca and Panuku 14 Dec 2017. 100 people per base during day including crew, staff, miscellaneous. No public, retail or entertainment. Assume 10% present at night.</td>
</tr>
<tr>
<td></td>
<td>Base 7 - Day time</td>
<td>12</td>
<td>365</td>
<td>0.500</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Base 8 - Day time</td>
<td>12</td>
<td>365</td>
<td>0.500</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Base 6 - Night time</td>
<td>12</td>
<td>365</td>
<td>0.500</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Base 7 - Night time</td>
<td>12</td>
<td>365</td>
<td>0.500</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Base 8 - Night time</td>
<td>12</td>
<td>365</td>
<td>0.500</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 4.2: SOCIETAL RISK

Societal Risk - Effect of Americas Cup Proposals Wynyard Wharf

- Acceptable
- Intolerable
- Stolt Relocation - 2011 QRA Addendum
- Sealink Relocation
- Americas Cup Option 3.4e Wynyard Basin

Cumulative Frequency per year

Number of People (N)

Document: 21206-RP-001
Revision: 0
Revision Date: 08 Jan 2018
Document ID: 21206-RP-001 Rev 0
4.3 Requirement for risk reduction

Whilst the risk does not increase to intolerable levels, the results suggest that there is a noticeable increase, and that risk reduction should be investigated to demonstrate that the risk has been reduced as low as reasonably practicable (ALARP).

There are a range of measures that could be applied. Some examples are listed below in risk reduction hierarchy order starting from elimination which is always the preferred option. The choice of measure will obviously depend on the cost / benefit assessment to determine whether the measures are practicable or not.

- Shut down the Stolthaven / BST operations in the southern part of the Wynyard area earlier than the end of lease, i.e. the facilities are no longer operational when the America’s Cup is occurring. (i.e. eliminate the highest risk). There would still be some (low) residual risk from the Stolthaven Wynyard Terminal on the north part of the point. This would result in the lowest risk so would be preferred over other options if found to be practicable by the stakeholders.

- Increase the separation distance between the facilities and the bases to similar distance as the existing Sealink building. (i.e. eliminate the exposure). It is noted that Sherpa has been advised that this option is not practicable for the required base configuration so this is not discussed further.

- Design the bases to withstand an external fire (mitigate the consequence). The risk to people can be mitigated to the acceptable range provided the building (floor, roof and walls) is designed to provide fire resistance to an external hydrocarbon fire at the terminals or from the pipelines to at least provide sufficient time to allow personnel to be evacuated without injury.

- Egress and evacuation provisions would also need to be carefully considered and established to provide an alternative route to Brigham St, for example down the wharf side of the bases.

Whilst the major risk is fire, the location can also be affected by toxic releases (which sets the extent of the 1x10^-9 per year risk contour) which should also be considered for egress / evacuation planning. All options will still require consideration of egress and evacuation of people, and also access by the emergency services. For this reason, these bases should be primarily used to accommodate staff who can be briefed and trained in egress / evacuation processes. Functions or other activities encouraging public access should not be held in this area.

4.4 Recommendations

Assuming that the terminal operations continue over the period of the Americas Cup event, the following recommendations are made to reduce the risk to people in the Wynyard Wharf bases to an acceptable level:
1. Bases 6, 7 and 8 are designed and assessed by a suitably qualified engineer to provide fire resistance to an external hydrocarbon fire. The minimum design to be adopted should ensure that there is sufficient time for an alarm and evacuation to occur without structural compromise or ignition of the building occurring. (Note that this is a minimum design intent and may not protect the asset to a degree sufficient for its continued use after the event and a higher standard may be adopted as required by Panuku).

2. Egress shall be provided and emergency response procedures defined and implemented to allow safe evacuation of the bases in the event of a fire or toxic release from the terminals, pipelines or Dangerous Goods area of Wynyard wharf.

3. The Emergency Evacuation Plan as required in recommendation 2 be implemented prior to the bases being occupied and all team members accommodated within the bases should be inducted and be familiar with the Emergency Evacuation Plan. The cumulative societal risk results are based on very low densities of people present in the Bulk Liquid Terminals Area north of Silo Park so there should be no significant increases in populations in the Bulk Liquid Terminals Area north of Silo Park beyond the staff occupying Bases 6, 7 and 8. Any increases in population due to events (for example, event attendees sightseeing or parking in the vicinity of the bulk terminals sites (north of Jellicoe Street) will result in a significant increase in societal risk. Therefore the following recommendations consistent with previous assessment of large events in the area are also made:

4. The total in each base is restricted to a maximum of 100 people per base.

5. There are no public events held within the bases.

6. No public access is permitted along Wynyard Wharf.

7. The Americas Cup event and public parking is limited to the land area south of the BST site.

8. Adequate access for emergency service vehicles is maintained to the area north of Jellicoe Street.

It is noted that minimising people in the vicinity of the bulk liquid terminals will also facilitate emergency planning and evacuation. The recommendations are therefore consistent with the guidance in the Emergency Evacuation Plan: Jellicoe Street, Silo Park & Gateway Plaza, Wynyard Quarter Auckland (by Holmes Fire Safety, 25 May 2011 Rev B) to control access and restrict traffic. Sherpa understands that Panuku Development Auckland will review this plan in light of the proposal and continue to implement these recommendations for events and the Emergency Evacuation Plan. In addition:

9. The review of the Emergency Evacuation Plan Jellicoe Street, Silo Park & Gateway Plaza Wynyard Quarter Auckland should ensure that the egress / evacuation
arrangements for superyachts in the vicinity of Sanford and potentially affected by an ammonia leak are included.