Department of Environment, Land, Water and Planning

Fishermans Bend Buffer Assessment

October 2016

Executive summary

Introduction

The State Government of Victoria has identified Fishermans Bend as a key urban renewal area for Melbourne. GHD was engaged by the Department of Environment, Land, Water and Planning (DELWP) to prepare the Buffer Assessment for Fishermans Bend to account for existing uses and proposed future development of the area.

The focus of the assessment is to provide a detalied understanding of exisitng environmental constraints and their potential impact on the introduction of 'sensitive[1]' land uses and to identify the suite of possible mitigation meaures to manage the risk to disamentity such that future sensitive development is possible. The focus has been on managing the risks and constraints associated with development to protect both new sensitive uses that may be affected due to odour, dust, noise or lighting and the viability of the emitting industries.

This assessment focuses on five distinct precincts within the project border: Lorimer, Montague, Wirraway, Sandridge and Employment.

Desktop Review Process

Mixed Use will be a key principle in the development of Fishermans Bend, however the actual mix will manifest differently in the various precincts. The establishment of compatible land uses and/or accommodating industrial uses in contemporary cities is an increasingly significant issue in the development of cities presenting a two-fold challenge:

- A risk to future newly developed sensitive uses being subjected to unacceptable amenity impacts, and
- The encroachment of sensitive uses into the buffer areas of existing industries which may result in unachievable or unreasonable requirements on the industries to mitigate the impacts at the source (reverse amenity).

Through desktop assessment and fieldwork, GHD has identified the existing industries within, and in close proximity to Fishermans Bend, which may have a detrimental amenity impact outside the premises' boundaries. For this reason, GHD has undertaken specific desktop assessments for odour, dust, noise and lighting as outlined below:

Odour and Dust

- Identified and mapped EPA recommended default buffers for industries with potential odour and dust emitting sources
- Analysed the most recent odour and dust complaint history and meteorological conditions for 'poor dispersion' conditions for odour and dust
- Conducted a directional buffer assessment to take account of the local meteorology to vary the default buffers

Noise

- Undertaken a review of the relevant noise and vibration guidelines and standards potentially applicable to the site

[1] A sensitive land use can be defined as any dwelling; caretakers house; library; educational institution; religious facility; childcare centre; kindergarten; hospital; surgery or other medical institution including an institutional home; informal outdoor recreation sites, commercial and/or retail activity (such as any, hotel, motel, caravan park or tourist establishment).

- Undertaken a review of potential environmental noise impacts from identified sources and provided general advice on potential noise mitigation measures

Lighting

- Reviewed the potential effects of external lighting on the Fishermans Bend area, as well as from Fishermans Bend area onto neighbours.

Key Industries (Figure 1 and Figure 2)

Fishermans Bend area contains at least 800 small to medium businesses in the wholesale trade, business services, manufacturing, retail trade, transport, postal and storage, construction, information media and telecommunications and administration services.

There are also a number of transport associated activities in the area, such as freeways, local roads, ports, docks, trams, helipads and rail freight facilities.

The industries that may have the potential to constrain development due to odour, dust, noise or lighting sources are shown in the Figure 1 and 2 below (refer to section 3.2 in the main report for further details).

Figure 1: Key industries within Fishermans Bend

Figure 2: Key industries surrounding Fishermans Bend

Key Buffer Assessment Findings

Note that the buffers are for upset[2] operational conditions only; routine emissions must meet EPA SEPP (Air Quality Management) guidelines and have no impact offsite.

Odour Constraints (Figure 3):

- Port Phillip Resource Recovery Centre
- Colonial Brewery
- Kraft Foods
- Herald and Weekly Times
- Sugar Australia
- Albright and Wilson

Figure 3: Odour Constraints

Dust Constraints (Figure 4):

- Pronto Concrete Batching Plant
- Hanson Concrete Batching Plant
- Piave concrete batching plant,
- Delta Group Transfer Station
- Cement Australia
- Steel Cement
- Independent Cement
- Boral plasterboard
- Sugar Australia
- Albright and Wilson

Figure 4: Dust Constraints

[2] Upset conditions refer to unintended emissions which do not occur under routine operations. Upsets may occur due to extreme weather conditions, mechanical breakdowns/malfunctions or operational failures.

Noise - Industrial (Figure 5)

- Concrete batching plants
- DSTO,
- Port Phillip Resource Recovery
- Port Phillip Depot Citywide Recycling Facility
- Port Melbourne Metals
- Kraft Foods
- Melbourne Shooting Complex
- Melbourne International Karting Complex
- Port Phillip Resource Recovery Centre
- Various factories, warehouses and container services facilities and logistics related activities, such as trucks, forklifts, cranes, metal clanging and stockpiling

Figure 5: Noise Sources

Noise - Transportation (Figure 5)

- West Gate Freeway
- CityLink Tollway
- Local roads - Plummer Street, Salmon Street, Williamstown Road and Montague Street
- Existing light rail corridors within the Montague precinct
- Helicopter noise due to the operation of the Helipad at Pier 35 Marina
- Webb Dock

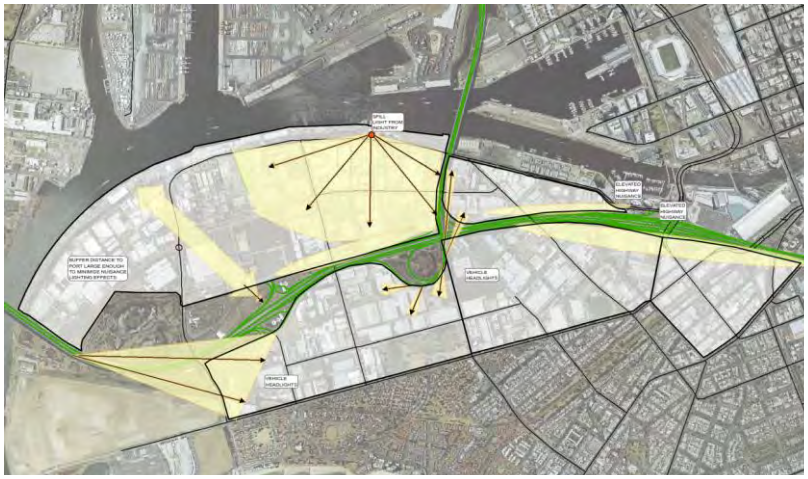
Noise - Future (Figure 5)

- Proposed future sources, such as café/restaurants/clubs with nighttime activities and the proposed light rail within Fishermans Bend.

Lighting Sources:

- The port (wharves and parking zones)
- Shipping activities
- Traffic on elevated roadways and bridges
- Local traffic
- Local adjacent operations such as Independent Cement and the cityscape.

Figure 6: Lighting Sources



Combined Constraints

- Figure 7 identifies the constrained areas and the suitable land uses for each precinct, as the worst case scenario prior to the application of any strategies from the Mitigation Toolbox
- The Mitigation Toolbox outlines the suite of mitigation strategies available to assist in the development of Fishermans Bend using a top down approach
- The application of one or more of these mitigation strategies may assist in the development of additional sensitive uses within the identified buffers

This is the worst case scenario prior to the application of any mitigation strategies / further investigations.
This map should be read in conjunction with TOOLBOX 1 Mitigation Strategies.
Implementation of one or more of these strategies has the potential to reduce or eliminate the buffer.

Constrained Land:
Can be developed for non - sensitive uses such as industrial, commercial, business. Application of TOOLBOX 1, may unconstrain portions of this land.

TOOLBOX 1
Mitigation Strategies
> Planning
> Transition / Relocation
> Further Investigation
> Development Design
> Transmission Controls
> Controls at Source
> Policy
> Local Law

Unconstrained Land:
Available for sensitive uses such as residential, education, childcare, health and recreation.

Paper Size A3

0 75 150 300 450 600
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Freeway
- Land Encompassed by 1 Industry Buffer
- Land Encompassed by 2 Industry Buffers
- Land Encompassed by 3 Industry Buffers
- Land Encompassed by 4 Industry Buffers

DELWP

Fisherrmans Bend Buffer Report - Update

Job Number	31-34061
Revision	B
Date	19 Oct 2016

Overall Directional Buffer Constraints

Figure 7

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Data Source: Imagery, NearMap, extracted 23/04/2016, Image Date 05/02/2015 and VicMap, DELWP (2016).

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Mitigation Toolbox

The Mitigation Toolbox (Toolbox 1) outlines the suite of mitigation strategies available to assist in the development of Fishermans Bend. Each mitigation strategy is described below.

Toolbox 1 – Suite of Mitigation Strategies
Planning
Transition / Relocation of Industry
Further Investigation
Development Design
Transmission Controls
Controls at Source
Policy
Local Law

Planning

- **Contact key industries to establish their future plans**

Once industry's future plans are known, the transition provisions in the EPA separation distance guideline can be used to sequence any proposed sensitive land use development within the existing buffer. Alternately, if expansion by the industry is proposed, the buffer may need to be extended.

- **Contact key industries to understand site operations**

Contact those key industries that have confirmed they will not be transitioning out of the area, to fully understand the nature of their emission sources, onsite operations and past complaint history.

An understanding of the onsite operations may allow a case to be developed for reductions to the default buffer for some of the above constraining industries.

- **Staged development / implementation plan**

Develop a staged development/implementation plan for the development of Fishermans Bend to the extent possible, as the area is predominately in private ownership.

- **Agent of change**

The 'agent of change' principle could be introduced into planning schemes which include industries, to ensure that the onus is on the encroaching sensitive use to provide a basis for adopting reduced buffers.

- **Development controls**

This could include a staged development approach, buffer overlays (interim protection while industries still exist), and commercial uses within buffers.

Transition / relocation of industry (vary separation distances)

The EPA separation guidelines recommend separation distances can be varied (i.e. reduced) for site specific cases. One of the criteria for varying the separation distances is the case of "transitioning of the industry". This may include relocation incentives for industry and acquisition by Government of problem sites.

Further investigations

Detail further investigations, as part of Next Steps in particular, show the level of detail required by councils to inform development planning decisions. Note, this buffer assessment report is for master planning purposes only.

Development design requirements

To assist with the transition, design requirements can be applied, such as height controls near stacks, lighting/baffling, design buildings without open balconies, etc.

Transmission controls

Transmission controls include noise barriers and involve reducing the noise along its path from source to receiver.

Controls at the source

Controls at the source may involve intervention strategies to reduce the odour/noise produced by industry and/or plant. This may include incentives to relocate or mitigate emissions.

The control of odours/dust at source can also be achieved through EPA actions such Pollution Abatement Notices (PANs) and Penalty Infringement Notices (PINs) and strict adherence to the limits set out in Australian Standard 4282.

Policy

- **Implementation of directional separation distances**

In the case of an existing industrial use, the directional separation distances could be established in the planning scheme. This can be done by means of an overlay (Environment Significance Overlay - ESO) or specific planning framework.

Local law

Potential mitigation measures in a capital city context (local law) would include:

- Managing the hours of operation of the offending activity
- Fines for emitting excessive noise
- Withholding liquor licences
- Slowing traffic and constructing sound barriers near major thoroughfares
- Construction management plans, including air and noise management
- Promote cycling and public transport options to reduce car use
- Prompt waste management collections
- Dust management plans
- Install motion sensitive lighting i.e. turn off lighting when not required
- Ensure light sources are covered and light faces down
- Install low watt lighting

Constraints and Potential Opportunities for Precincts

Montague (Figure 8)

Montague is the only precinct without any identified constraints, allowing this precinct to be developed first if a staged approach is used to develop Fishermans Bend. Sensitive and non-sensitive uses would be acceptable throughout the precinct, including residential and office activity, along with open space near the corner of Buckhurst and Ferrars Streets, connected to a series of public spaces and the Buckhurst Street green spine.

Figure 8: Montague Constraints

Lorimer (Figure 9)

The two concrete batching plants within the Lorimer precinct constrain a significant portion within its centre.

A linear open space which extends from the river, through the centre of the Lorimer precinct and beyond to the Employment precinct, may be partially constrained, while sensitive high-density living outside of the buffers would be unconstrained.

Over time, mitigation measures could be applied to the two concrete batching plants. The possible mitigation measures applicable would be; 1) Planning - contact industries to establish their future plans and, contact industries to understand site operations, and 2) Transition of industry / relocation.

Figure 9: Lorimer Constraints

Sandridge (Figure 10)

The aim for the Sandridge precinct is to become a premium office and commercial location, balanced with housing and retail. Given the amount of current sequestered land within the precinct, focus will need to be on the non-sensitive uses while industries are still operational. Once industries begin to transition out of the precinct, further opportunities for residential housing and non-residential sensitive uses will be created.

The relevant mitigation measures for all shaded areas which would enable sensitive development overtime may include; 1) Planning - contact industries to establish their future plans, contact industries to understand site operations, 2) Transition of industry / relocation, 3) Further investigations and 4) Staged development/ implementation plan.

Figure 10: Sandridge Constraints

Wirraway (Figure 11)

More than half of the Wirraway Precinct is constrained, due to the presence of Albright and Wilson and the northern portion due to Kraft. The eastern portion is unconstrained and is ready for development into a mixed use precinct with sensitive uses. JL Murphy Reserve is a major green space, which is also unconstrained.

Further investigation and refinement of the buffers for Albright and Wilson and Kraft, may release land for development into mixed use in the western portion of the precinct. This may also include the use of mitigation measures 1) Planning - contact industry to establish their future plans, contact industry to understand site operations, 2) Transition of industry / relocation, 3) Further investigations and 4) Staged development/ implementation plan.

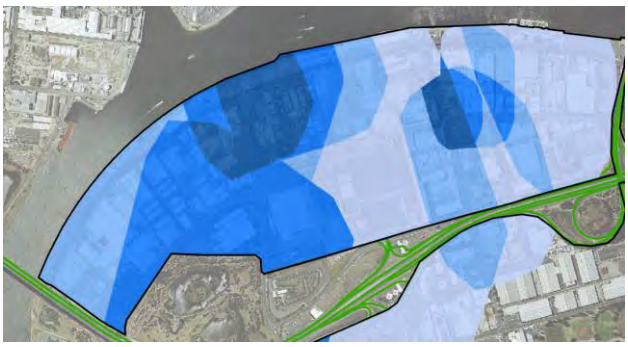
Figure 11: Wirraway Constraints

Employment Precinct (Figure 12)

The entire Employment Precinct is currently constrained by overlapping buffers. Should the existing industrial activities be retained going forward within the precinct, while also hosting compatible land uses in closer proximity than previous to enable the city to grow in a sustainable way, the focus will be on managing the risks associated with development to protect both new sensitive uses that may be affected due to odour, dust, noise or lighting and the viability of the emitting industries.

The relevant mitigation options for all shaded areas which may enable sensitive development overtime may include, 1) Planning - contact industries to establish their future plans, contact industries to understand site operations, 2) Transition of industry / relocation, 3) Further investigations and 4) Staged development/ implementation plan.

Figure 12: Employment Constraints



Recommended Next Steps

The transitioning of Fishermans Bend will be a gradual process occurring over a number of years which is consistent with other large urban renewal projects around the world.

The findings and identified mitigation measures from this investigation have been used as the basis for recommending next steps for the transition (staging) of development within Fishermans Bend, refer to Figure 13 for the details of the recommended next steps.

Figure 16 shows a proposed process for assessing the development of a sensitive land use in Fishermans Bend.

Recommended Next Steps

Consult with Affected Industries

Vary Separation Distances

Conduct Further Investigations

Develop Staged Implementation Plan

Develop Design and Development Controls

Introduce Planning Policy

Figure 13: Details of Recommended Next Steps

Planning:

Consult with Affected Industries

Understanding the nature of the following industries plans going forward may have the potential for a buffer reduction.

- Albright and Wilson
- Sugar Australia
- Colonial Brewery
- Holden
- HWT
- Delta
- PPRRC
- Kraft
- Independent Cement
- Boral
- Pronto
- Hanson
- Piave
- Steel Cement
- Cement Australia
- Port Melbourne Metals
- GrainCo
- Sandford Fishmarket

An understanding of the site operations for the following industries may result in buffer reductions for some of the constraining industries.

- Albright and Wilson
- Sugar Australia
- Colonial Brewery
- HWT
- Delta
- PPRRC

Transition / Relocation of Industry

Vary Separation Distances

The EPA separation guidelines recommend separation distances can be varied (i.e. reduced) for site specific cases. One of the criterions for varying the separation distances is the case of “transitioning of the industry”.

Fishermans Bend is planned to transition from industrial to mixed use and thus buffers may be reduced with agreement of the industries and EPA, as they will be transitioning out of the area over a specified time frame.

Further Investigations

Conduct Further Investigations

As this assessment is for master planning purposes detailed further investigations would be required to assist Council when making decisions on development applications. Key actions for DELWP Victoria/Victorian Government are listed below from most critical to least critical:

Odour/Dust Impact Assessments

Conduct odour/dust impact assessments for those constraining industries under routine operations, and/ or a site specific buffer assessment.

Where appropriate, some buffers identified in this assessment have the possibility of a reduction due to lesser throughputs or emissions compared with larger facilities.

Assessment of South East Sewer Mining Plant

Once the design parameters of the South East Sewer mining plant have been finalised along with the location, an assessment should be conducted to develop the appropriate buffer required.

Detailed Noise and Vibration Survey

Undertake a detailed noise and vibration survey within and surrounding Fishermans Bend, to characterise the baseline noise and vibration environment, as well as identify potential high risk areas and establish noise and vibration criteria based on applicable standards.

Following the baseline study, further assessment of potential high risk operations/industries could be conducted to identify cost-effective mitigation measures and possible recommendations for ensuring compliance and amenity preservation.

Safety Separation Distance Assessments

Further safety separation distance assessments could be sought from WorkSafe for all identified Major Hazard Facility (MHF) sites nearby Fishermans Bend to confirm that Fishermans Bend will be outside of the outer planning advisory areas of the identified MHFs.

Lighting Plan

Develop a lighting plan for Fishermans Bend to integrate the lighting to be installed in public, street and private developments.

Planning

Develop Staged Implementation Plan

- The planning authority should consult with potentially affected industries in order to develop a staged implementation plan that allows for the smooth transition of land uses over a period of time.
- Planning policy may be introduced into the Melbourne and Port Philip Planning Scheme to support this approach and put the onus on ensuring appropriate separation rests with the encroaching sensitive land use.

Development Design

Develop Design and Development Controls

Development controls:

- a staged development approach
- buffer overlays (interim protection while industries still exist)
- acquisition of problem sites by government to aid transition
- incentives to relocate or mitigate emissions
- commercial uses within buffers

Design controls:

- height controls near stacks,
- lighting/baffling,
- numerous noise protection measures
- other measures identified in each of the desktop reviews

Policy

Introduce Planning Policy

- The use of zoning mechanisms (i.e. industrial zones or the Special Use Zones (SUZ)) to identify noxious industrial activities in the Planning Scheme and alert new residents to potential amenity issues
- Locating commercial and business (i.e. non sensitive) uses within close proximity to industry
- Implementation of directional separation distances in the planning scheme via an Environment Significance Overlay (ESO) – refer to Figure 14 on how to develop and implement and ESO
  - The ESO can provide a statutory buffer with associated conditions to limit the establishment of sensitive land uses
  - Without an ESO or other legislation, the default buffers remain recommendations only and cannot be enforced
  - This may lead to future land use conflicts, such as planning permits granted for residential land uses adjacent to a potential constraining industry, resulting in adverse amenity – refer to Figure 15 for an example case study

Figure 14: Developing and Implementing an

Developing and Implementing an ESO

1. Technical assessments completed to assess potential constraints
2. Detailed assessments required to define buffers
3. Application of appropriate mitigation measures to reduce buffers
4. Propose appropriate buffers
5. Planning Authority to refer proposed buffers to EPA
6. Planning Authority to refer proposed buffers to Council
7. Council to introduce proposed ESO in the form of planning Scheme Amendment
8. Council refer Scheme Amendment to Planning Panel

Figure 15: Case Study

Case Study:

"The Block" obtained a planning permit to build in Ingles Street which is constrained by a buffer.

The approval of such developments is made by local Council and is subject to conditions placed on the permit.

In this process, Council can request an amenity constraint assessment.

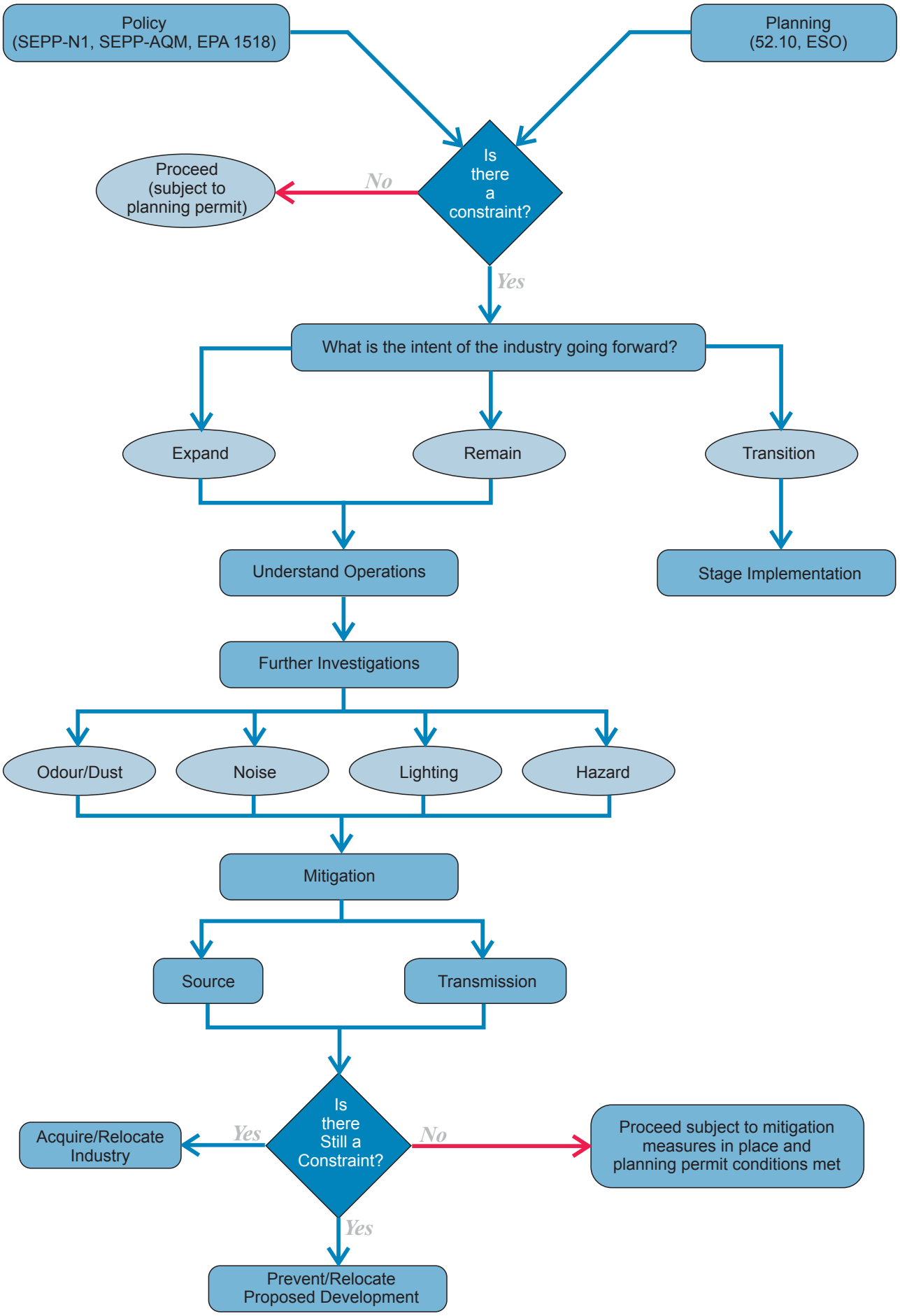
Further Schedule 4 to the Capital City Zone requires that the threshold distance from any existing industrial uses referred to in the table to Clause 52.10 must be met otherwise a permit must be sought.

Note buffers are recommendations only and cannot be enforced.

However, should the buffers be bound by the presence of an ESO, this would require all planning permit applications within the ESO to contain an amenity impact assessment as part of the planning permit. This would ensure that potential amenity impacts are not overlooked.

This would be funded and commissioned by the proponent. Therefore, the onus on applying the appropriate buffers resides with the proponent of the encroaching sensitive use.

Figure 16: Proposed assessment method for the development of a proposed sensitive land use



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Glossary

Term	Definition
AQMS	Air Quality Monitoring Station, capable of recording wind speed, wind direction, temperature and wind variability.
Background Noise Level	For a day, evening or night period means the arithmetic average of the L_{A90} levels for each hour of that period for which the commercial, industrial or trade premises under investigation normally operates. The background level shall include all noise sources except noise from commercial, industrial or trade premises which appear to be intrusive at the point where the background level is measured.
dB	Unit of measurement for Sound Pressure Level known as a decibel.
dB(A)	'A-weighted' decibel measurement. Developed in the 1930s as a way to represent the sound frequency sensitivity of the human ear.
De-rating	Decreasing the original set of parameters, for example, a buffer zone distance, through determining the actual impacts that operational conditions of a process will have on the area.
Default buffer (separation) distance	The minimum distance as specified in EPA guidelines from the source of an industry emission (dust or odour) required to minimise impact in the event of a process malfunction at the source. Buffer distances are specified for a range of industries and the distance is selected based on EPA experience with upsets/malfunctions for those industries.
DPCD	Department of Planning and Community Development.
Drainage flows	The flow of air down drainage lines (river valleys, stream lines etc). Outside daylight hours, these flows generally have high stability, so that any contaminant released into such flows will be poorly dispersed.
EPA	Environment Protection Authority.
Encumbered land	Land that is constrained for development purposes.
Fishermans Bend	Fishermans Bend Urban Renewal Area
Fugitive emissions	Emissions of gases or vapours due to leaks and other unintended releases of gases. The sources of fugitive emissions can be myriad and are hard to capture.
GHD	GHD Pty Ltd
Heat curing	The toughening of a polymer (plastic) by cross-linking the chains brought about through heat
Hazardous facilities	Facilities that have the potential to cause harm to the environment or to human health due to a wide variety of factors.
Interim criteria	Criteria relating to that specific point in time.
$L_{Aeq\ (Time)}$	Equivalent sound pressure level is the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring. This is considered to represent ambient noise.
$L_{A90\ (Time)}$	The A-weighted sound pressure level that is exceeded for 90 per cent of the time over which a given sound is measured. This is considered to represent the background noise.
$L_{A10\ (Time)}$	The arithmetic average of the sound pressure level that is exceeded for 10 per cent of the time specified. This is considered representative of the average maximum noise.

Term	Definition
L_{OCT10}	C-weighted or Linearsound pressure level for a specified octave band that is exceeded for 10 per cent of the time interval considered.
L_{OCT90}	C-weighted or Linearsound pressure level for a specified octave band that is exceeded for 90 per cent of the time interval considered.
MHF	Major Hazard Facility; A facility with the potential to cause harm to the environment or to human health in a severe way (including loss of life).
Nuisance	A negative effect of a process or action that has the potential to cause inconvenience or annoyance to a person.
OU	Odour units, whereby one odour unit corresponds with the concentration of an odorant or blend of odorants that can be detected by 50% of a panel of people selected to be representative of the general population.
PEM	Protocol for Environmental Management, as incorporated in the State Environment Protection Policy (Air Quality) for Victoria, which sets out a methodology to assess potential impacts from mining and extractive industries.
PoMC	Port of Melbourne Corporation.
Reverse amenity issues	Reverse amenity refers to the situation where sensitive land uses threaten to encroach into the buffer of an existing industry premises.
SEPP N-1	State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1.
SEPP N-2	State Environment Protection Policy (Control of Music Noise from Public Premises) No. N-2.
Sensitive land use	A sensitive land use can be defined as any dwelling; caretakers house; library; educational institution; religious facility; childcare centre; kindergarten; hospital; surgery or other medical institution including an institutional home; informal outdoor recreation sites, commercial and/or retail activity (such as any, hotel, motel, caravan park or tourist establishment).
Sound Pressure Level (SPL)	The Sound Pressure level is the change in air pressure above and below the average atmospheric pressure (amplitude) cause by a passing pressure wave; this is then converted to decibels and can be abbreviated as SPL or L_p.
Sound Power Level (PWL)	This is defined as the average rate at which sound energy is radiated from a sound source and is measured in watts (W). The Sound Power Level can be abbreviated as PWL or L_w.
Spill light	The scattered light outside of a direct beam that causes unintentional lighting of other areas, usually considered wasteful.
Throughput	The secondary and waste effects as a result of a process of production.
TSP	Total Suspended Particles; the mass concentration of all particles of contaminants (aerosols) in the air typically less than 40 µm in aerodynamic odour.
Upset conditions	Upset conditions refers to unintended emissions which do not occur under routine operations. Upsets may occur due to extreme weather conditions, mechanical breakdowns/malfunctions or operational failures.
VOCs	Volatile Organic Compounds; Chemical compounds usually emitted as gases that are generally quite odorous and potentially harmful to human health.
Wake influences	Disturbed air downwind from a building or similar structure affecting the free stream wind direction, speed and turbulence.

1. Introduction

1.1 Objective

The State Government of Victoria has identified the Fishermans Bend as a key urban renewal area within the Central City Zone. It is currently utilised for primarily light industry and logistics related businesses, but offers potential as a strategically important urban renewal opportunity in close proximity to the Melbourne CBD.

GHD was engaged by the Department of Environment, Land, Water and Planning (DELWP) to prepare a Buffer Assessment Report that presents a suitable approach to development at Fishermans Bend. DELWP are responsible for coordinating the preparation of the Fishermans Bend Framework Plan to guide future development in Fishermans Bend.

The Framework Plan will set the direction for future urban development in Fishermans Bend. It would identify:

- The strategic directions and shared vision for Fishermans Bend
- Areas suitable for urban development and the broad form of development that is appropriate
- The strategic infrastructure (physical and social) required to support urban development

1.2 Scope of Assessment

The purpose of this Buffer Assessment is to inform the Framework Plan for Fishermans Bend.

This assessment aims to identify and report on all existing relevant known default buffers and barriers internal to Fishermans Bend and within the surrounding area. The focus of the assessment is to identify any potential risks to the future development of Fishermans Bend, including the impact of sensitive uses on existing industrial uses and the consideration of reverse amenity provisions. In particular, the focus will be on industries that have the potential to constrain Fishermans Bend due to odour, dust, noise or lighting sources.

GHD has identified potential mitigation measures that may be appropriate and also identify any future planning scheme requirements and potential measures that may be relevant during the transition phase (staging) of the development of Fishermans Bend.

In preparation of this Buffer Report, consideration was also given to:

- Understanding the existing meteorological patterns in the area and the effect these may have on odour and dust emissions
- Understanding of the relevant State and Local statutory requirements (including the recently released Draft Guideline on Recommended Separation Distances for Industrial Residual Emissions[3])
- Understanding of the Port Capacity Project's proposed development at Webb Dock and to minimise the potential impacts of Fishermans Bend on the port's ability to continuously operate 24/7
- Understanding that the development of Fishermans Bend would occur incrementally over time, the importance of managing the transition of industrial land to residential uses and the likely impacts of short term non-compatible uses

[3] EPA Victoria Publication 1518 dated March 2013

- Understanding of amenity perceptions as well as measurable amenity impacts including design solutions in responding to buffer considerations
- Drawing on solutions already investigated in adjoining precincts, including Southbank and Docklands, to capitalise on existing work
- Presenting the outputs of the Buffer Assessment in a form for input into the preparation of the Fishermans Bend Framework Plan

Note that in this report the terms 'buffer distance' and 'separation distance' are used interchangeably – the former was used in the old EPA guideline and this has been replaced by the latter in the new EPA guideline (Publication 1518, March 2013).

1.3 Methodology

Our project methodology follows the following structure:

- Review of previous work
- Assessment of all known default buffers
- Review and update of the existing buffer assessment
- Identify Major Hazard Facilities
- Establish site-representative meteorology
- Desktop odour review
- Desktop dust Impact review
- Desktop noise Impact review
- Desktop lighting Impact review
- Identify proposed future sensitive receptors
- Identify potential risks to future development in Fishermans Bend
- Identify mitigation measures to minimise inappropriate placing of sensitive land uses in Fishermans Bend
- Identify future planning scheme requirements and potential measures that may be relevant during transition phase of the development

1.4 Limitations and assumptions

This report has been prepared by GHD for Department of Environment, Land, Water and Planning and may only be used and relied on by Department of Environment, Land, Water and Planning. GHD otherwise disclaims responsibility to any person other than Department of Environment, Land, Water and Planning arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. The opinions, conclusions and any recommendations in this report are based on the composite plan provided by DELWP as of 10 May 2016. GHD disclaims liability arising from any change to this composite plan.

GHD has prepared this report on the basis of information provided by Department of Environment, Land, Water and Planning and project stakeholders EPA and PoMC who provided information to GHD which GHD has not independently verified or checked. GHD does not

accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information. GHD disclaims liabiity for the identification of all relevant industries and any subsequent industries that were overlooked.

Information provided by stakeholders is preliminary information only, should not be relied upon and is subject to change and to verification.

2. Precinct description

2.1 Precinct location

Fishermans Bend is located on a peninsula south west of Melbourne's CBD. It is geographically bound by the Yarra River to the north and west, and Hobsons Bay to the south. South Melbourne bounds the area to the east and Port Melbourne to the south.

Project borders were identified in September 2011 by the Department of Transport, Planning and Local Infrastructure (DTPLI). This assessment focuses on five distinct precincts within the project border as shown in Figure 1. For the purposes of this assessment, these five precincts will be collectively referred to as Fishermans Bend Precinct. Fishermans Bend Precinct covers an area of approximately 490 hectares.

The Lorimer Precinct and Employment Precinct, shown in Figure 1, are within the municipality of the City of Melbourne.

The Employment Precinct was added to Fishermans Bend Precinct in April 2015. The Employment Precinct has the potential to retain significant industrial activities while also hosting compatible productive non-residential uses with low environmental impact. In addition, the precinct might need to accommodate a selected number of non-productive uses (e.g. district level recreational use or green infrastructure to support biodiversity) to complement the development of the entire Fishermans Bend area.

The remaining three precincts, the Montague, Wirraway and Sandridge Precincts, are located within the municipality of the City of Port Phillip.

The Lorimer, Montague, Wirraway and Sandridge Precincts are envisaged to develop as residential and mixed use precincts. The 'industry-led' mixed use development approach can offer a greater scope for intensification and assumes that a strict separation of land uses across a large area in close proximity to urban centres, often delivers less optimised urban development results. Clear planning strategies and a thorough understanding of the various constraints including site conditions are a pre-requisite for this approach.

The precincts are split by the Westgate Freeway that runs generally east-west through the Fishermans Bend Precinct.

Westgate Park is currently not included within Fishermans Bend Precinct and is maintained by Parks Victoria.

Figure 1 Fishermans Bend Precinct

The municipality and approximate area of each precinct within Fishermans Bend are listed in Table 1.

Table 1 Precinct Size

Precinct	Approximate Area	Municipality
Montague	43 hectares	City of Port Phillip
Lorimer	27 hectares	City of Melbourne
Sandridge	85 hectares	City of Port Phillip
Wirraway	89 hectares	City of Port Phillip
Employment	250 hectares	City of Melbourne

2.2 Existing planning and land use characteristics

2.2.1 Strategic planning policy

Plan Melbourne - Metropolitan Planning Strategy (Plan Melbourne), released in May 2014, sets out the Victorian Government's vision for the City to 2050. Fishermans Bend is identified as a key urban-renewal precinct located in close proximity to Melbourne's central business district (CBD). Plan Melbourne recognises the importance of these precincts and notes that these sites will "*play an important role in accommodating future housing and employment growth and making better use of existing infrastructure"*[4].

One of the key objectives sought under *Plan Melbourne* is to: *"create a city structure that drives productivity, supports investment through certainty and creates more jobs".* The directions that sit under this objective relate to growth planning and the need to invest in new employment areas.

[4] Plan Melbourne, State Government of Victoria, pg. 31

Plan Melbourne notes that to ensure retention of important industries in Fishermans Bend, north of the Westgate Freeway, will remain as a significant industry and employment area[5].

The Fishermans Bend Strategic Framework Plan (FBSFP), released in 2014, seeks to implement the directions of Plan Melbourne in relation to Fishermans Bend. The FBSFP provides the overarching framework and sets the direction for the assessment of planning proposals/permit applications within Fishermans Bend. Fishermans Bend has been incorporated into both the Port Phillip Planning Scheme and the Melbourne Planning Scheme by way of an Incorporated Document under Clause 81.

Currently, the Metropolitan Planning Authority (MPA) in collaboration with the City of Melbourne and the City of Port Phillip is in the process of developing a Draft Vision, Design Guidelines, detailed neighbourhood plans for the Lorimer, Montague, Wirraway and the Sandridge Precincts and a Fishermans Employment Precinct Plan.

2.2.2 Existing land uses

The existing land use in the Fishermans Bend Precinct is predominantly industrial and business with a small amount of residential.

There is also a large and active ownership by developers, particularly Goodman and MAB.

In the Montague Precinct, there is some smaller scale office industry and a number of automotive premises. DELWP Victoria has reported that the number of people employed in the precinct is in the order of nine thousand.

Land within the Lorimer, Sandridge and Wirraway Precincts is primarily used for office space, light industry, auto dealerships/repairs and warehouses. Further details on specific industries within these precincts are provided in section 3.2.1 of this report. In addition, the Wirraway and Sandridge Precincts include several reserves/parkland along Williamstown Road, as identified in section 2.3.1.

Current land uses within the Employment Precinct include auto repair/panel beating, cement depots, plasterboard manufacturing and a number of factories and warehouses. In addition, the eastern section of the Employment Precinct near the Bolte Bridge is occupied by the Fisherman's Bend Sewer Mining Plant and sewer extraction system.

There are major freight transport routes along Williamstown Road and the Fishermans Bend Precinct contains vital access routes to Webb Dock and is host to other port related traffic. Road reserves are generally wide and can support large vehicle access. There are overpass crossings of the Westgate Freeway at Salmon and Ingles Streets as well as access points to the Westgate Freeway at Todd Road and Montague Street. There is a light rail line along Montague Street and one bus service to the area.

Due in part to the history of industrial land use in the Fishermans Bend Precinct, there is a varying risk of land contamination. Golder Associates completed a Land Contamination Study on behalf of DELWP Victoria in 2012 for this precinct. Findings from this report identify that the near surface stratigraphy for the Fishermans Bend Precinct is anticipated to consist of the Port Melbourne Sand and Coode Island Silt capped by a layer of fill over much of the area. As a result, it is anticipated that there may be contaminants throughout the Fishermans Bend Precinct. Groundwater was found to be generally shallow, ranging from around one metre to three metres below the surface. This likelihood of encountering groundwater during construction activity would need to be considered during the planning of new developments.

[5] It is noted that while Plan Melbourne is currently under review and a refresher discussion paper was released in October 2015, changes to Plan Melbourne are not likely to affect the overall objectives outlined in relation to urban-renewal areas, and in particular, Fishermans Bend.

2.2.3 Recent planning permits

GHD was provided with a list of current planning applications from the Melbourne City Council and undertook a search of the online DELWP register and the Port Phillip Council register to identify recent planning permit applications within and surrounding Fishermans Bend. The purpose of this assessment was to identify which industries have already transitioned or are planning to transition out of Fishermans Bend area in the coming months and to identify future sensitive receptors. Figure 2 shows the location and type (i.e. residential, mixed use, office, light industrial etc.) of planning applications either already approved or currently being processed.

Figure 2 shows a number of planning applications for multi-storey mixed use and residential developments within the Montague and Lorimer Precincts. There are also scattered developments proposed throughout the Employment Precinct, the Wirraway Precinct and the Sandridge Precinct.

One existing industry (Port Melbourne Metals) was identified as potentially transitioning out of Fishermans Bend. A planning permit for 199-201 Normanby Road was approved by the Minister for Planning in September 2014 for the demolition of the existing building and the construction of a new multi-storey building for the purpose of dwellings and offices.

GHD is also aware of a proposed residential development at 187 Williamstown Road signalling that Detmold is no longer operational.

Paper Size A4

0 165 330 660

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

Precinct Boundaries

Type

- Child care
- Office
- Light industrial
- Need more information
- Residential Development
- Mixed use
- × N/A

GHD

VICTORIA State Government | Environment, Land, Water and Planning

DELWP
Fishermans Bend Buffer Report - Update

Job Number	31-34061
Revision	B
Date	11 Aug 2016

Planning Permits

Figure 2

G:\31\34061\GIS\Maps\Working\3134061_001_A4L_KBM_FishermansBendBufferAssessment.mxd [KBM: 16]

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Data source: DELWP, Vicmap, 2016; GHD, Analysis Data, 2016; CIP, Imagery, 2013. Created by: lrsmith

2.2.4 Existing planning controls

The existing planning controls in each precinct have been reviewed to gain an understanding of the prominent land uses within Fishermans Bend and to assist in the identification of future sensitive receptors. Fishermans Bend is under the jurisdiction of two different Planning Schemes, the Port Phillip and the Melbourne Planning Scheme. The Lorimer Precinct and Employment Precinct are subject to planning controls within the Melbourne Planning Scheme, while the Montague, Wirraway and Sandridge Precincts are subject to planning controls within the Port Phillip Planning Scheme.

The planning zones and overlays for each of the five precincts are summarised in Table 2. The table also identifies zones and overlays in areas directly adjacent to Fishermans Bend. This will help establish a broader understanding of land uses within the area and sensitive receptors in the vicinity of Fishermans Bend.

Table 2 Existing Planning Zones and Overlays within and nearby Fishermans Bend

Zone	Overlay	Adjacent Zone	Adjacent Overlays
Lorimer Precinct			
Capital City Zone 4 (CCZ4)	City Link Project Overlay (CLPO) Development Contributions Plan Overlay – Schedule 1 (DCPO1). Parking Overlay – Precinct 13 (PO13). Special Building Overlay (SBO).	Docklands Zone Schedule 1 – Yarra waters (DZ1) Commercial 2 Zone (C2Z) Public Use Zone 1 (PUZ1) Capital City Zone 1 (CCZ1) Public Use Zone – Schedule 1 (PUZ1) Commercial Zone 2 (C2Z) Docklands Zone – Schedule 1 (DZ1)	Design and Development Overlay – Schedule 12 (DDO12) (Noise Attenuation Area) Design and Development Overlay – Schedule 49 (Area 1 and 2) (DDO 49) (Yarra's edge precinct) Development Plan Overlay – Schedule 2 (DPO2) (Yarra's Edge Precinct). Parking Overlay – Precinct 11 (PO11) Environmental Significance Overlay 1 (ESO1) Development Contributions Plan Overlay – Schedule 2 (DCPO2)
Montague Precinct			
Capital City Zone 1 (CCZ1) Public Use Zone 4 (PUZ4) (transport) Road Zone – Category 1 (RDZ1) Public Use Zone 2 (PUZ2) (education)	Development Contributions Plan Overlay – Schedule 2 (DCPO2) Parking Overlay – Precinct 1 (PO1) Heritage Overlay (HO4) (HO217) (HO2018) (HO201) (HO131) (HO135) (HO200) (HO196) (HO202) (HO203) (HO272) (HO442)	Public Park and Recreation Zone (PPRZ) Residential 1 Zone (RZ1) Capital City Zone 1 (CCZ1) Capital City Zone 3 (CCZ3) Business 3 Zone (B3Z) Business 2 Zone (B2Z) Industrial 1 Zone (IN1Z)	Heritage Overlay (HO1) (HO442) Special Building Overlay (SBO) Design and Development Overlay – Schedule 8 (DDO8) Environmental Audit Overlay (EAO) Design and Development Overlay – Schedule 17 (DDO17)

Zone	Overlay	Adjacent Zone	Adjacent Overlays
	Special Building Overlay (SBO) Environmental Audit Overlay (EAO)		Design and Development Overlay – Schedule 5 (DDO5) Public Acquisition Overlay – Schedule 3 (PAO3)
Wirraway Precinct			
Capital City Zone 1 (CCZ1) Public Park and Recreation Zone (PPRZ) Public Use Zone 6 (PUZ6) (Local Government) Industrial 1 Zone (IN1Z) Road Zone – Category 1 (RDZ1)	Development Contributions Plan Overlay – Schedule 2 (DCPO2) Parking Overlay – Precinct 1 (PO1) Special Building Overlay (SBO) City Link Project Overlay (CLPO) Heritage Overlay (HO246) (HO472) (HO282) Road Closure Overlay (RXO)	Industrial 1 Zone (IN1Z) Public Park and Recreation Zone (PPRZ) Residential 1 Zone (R1Z) Capital City Zone 1 (CCZ1)	City Link Project Overlay (CLPO) Environmental Significance Overlay – Schedule 4 (ESO4) Heritage Overlay (HO2) Development Contributions Plan Overlay – Schedule 2 (DCP02) Parking Overlay – Precinct 1 (PO1)
Sandridge Precinct			
Capital City Zone 1 (CCZ1) Public Use Zone 6 (PUZ6) Public Park and Recreation Zone (PPRZ)	Development Contributions Plan Overlay – Schedule 2 (DCPO2) Parking Overlay – Precinct 1 (PO1) Heritage Overlay (HO447) (HO164) (HO165) Special Building Overlay (SBO)	Residential 1 Zone (R1Z) Capital City Zone 1 (CCZ1) Capital City Zone 4 (CC4Z) Mixed Use Zone (MUZ) Industrial 1 Zone (IN1Z) Commercial 2 Zone (C2Z)	City Link Project Overlay (CLPO) Heritage Overlay (H01) (H02) Development Contributions Plan Overlay – Schedule 2 (DCPO2) Special Building Overlay (SBO) Environmental Audit Overlay (EAO)
Employment Precinct			
Industrial Zone 1 (IN1Z) Public Use Zone 1 – Service and Utility (PUZ1) Commercial Zone 2 (C2Z) Special Use Zone 3 (SUZ3) Public Use Zone – 4 Transport	Environmental Significance Overlay 1 (ESO1) City Link Project Overlay (CLPO)	Public Park and Recreation Zone (PPRZ) Special Use Zone 4 (SUZ4) Special Use Zone 1 (SUZ1) Capital City Zone 1 (CCZ1) Capital City Zone 4 (CCZ4) Public Use Zone 6 (PUZ6) Industrial 1 Zone (IN1Z)	City Link Project Overlay (CLPO) Development Contributions Plan Overlay – Schedule 2 (DCPO2) Parking Overlay – Precinct 13 (PO13) City Link Project Overlay (CLPO) Parking Overlay – Precinct 1 (PO1)

2.2.5 Capital City Zone and Fishermans Bend Vision

Fishermans Bend has been identified as an inner-urban area suitable for large scale urban renewal, incorporating a mix of densities and land uses. To facilitate the renewal of this area in an efficient and co-ordinated manner, on 5 July 2012, most of Fishermans Bend was rezoned to Capital City Zone via a Ministerial Amendment (C102). The Lorimer Precinct is located in CCZ4 (Melbourne Planning Scheme) and the Montague, Wirraway and Sandridge Precincts are all located in CCZ1 (Port Phillip Planning Scheme) (Table 2). The Employment Precinct is not included within the Capital City Zone.

The intent of the Capital City Zone is to aid the achievement of a new vision for Fishermans Bend, which emphasises the development of a mixed use precinct with a residential and commercial focus. The purpose of the CCZ1 and CCZ4 as outlined in the Melbourne and Port Phillip Planning Schemes is to:

- Provide for medium to high residential density and a variety of dwelling types which are well-located to services and public transport
- Provide for a range of residential, commercial and industrial, recreational, business and leisure uses within a mixed use environment
- Encourage employment uses and the continued operation of existing uses
- To use and develop Fishermans Bend generally in accordance with the Fisherman's Bend Strategic Framework Plan, July 2014 (amended April 2015)
- Provide for a range of financial, legal, administrative, cultural, recreational, tourist, entertainment and other uses that complement the capital city function of the locality

It is envisaged that Fishermans Bend will become an extension of the city with a mix of land uses including residential, commercial, retail, industrial, recreation, education, entertainment and community. It will be a place where people can live, work and recreate all in the one area with a range of living, employment and recreational opportunities.

By rezoning the area to Capital City Zone and through subsequent Planning Scheme Amendments, the Minister for Planning is now the Responsible Authority for major[6] development applications within the precinct. The two municipalities of Melbourne and Port Phillip remain as the Responsible Authority for non-major applications.

Maps contained in Appendix A show the planning zones and overlays in the Fishermans Bend Precinct.

2.3 Sensitive land uses

The definition of a sensitive receptor or sensitive land use is defined by the EPA[7] as *'any land uses which require a particular focus on protecting the beneficial uses of the air environment relating to human health and well-being, local amenity and aesthetic enjoyment, for example residential premises, child care centres, pre-schools, primary schools, education centres or informal outdoor recreation sites'.*

[6] Applies to development with a building height of 4 storeys or greater, use or development of more than 60 dwelling, land use or development with a gross floor area exceeding 10,000 square metres and use and development of land where the he estimated cost of development is more than $10,000,000.

[7] EPAV 2013 "Recommended separation distances for industrial residual air emissions" Pubn. 1518, March 2013

Note that this definition was expanded in 2013 from that in the previous EPA buffer guideline in that “informal recreation sites” are now included whereas the previous definition had an exclusion (“…and other similar uses involving the presence of individual people for extended periods except in the course of their employment or for recreation”). However, the workplace continues to be excluded as a sensitive land use.

2.3.1 Sensitive land uses surrounding Fishermans Bend

Current residential zoned land is adjacent to Fishermans Bend Precinct south of Williamstown Road. These residents are currently adjacent to Industrial 1 zoned land and have an existing tram corridor (Route 109) running through the residential zone, while the residents to the east along Todd Road are adjacent to the Webb Dock precinct.

2.3.2 Existing and future sensitive land uses within Fishermans Bend

Land to the south of Fishermans Bend Precinct, south of Williamstown Road, is predominantly residential in nature and zoned General Residential under the Port Phillip Planning Scheme. Residential dwellings within this area generally consist of one to two storey stand-alone buildings. Recreation areas consisting of open spaces and neighbourhood parks are scattered throughout this residential area.

These residents have an existing tram corridor (Route 109) running through the residential zone with some retail and commercial activities located along main arterial corridors (e.g. Bay Street). In addition, the Webb Dock container shipping facility sits directly west of Todd Road, with this area consisting of eight berths including a dedicated roll-on roll-off cargo terminal.

Lorimer Precinct

The Lorimer Precinct is directly opposite the West Gate Freeway and the recently developed Yarra’s Edge Precinct. The primary objective is to develop as a precinct of mixed uses and mixed density with high density development occurring along the West Gate Freeway and City Link. Sensitive receptors for consideration during the development of the precinct are shown in Table 3.

Table 3 Existing and Future Sensitive Receptors in the Lorimer Precinct

Existing Sensitive Receptors	Future Sensitive Receptors
• No sensitive uses currently within the site but neighbours the Yarra Edge Marina, Residential area (townhouses and apartments) and a number of open spaces • Nil area of Public Open Space (POS)	• Residential • Parkland along Lorimer Street • Key activity node (Includes Potential Community/Education Cluster) along Lorimer Street • Low Density Development – nil area of POS • Medium Density Development 4.7 ha POS • High density development 4.7 ha POS

There are no existing ‘sensitive land uses’ within the Lorimer Precinct. However, directly adjacent is the Yarra’s Edge Precinct, which has residential, public park and recreational areas. While it is unlikely to be directly affected by future development in the Lorimer precinct, given that a similar land use mix is likely, its presence still needs to be taken into consideration.

As shown in Table 3, there are expected to be a number of future sensitive land uses identified within the Lorimer Precinct. Appropriate buffering is required to be implemented to ensure these land uses are not impacted by existing industrial uses that are currently operating in the area during any stage of the areas development.

Montague Precinct

More advanced planning has occurred within the Montague Precinct, with the Montague Precinct Structure Plan recently released. The objective of the plan is to encourage the development of a mixed use precinct with the mix of uses being established from the outset. It is intended that the precinct will have:

- A vertical mix of land uses
- A mix of residential housing options
- A mix of the density of development

It is intended that there will be low density development around the eastern and southern boundaries of the precinct to ensure consistency with the adjacent residential areas. Table 4 identifies existing and future sensitive receptors within the precinct.

Table 4 Existing and Future Sensitive Receptors in the Montague Precinct

Existing Sensitive Receptors	Future Sensitive Receptors
• Residential (Corner of Montague and Gladstone Street, Corner Gladstone and Boundary Street and Corner of City Road and Boundary Street, Townhouses/apartments South of City Road and along Boundary street and Mix use residential, retail and office buildings along Montague Street (from City Road to Thistlethwaite street and along Buckhurst street) • SAE Institute (Creative Media College) - 0.36 ha Dedicated to schools (Existing Land budget) • Nil area of POS	• School and community hub (corner of Montague Street and Gladstone Street) • Clustering of restaurants, cafes and retail at street level (Buckhurst Street and the Corner of City Road and Montague Street) • Open space (Buckhurst street, Ferrars Street, Munro Street, Woodgate street and along Gladstone Street) • Residential (Area from Munro Street to Westgate freeway Apartments, with some commercial uses at street level) • Low density development scenario 6.1 ha of POS • Medium density development scenario 6.1 ha of POS • High Density development scenario 10.8 ha of POS

A number of sensitive land uses currently exist in the Montague Precinct including an education facility (Creative Media College) and residential land. The scale of residential land within the precinct is mixed, with some high density apartments and low density houses. The precinct also lies adjacent to a sensitive residential zone to the north, which is predominantly comprised of low density housing.

Wirraway Precinct

The Wirraway/Plummer precinct will also be of mixed use and mixed density, with low density development and parkland/open space located along Williamstown Road, medium density development surrounding the low density and parkland areas and high density development along the Westgate Freeway and City link.

Table 5 highlights the existing and future sensitive receptors identified within the precinct.

Table 5 Existing and Future Land Uses in the Wirraway Precinct

Existing	Future
• Melbourne Grammar Sports Oval (end of Todds Road) • Parkland (Williamstown Road, Corner of Prohasky Street) • JL Murphy Reserve • 6.92 ha dedicated to sport facility • 11.98 ha dedicated to Public Park and Recreation • Existing POS 24.4 ha (Infrastructure assessment) • Adjacent to a residential area (Opposite side of Williamstown Road) • Presence of historic quarry along the northern boundary closest to the Western Highway – potential contamination	• Residential • Parkland and Melbourne Grammar sports fields (corner of Todd Road and Williamstown road and along Williamstown road between Salmon street and Graham Street • Key activity node (Includes potential Community/Education Cluster) -Corners of Salmon Street and Fennell Street • Potential community/education cluster along Fennell Street in the middle of Graham and Salmon streets • Low density development scenario – 24.4 ha POS • Medium density development scenario – 24.4 ha • High density development scenario 34 ha

The predominant sensitive land use in the Wirraway Precinct is Public Open Space (POS), with a number of Public Park and Recreation areas including the JL Murphy Reserve and also the Melbourne Grammar Sports oval. While these uses are highly sensitive, they have been able to co-exist with surrounding industrial and business uses.

The precinct is adjacent to an existing residential area, which is predominantly low density. This should be considered when assessing different height densities within the precinct.

A number of future sensitive land uses have also been identified in the precinct. The implementation of appropriate development and design controls will be required to ensure these land uses are developed in a manner that results in a co-ordinated precinct that has appropriate land uses in proximity to each other.

Sandridge Precinct

Proposed development in the Sandridge Precinct is similar to that in the Wirraway Precinct, with low density development and parkland/open space along Williamstown Road surrounded by medium density development and with high density development along the Westgate Freeway. In line with the other precincts in Fishermans Bend, the objective is to develop the Sandridge Precinct for mixed use. Existing and future sensitive receptors that could be impacted by development of mixed uses within the precinct are outlined in Table 6.

Table 6 Existing and Future Land uses in the Sandridge Precinct

Existing	Future
• Port Melbourne Cricket Ground • Adjacent to a residential area (Opposite side of Williamstown Road). • 3.45 ha Public Park and recreation (Existing Land Budget) • 3.9 Ha public open space (Infrastructure assessment) • Presence of historic quarry on the western side of the precinct – potential contamination	• Residential • Parkland (along Williamstown Road boarder by Woodruff St, Bridge St and Ingles street) • Key activity node around Ingles and Boundary Street • Potential community/education cluster – Corner of Fennell and Bridge St • Potential community/education Cluster corner of precinct near south Wharf on edge bordered by Westgate Freeway • Low density development scenario – 3.9 ha public open space (POS) • Medium density – 7.0 ha POS • High Density – 9.4 ha POS

The primary existing sensitive land use in the Sandridge Precinct is Public Open Space (POS) with the Port Melbourne Cricket Ground and a number of public park and recreation areas. These sensitive land uses have also been identified as future sensitive land uses, as well as residential, key activity nodes and community/education clusters.

While the presence of existing sensitive uses indicates that they can co-exist with the industrial uses in the area, appropriate buffering and controls are required to be implemented to ensure a smooth transition of uses of the coming years. Controls need to be implemented to project existing sensitive uses and ensure new sensitive uses are located appropriately.

Adjacent to the Sandridge Precinct is a residential area. While it is unlikely to be directly affected by development that takes place in the Sandridge Precinct, appropriate consideration needs to be given to density and scale of development in areas closest to these adjoining residential areas.

Employment Precinct

The Employment Precinct is located directly opposite the West Gate Freeway, north of the Wirraway Precinct and south of the Yarra River.

The primary objective is to develop as a precinct retaining significant industrial activities while also hosting compatible productive non-residential uses with low environmental impact. Sensitive receptors for consideration during the development of the precinct are shown in Table 7.

Table 7 Existing and Future Sensitive Receptors in the Employment Precinct

Existing Sensitive Receptors	Future Sensitive Receptors
• No sensitive uses currently within the site but neighbours the Lorimer and Wirraway Precincts, Residential area (townhouses and apartments) and a number of open spaces • Nil area of Public Open Space (POS) • Adjacent to Westgate Park	• Potential sports and recreational facilities • Potential Community facilities Potential parkland

There are no existing ‘sensitive land uses’ within the Employment Precinct.

As shown in Table 7, there are expected to be a number of future sensitive land uses identified within the Employment Precinct. Appropriate buffering needs to be implemented to ensure these land uses are not adversely impacted by existing industrial uses that are currently in the area during any stage of the areas development.

2.4 Fishermans Bend Urban Renewal Area Vision

The Recast Vision for Fishermans Bend was announced on 27 May 2016 and responds to a recommendation from the Ministerial Advisory Committee (MAC) to refresh and redefine the vision for Fishermans Bend. The Advisory Committee recognised the community’s broad support for the Fishermans Bend Urban Renewal Area Draft Vision 2013 (Draft Vision 2013). The MAC advised that any new vision should use the Draft Vision 2013 as a baseline and draw on wider economic, social and environmental influences on Fishermans Bend.

2.4.1 Fishermans Bend in 2050

An extract from the recast vison is below:

Fishermans Bend celebrates and showcases the best that Melbourne has to offer: great places, world-class design, thriving businesses and healthy communities. As Australia’s largest urban renewal area, Fishermans Bend is celebrated as an exemplar of sustainable and resilient urban transformation. Bayside, riverside and cityside, Fishermans Bend occupies a unique position in Melbourne, between the city and the bay, with connections to surrounding suburbs and Melbourne’s growing west. Melbourne is a now a city approaching 8 million people and experiences more hot days and extreme weather events. The city also operates in an increasingly connected and competitive global environment. Fishermans Bend plays a vital role in ensuring that Melbourne meets the challenges and seizes the opportunities of this changing world. 455 hectares of land, only minutes from Melbourne’s CBD, has been transformed into a series of diverse, walkable, high-density neighbourhoods that support around 80,000 residents and 60,000 workers. Fishermans Bend is a world-class location for high technology, education and research jobs that are an integral part of Australia’s economy. Fishermans Bend provides safe, welcoming and vibrant places for all people, including families. A diverse mix of housing options, public spaces and community facilities are integrated with a range of innovative industries and businesses. Leafy streets, intimate laneways and great public spaces frame contemporary architecture— celebrating both Aboriginal and European heritage and culture. A generous tree canopy keeps Fishermans Bend cool in summer. Not only are the public spaces green – so, too, are the buildings. The buildings incorporate vertical and roof-top greening— saving water while supporting a rich biodiversity throughout the area. A network of leafy boulevards and green links connect neighbourhoods and public spaces, providing a focus for city life as well as high quality public transport, walking and cycling infrastructure.

An underground train line—together with trams and high-frequency buses—connect Fishermans Bend to Melbourne’s transport network. Efficient connections to the Port of Melbourne are also provided. Car parking has been reduced. In fact, less than one-in-five trips are now made by private car. Instead, the efficient and direct public transport network reduces traffic congestion and carbon emissions. Fishermans Bend has transformed into a series of distinctive places that reflect Melbourne’s past and define its future.

There will be five precincts each with their own distinctiveness, as outlined below.

Montague

Montague is a diverse and well-connected mixed-use precinct with a range of buildings. It comprises of two neighbourhoods, each with their own character and identity.

Located between the Westgate Freeway and the 109 light rail route, the northern neighbourhood has a strong mixed used focus, including residential and office activity. Most of the buildings are tall, similar to those in the CBD, and are carefully designed to achieve human scale at street level, generally with towers set back on active podiums.

The southern neighbourhood has range of building types. Its network of gritty streets and laneways support a myriad of businesses, including shops, cafés and creative industries that support the area's vibrant and eclectic character. The area is safe and lively, both day and night, with street art and a strong pedestrian focus. Heritage and character buildings have been adapted to provide high amenity housing and commercial opportunities. Lower scale residential and commercial buildings along City Road and Boundary Street ensure that the precinct is well integrated with its neighbours.

The open space near the corner of Buckhurst and Ferrars Street is a key landscape asset for the precinct, connected to a series of public spaces and the Buckhurst Street green spine. A community hub, co-located with the South Melbourne Ferrars Street Primary School, is a focus for the local community. It is supported by a secondary community hub co-located at the Montague Continuing Education Centre. The Buckhurst Street green spine connects these two hubs with a series of complimentary activities, creating the heart of Montague through an activated public realm.

Lorimer

Lorimer, together with the Yarra's Edge Precinct in Docklands, is a keystone central to Melbourne's identity as a river city. River crossings for walking, cycling and public transport continue the legacy of connecting Melbourne – linking Fishermans Bend to the Docklands, the CBD, and further afield to the renewal areas around North and West Melbourne. Water transport links Lorimer to the CBD, Docklands and the Employment Precinct.

The precinct promotes healthy and diverse lifestyle choices to the full. A linear open space extends from the river, through the centre of Lorimer, and beyond to the Employment Precinct. This provides a safe walkable connection between jobs, homes, community facilities, shopping and entertainment. It links a series of public spaces with different roles and characters, provides a recreational corridor and a significant biodiversity connection to Westgate Park.

It ensures high-density living in well-designed homes is appealing and complemented by great places to meet and gather in the public realm.

Sandridge

Sandridge is one of Melbourne's premium office and commercial locations, balanced with housing and retail. It provides a high quality vibrant streets and public spaces, well served by public transport and walking and cycling links.

Professional services and creative businesses are attracted to Sandridge – the commercial sized floorplates in many of the buildings are ideal for their needs. Proximity and good connections to the CBD, Docklands, Employment Precinct, South Melbourne and Domain ensure that businesses in Sandridge can access a wide range of clients and services.

Architecturally diverse towers north of and along the Fennel-Plummer Street boulevard extend Melbourne's skyline towards Port Phillip Bay. These buildings are designed to provide an attractive street level experience and protect public spaces from overshadowing. Residents and workers in these towers enjoy spectacular views towards the CBD, Port Phillip Bay and across the surrounding suburbs.

A series of public spaces, ranging from piazzas, squares, event spaces, sporting grounds, intimate formal gardens and playgrounds are linked through a network of boulevards, living streets, laneways and shared paths. North Port Oval, with its historic grandstand, is a key anchor for the local community and supports many civic and recreational uses. State and local governments have worked together with the sports clubs that use North Port Oval to expand the ground and its program of uses, and improve the quality of facilities.

Wirraway

Wirraway is a family friendly neighbourhood. Small parks, plazas and playgrounds throughout the neighbourhood are linked by leafy streets lined with different types of shops, businesses and homes.

Wirraway provides a choice of diverse housing, include small to medium scale apartment buildings. There are also some higher-rise developments with views to surrounding suburbs and the Bay. Residential developments provide intimate scaled green spaces where people can meet, gather and relax. The contemporary architecture in Wirraway sensitively references the area's cultural and industrial heritage.

JL Murphy Reserve is a major green space in Fishermans Bend. It is a focus for recreation, active throughout the day and evening, with organised sports and leisure activities.

The Reserve incorporates best practice stormwater management features, which contribute to Fishermans Bend's status as a model for water sustainability.

Local schools use JL Murphy Reserve during the day for outdoor activities, sharing the space with the broader community.

Employment

The Employment Precint will be a world-renowed location for innovative industries attracting international investment and producing world-leading research, technology and products. Areas of expertise include aerospace, defence, research and development, education, transport, biotechnology, transport and information technologies. These new businesses are highly productive and profitable, but with a low environmental impact generally not requiring buffers, and complement Fishermans Bend as whole through compatible land uses.

World-class transport and IT infrastructure enhances the daily experience for workers and visitors alike. The precinct is close to the CBD and Docklands, and has easy access to the Port of Melbourne and Melbourne Airport with close proximity to the West Gate Freeway. Its strategic location in Melbourne makes this an attractive place to work for highly skilled professionals.

The light rail and high frequency bus routes connect people to Melbourne's public transport network, reducing travelling times and costs.

This is a great place to work, learn and visit where communities flourish. Purpose-built labs, campuses, offices and education spaces sit alongside a public realm of exceptional standard. Conversations and ideas are as likely to happen in streets, cafes, and piazzas or by the water, as they are in the boardroom. Workers and researchers often make the journey along the linear green spine to the expanded Westgate Park or into Lorimer and Wirraway for shopping and other services. Many of the people who work in the precinct live close by, with their children attending schools there too. The green spaces contribute to high levels of biodiversity and are 'green lungs' for the area, with treelined streets and parks for workers. The rate of water consumption in the area is 50 percent less than that of broader Melbourne, thanks to the integrated water recycling facility. A hub of innovation, the Employment Precinct is a catalyst for Melbourne's sustainable growth.

3. Identification of relevant existing industries

3.1 Fishermans Bend industry overview

Port Melbourne/Fishermans Bend precinct is primarily home to numerous advanced manufacturing organisations specialising in research and design in the aerospace and automotive sectors. The significant organisations in this category are:

- Aerostaff
- Air International
- Australian Aerospace and Defence Innovations
- Boeing's Phantom Works
- Defence Science and Technology
- General Motors Holden
- GKN Aerospace
- Hawker de Havilland
- Toyota
- RMIT University Sir Lawrence Wackett Centre for Aerospace Design.

Other major operations in the area include:

- Freight and Logistics
  - Linfox
  - Patrick Stevedoring
  - Toll Group
- Food;
  - Kraft
- Construction
  - Fishermans Bend is home to distribution facilities that provide up to 70% of Melbourne's cement
- Small and medium business
  - Fishermans Bend is home to at least 800 businesses with 50 employees or less in the wholesale trade, business services, manufacturing, retail trade, transport, postal and storage, construction, information media and telecommunications and administration services.

3.2 Industry identification

A site inspection of the proposed Fishermans Bend development site and the surrounding area was conducted by GHD on 18 May 2016. This was supplemented in this review by aerial photography using Google Earth and Google Street View. Various existing industries with the potential for odour, dust, general air, noise and light emissions were identified both within Fishermans Bend and in proximity to Fishermans Bend. These are detailed in the following sub-sections.

GHD was provided a list of planning applications at various stages from approved to recently submitted. This assisted to identify which industries had already transitioned or were planning to transition out of the area in the coming months and thus were excluded as possible constraints.

3.2.1 Industries within Fishermans Bend

The identified industries within the five Fishermans Bend precincts are listed in Table 8. The table identifies the company, their operations, address, type of potential sources of emission and the primary concern for this assessment. Refer to Figure 3 for map locations of these identified industries within the five Fishermans Bend precincts. Note, only major sites have been identified in Figure 3. Auto facilities and general factories and warehouses have not been included.

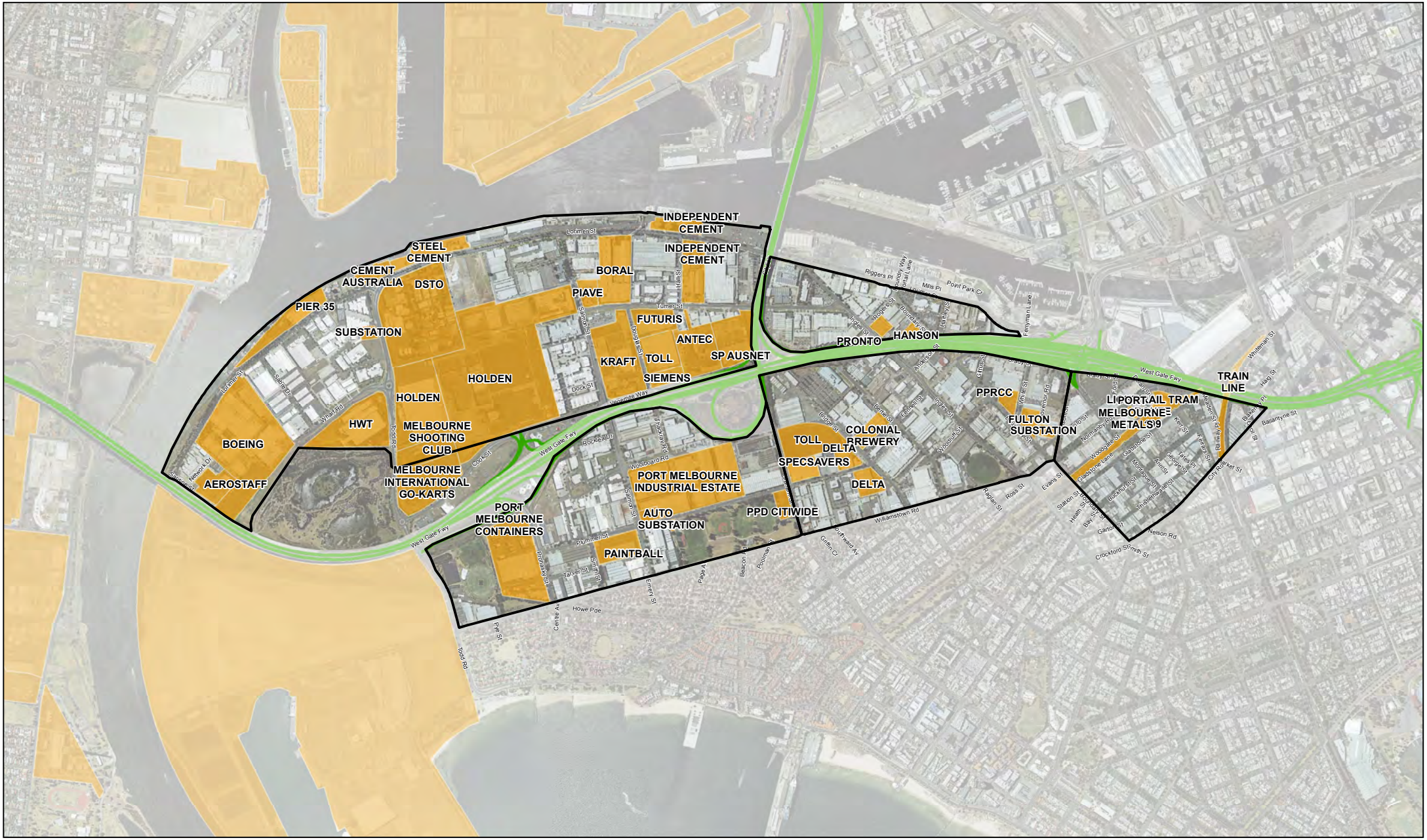
Table 8 Identified Industries within Fishermans Bend Precinct

Company	Operations	Address	Potential Sources	Primary Concern
Lorimer Precinct				
Auto Dealerships/Repairs (Volvo, Land Rover, Subaru etc.)	Car and truck sales and repairs	Various	Trucks, cars, spray painting	Noise, Odour
Hanson	Concrete Batching Facility	Boundary Street, Port Melbourne	Trucks, stockpiling, concrete batching process	Dust, Noise
Factories and warehouses	Various factories and warehouses	Various	Trucks, manufacturing and logistics activities	Noise
Pronto	Concrete Batching Facility	Rogers Street, Port Melbourne	Trucks, stockpiling, concrete batching process	Dust, Noise
Wirraway Precinct				
AusCarts Racing	Indoor Go karts track	50 Salmon Street, Port Melbourne	Go karts	Noise
Melbourne Indoor Paintball	Paintball facility	25 Salmon St. Port Melbourne	Paint guns	Noise, Odour
Factories and warehouses	Various factories and warehouses	Port Melbourne Industrial Estate and various others	Trucks, manufacturing and logistics activities	Noise

Company	Operations	Address	Potential Sources	Primary Concern
Port Phillip Depot - Citywide	Truck depot, storage of parks equipment, mulch, greenwaste piles and road construction material	47 Graham Street, Port Melbourne	Trucks, building materials, greenwaste, mulch	Noise, Dust, Odour
Port Melbourne Containers	Servicing Containers	37 Prohasky Street Port Melbourne	Trucks, cranes	Noise, Lighting
Electrical substation	Electrical substation – electrical distribution	422-430 Plummer Street, Port Melbourne	Transformer, ventilation fan, air conditioning unit	Noise
Sandridge Precinct				
Auto Dealerships/Repairs	Car and truck sales and repairs	Various	Trucks, cars, spray painting	Noise, Odour
Colonial Brewery	Beer brewing	89 Bertie Street, Port Melbourne	Brewing activities	Noise, Odour
Delta Group	Refuse transfer station	577 Plummer St, Port Melbourne	Trucks, building materials	Dust, Noise
Factories and warehouses	Various factories and warehouses	Various	Trucks, manufacturing and logistics activities	Noise
Fulton Hogan Depot	Truck depot	101 Boundary Street, South Melbourne	Trucks, building materials	Dust, Noise
Logistic Services	Container operations	Various	Trucks	Noise
Port Phillip Resource Recovery Centre	Accepts general household rubbish materials for recycling	Corner of White and Boundary Streets, South Melbourne	Rubbish and recyclable materials	Odour, Dust
Specsavers	Eye glasses manufacturing facility	520 Graham St, Port Melbourne	Glass, machinery, trucks	Noise
Electrical substation	Electrical substation – electrical distribution	90-96 Grosvenor Road, Port Melbourne	Transformer, ventilation fan, air conditioning unit	Noise
Montague Precinct				
Auto Businesses/Repairs	Car and truck sales and repairs	Various	Trucks, cars, spray painting	Noise, Odour
Factories and warehouses	Various factories and warehouses	Various	Trucks, manufacturing and logistics activities	Noise

Company	Operations	Address	Potential Sources	Primary Concern
Port Melbourne Metals	Metal Recycling facility	201 Normanby Road, South Melbourne	Trucks, machines, scrap metal	Dust, Noise
Southbank Tram Depot	Trams	Normanby Road, South Melbourne	Trams	Noise
Tram line and stations Route 96 and 109	Trams	Montague Street Light Rail	Trams	Noise
Employment Precinct				
Aerostaff Australia	Research and design in the aerospace and automotive sectors	32 Network Dr, Port Melbourne	Steel cutting and manipulation	Air emissions, Noise
Auto Businesses	Auto Repair/ panel beating	Various	Cars, spray painting	Odour, Noise
Antec	Engineering Products	90 Turner St, Port Melbourne	Steel and machinery trucks	Noise
Boeing Aerostructures	Aircraft Assembly	226 Lorimer St, Port Melbourne	Aircraft Assembly equipment, engines	Air emissions, Noise
Boral	Plasterboard manufacturing	251 Salmon Street, Port Melbourne	Plasterboard and machinery	Dust
Cement Australia	Cement product depot	465 Lorimer St Port Melbourne	Trucks, cement	Dust, Noise
Department of Science and Technology Organisation (DSTO)	Science and technology support for Australia's defence and national security	506 Lorimer Street, Port Melbourne	Aerospace and automotive equipment	Noise, Lighting, Odour, Air emissions
Electrical substation	Electrical substation – electrical distribution	221-229 Todd Road, Port Melbourne	Transformer, ventilation fan, air conditioning unit	Noise
Engineering Services	Research and design in the aerospace and automotive sectors	Various	Aerospace and automotive equipment	Noise, Air emissions
Factories and warehouses	Numerous factories and warehouses	Various	Trucks	Noise
Futuris	Automotive Interiors	80 Turner Street, Port Melbourne	Paints and glues, metal and plastic	Odour, Air emissions
Herald and Weekly Times	Printing facility	127 Todd Rd, Port Melbourne	Inks, printing machines	Odour, Noise

Company	Operations	Address	Potential Sources	Primary Concern
Holden's Global V6 Engine plant	Engine manufacturer	191 Salmon St, Port Melbourne	Engine manufacturing, engines,	Air emissions, Noise
Independent cement	Cement and lime distributer and depot	750 Lorimer St, Port Melbourne	Trucks, stockpiling, cement	Dust, Noise, Lighting
Kraft Foods	Food production	Salmon Street, Port Melbourne	Vegemite food manufacturing, logistics	Odour, Noise
Logistic Services	Container operations	Various	Trucks	Noise
Melbourne International Karting Complex	Go karts complex	50 Salmon Street, Port Melbourne	Go karts	Noise
Melbourne International Shooting Club	Shooting Club	120 Todd Rd, Port Melbourne	Guns shooting	Noise
Metal Fabrication Works	Sheet metal fabrication	Various	Steel and machinery	Dust, Odour
Piave	Concrete batching facility	262 Salmon St, Port Melbourne	Trucks, stockpiling, concrete batching process	Dust, Noise
Small and medium businesses	Numerous factories and warehouses	Portside Business Park, Bridge side Business Park, Lorimer Business Park, Dockside Business Park, Port-It-at-Turner Business Park	Trucks, forklifts, etc.	Noise
SP Ausnet	Terminal station	Terminal station, Port Melbourne	Power terminal station	Noise
Steel cement	Cement depot	469-591 Lorimer Street, Port Melbourne	Trucks, cement	Dust, Noise
South East Water	Fishermans Bend Sewer Mining Plant and sewage extraction system	Eastern section of Employment Precinct near the Bolte Bridge	Sewerage treatment	Odour, Noise



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Industries
- Freeway

DELWP

Fishermans Bend Buffer Report - Update

Job Number 31-34061
Revision C
Date 11 Aug 2016

Industries within the FBURA

with the potential for air, noise or light emissions

Figure 3

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3.2.2 Industries surrounding Fishermans Bend

The identified industries surrounding the five Fishermans Bend precincts are listed in Table 9. The table identifies each company, their operations, address, potential sources on site and the emission type of primary concern for this assessment. Refer to Figure 4 for map locations of identified industries surrounding Fishermans Bend precincts. Note only major sites have been identified in Figure 4. Auto facilities and general factories and warehouses have not been included.

Table 9 Identified Industries Surrounding Fishermans Bend Precinct

Company	Operations	Address	Potential Sources	Primary Concern
ACI Operations Pty Ltd	Glass Manufacturing	2 Booker St, Spotswood	Glass, machinery	Air emissions, Dust, Noise
Albright & Wilson	Phosphates product manufacture	2a Francis St, Yarraville	Phosphate product manufacture	Odour
Brandon Molasses	Blackstrap sugar cane molasses handling facility	80 MacKenzie Road, Footscray	Molasses, trucks, machinery	Odour, Noise
Caltex Australia Petroleum	Petrol Storage	Caltex Newport Terminal 411 Douglas Parade, Newport	Petrol Storage Tanks	Odour, Air emissions
CSR Gyprock	Plasterboard Manufacturing	277 Whitehall Street, Yarraville	Machinery, gypsum, trucks	Dust, Noise
DP World	Container Terminals	Coode Island	Containers, ships, cranes, trucks	Noise, Lighting
Ecogen Energy Pty Ltd	Newport Power Station	350 Douglas Parade, Newport	500 MW gas-fired Power generator	Air emissions, Noise
Grainco Ltd	Grain elevator	Enterprize Road, West Melbourne	Grain handling	Dust, Noise
Marstel Terminals Coode Island Pty Ltd	Bulk storage facility	42-52 Mackenzie Rd, West Melbourne	Storage of propylene oxide and benzene	Odour, Air emissions, Lighting
Mobil Oil Australia	Petrol storage	Yarraville Terminal Francis St, Yarraville	Petrol storage	Odour, Air emissions,
Patrick Stevedore	Container Terminals,	Coode Island and 3-5 Dockside Rd Port Melbourne	Containers, ships, cranes trucks	Noise, Lighting
P&O Ports	Container Terminals,	Coode Island, West Melbourne	Containers, ships, cranes trucks	Noise, Lighting
Sanford Australia	fish market	1/29 Youell St, Footscray	Trucks, fish processing and sales	Odour, Noise
Stolthaven Coode Island	Terminals bulk storage facility	Coode Island, West Melbourne	Bulk liquid hazardous chemical storage facility	Odour, Air emissions, Lighting
Sugar Australia	Sugar refinery	265 Whitehall St, Yarraville	Sugar refining	Odour, Air emissions

Company	Operations	Address	Potential Sources	Primary Concern
Terminals Pty Ltd	Terminals bulk storage facility	54-62 Mackenzie Road, West Melbourne (Coode Island)	Storage of acrylonitrile and propylene oxide, flammable and toxic chemicals (e.g. benzene and ethyl acrylate) combustible and corrosive chemicals	Odour, Air emissions, Lighting
The Shell Co of Australia Limited	Petrol storage	Shell Newport Terminal 91-119 Craig St, Spotswood	Petrol storage tanks	Odour, Air emissions
Toll Shipping	Container terminal	120-150 Williamstown Road, Port Melbourne	Trucks, cranes	Lighting, Noise
Webb Dock	Automotive and container terminal	50 Williamstown Road Port Melbourne	Trucks, cranes, cars, ships	Lighting, Noise

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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LEGEND

- Precinct Boundaries
- Industries
- Freeway

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DELWP

Fishermans Bend Buffer Report - Update

Job Number 31-34061
Revision C
Date 11 Aug 2016

Industries surrounding the FBURA

with the potential for air, noise or light emissions

Figure 4

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3.3 Transport related sources

Additional sources of odour, dust, general air, noise and lighting impacts may be produced from the following transport associated (mobile) activities surrounding and within Fishermans Bend as shown in Table 10.

Table 10 Sources of odour, dust, noise and lighting impacts

Source	Potential Sources	Primary Concern
Westgate Freeway	Cars and trucks (Traffic on elevated roadways and bridges)	Air emissions, Noise, Lighting
CityLink Tollway	Cars and trucks (Traffic on elevated roadways and bridges)	Air emissions, Noise, Lighting
Port of Melbourne	Ships and trucks (wharves and parking zones), cranes and forklifts	Air Emissions, Noise, Lighting
Webb Dock	Ships and trucks (wharves and parking zones), cranes and forklifts	Air Emissions, Noise, Lighting
Rail Freight Facilities	Trucks and cranes	Noise
Local Traffic	Cars and Trucks (traffic)	Air emissions, Noise, Lighting
Helipad at Pier 35 Marina	Helicopters	Noise
Tramline (existing and proposed)	Trams	Noise

3.4 Potential for future development

Several vacant premises were observed during the review of existing industries. The potential for future industries within Fishermans Bend that may cause constraints on the proposed Fishermans Bend development due to air, noise or lighting emissions is unlikely. In part, this is because Fishermans Bend has been zoned Capital City Zone which is reserved for mixed use (including residential) while the land to the north of the Lorimer Precinct is zoned for Docklands development (both these zones are invoked for protection from future industrial development in Clause 52.10).

Also the Business 3 Zoning north of the Wirraway Precinct is normally reserved only for small industrial facilities and warehouse-type businesses, and for uses such as retail, trade supplies and offices. These zones are sometimes sited in order to provide a buffer between industrial zoned land (designed to accommodate facilities requiring larger buffers) and residential areas.

The potential for future industries within the Employment Precinct to cause constraints is also unlikely. This is because the vision for the Employment Precinct is that it is a precinct that is a wold-renowned location for innovative industries, attracting international investment and producing world-leading research, technology and products. Areas of expertise include aerospace, defence, research and development, education, transport, biotechnology, transport and information technologies. These new businesses are highly productive and profitable, but with a low environmental impact generally not requiring buffers, and complement Fishermans Bend as whole through compatible land uses.

4. Relevant Buffer Guidelines and Assessment of all known default buffers

4.1 The importance of separation distances

When there is an inadequate separation distance between an industry and sensitive land uses, remedial action to alleviate off-site impacts may be uneconomic. As a consequence, the viability of the industry is jeopardised and the off-site effects are not alleviated. Provision of adequate separation distances seeks to avoid these potential lose/lose situations.

Two classes of buffer/separation distance guidelines are relevant in the context of planning in Victoria. Where there is an industrial use proposed on a land parcel, then the provisions of Clause 52.10[8] under the Victorian Planning Provisions (VPPs) as specified in the relevant planning scheme will apply. In effect, if the industry is specified in the Table to the Clause, then the corresponding threshold distance to the nearest Residential Zone, Business 5 Zone, Capital City Zone or Docklands Zone (the latter two are relevant here) must be met. A planning permit may be sought to reduce the minimum separation distance; however, the proponent will need to demonstrate that potential offsite impacts would be negligible. Note that should the reverse situation arise (reverse amenity[9]) namely, that is a residential use is proposed, Schedule 4 to the Capital City Zone for Fishermans Bend requires that the threshold distance from any existing industrial and/or warehouse uses referred to in the table to Clause 52.10 must be met otherwise a permit must be sought.

Planning mechanisms, such as environmental overlays, in the planning scheme may also be used to regulate new developments to ensure that that the new use does not have negative impacts on the operations of existing industrial activities. For example, an environmental significance overlay may be introduced to manage potential land use conflicts by requiring any new developments to be assessed in terms of the compatibility, siting and design and potential for conflict.

In the case of an existing industrial use, the use of zoning mechanisms (i.e. industrial zones or the Special Use Zones (SUZ)) or planning overlays (i.e. an Environmentally Sensitive Overlay), specified in the relevant planning scheme allow for noxious industrial activities to be identified in and, where required, buffer distances between the industrial emission point and nearest sensitive receptors may be defined. The EPAV[10] recommend that buffer (now termed separation) distances should be established in the relevant planning scheme as without their implementation by these tools, the default buffers remain recommendations only and cannot be enforced.

A separation distance is a planning instrument used to provide separation of sensitive land uses (i.e. residential, schools, hospitals and recreation reserves) from existing industrial premises with the potential for off-site emissions (odour or dust) that can cause disamenity in the event of an upset/malfunction. Under routine operations, SEPP (AQM) objectives should be met and odour/dust impacts should be confined on-site by the implementation of environmental management practices. Unlike routine emissions, unintended emissions are often intermittent or episodic and may originate at or near ground level. Separation distances seek to avoid the consequence of upset industrial residual air emissions.

[8] Victorian Planning Provisions, Clause 52.10 “Uses with Adverse Amenity Potential”

[9] Reverse amenity refers to the situation where sensitive land uses threaten to encroach into the buffer of an existing industry premises

[10] EPA Victoria Publication 1518 dated March 2013

The purpose of the EPA separation distance guidelines is to provide recommended minimum separation distances between odour or dust emitting industrial land uses and sensitive land uses. Accordingly, the relevant sections of the guideline for this assessment are to:

- Provide clear direction on which land uses require separation
- Inform and support strategic land use planning decisions
- Prevent new sensitive land uses from impacting on existing industrial uses
- Prevent new or expanded industrial land uses from impacting on existing sensitive land uses
- Identify compatible land uses that can be established within a separation distance area

The buffers are to be scribed as per EPA Guidelines Method 1 (Urban method). This method requires that the separation distance be measured from the activity boundary of the industry to the property boundary of the sensitive land use, i.e. this activity boundary of the industry is a convex polygon containing the activities of the industry.

Where facilities that require buffers are not cited in the Victorian EPA guidelines, the corresponding guidelines in Western Australia and South Australia have been examined to give an indication of the buffer distance used in other states, if available.

Note that noise, vibration, ambient and hazardous air pollutants are not considered in the separation guideline. Other regulations, polices and guidance relevant to the consideration of land use separation for protection from the above impacts include:

- State Environment Protection Policy Air Quality Management (SEPP-AQM)
- State Environment Protection Policy (Control of Noise from Commence, Industry and Trade) No. N-1)
- Land Use Planning Near Major Hazard Facilities, WorkSafe, 2010
- Victoria Planning Provisions (VPPs), Department of Planning and Community Development

Noise, vibration and Major Hazard Facilities are covered in the subsequent sections of this assessment.

4.2 Default separation distances

In this case, the EPA Victoria (EPA) recommended separation distance guidelines that apply to existing industries in the vicinity of the subject site are the relevant current guidelines to apply with respect to the future planning of sensitive land uses at Fishermans Bend precinct.

EPA has published[11] recommended separation distances for selected industry categories (EPA Guidelines) that replace the earlier buffer guideline. Separation distances can be used to define zones of land off-site from the industry premises, which are constrained from development for sensitive land uses.

Note that many of the default buffers presented in this assessment have been scribed from the industry's site boundary and not the activity boundaries as required in the EPA's separation guidelines. Further refinement of these buffers to account for only the envelope of the potential sources could be resolved though discussions with the individual site operations at the appropriate time.

[11] EPAV 2013 "Recommended separation distances for industrial residual air emissions" Pubn. 1518, March 2013

4.2.1 Default buffers within Fishermans Bend precinct

Table 11 identifies the recommended buffer distances as specified in the Victorian EPA guidelines for those industries with the potential for off-site emissions (odour or dust) within the five precincts of Fishermans Bend. GHD has also recommended buffer distances it considers appropriate for those industries not specifically defined in the Victorian EPA guidelines. The potential for a buffer reduction is also assessed and what future actions may be applied to potentially reduce the buffer – refer to Figure 7. Refer to Figure 5 for the scribing of the default buffers for all relevant industries within the five Fishermans Bend precincts. Auto facilities have not been included due to the sheer number of them within the five precincts.

Table 11 Default Buffers for Industries within Fishermans Bend **Precinct's** (refer to Figure 7 for industries with the potential to have a reduced buffer)

Company	Industry Class	EPA Default Buffer (m)	Potential for a buffer reduction	Future actions to potentially reduce the buffer
Lorimer				
Auto Panel beaters	N/A	N/A	N/A	None
Hanson	Concrete Plant	100	Yes	Transition
Pronto	Concrete Plant	100	Yes	Transition
Wirraway				
Melbourne Indoor Paintball	N/A	N/A	N/A	None
Port Phillip Depot-Citywide	N/A	N/A	N/A	None
Sandridge				
Auto Dealerships	N/A	N/A	N/A	None
Colonial Brewery	Malt works	250	Yes	To be pro-rated based on throughput
Delta Group	Transfer Station	250	Yes	Determine what operations occur on site
Fulton Hogan Depot	N/A	N/A	N/A	None
Port Phillip Resource Recovery Centre	Transfer Station	250	Yes	Determine what operations occur on site
Montague				
Auto Businesses	N/A	N/A	N/A	None
Port Melbourne Metals	Materials recovery and recycling facility	Case by Case	N/A	Given the size of the facility and nature of operations, GHD recommends that no buffer is required

Company	Industry Class	EPA Default Buffer (m)	Potential for a buffer reduction	Future actions to potentially reduce the buffer
Employment Precinct				
Aerostaff Australia	N/A	N/A	N/A	None
Auto Businesses	N/A	N/A	N/A	None
Boeing Aerostructures	N/A	N/A	N/A	None
Boral	Plasterboard and plaster article manufacture	100	Yes	Transition
Cement Australia	Cement Handling	250[1]	Yes	Transition
DSTO	N/A	N/A	N/A	None
Futuris	N/A	N/A	N/A	None
Herald and Weekly Times	Printing facility	500[4]	Yes	To be pro-rated based on throughput
Holden's Global V6 Engine plant	Engine manufacturer	500[2]	Yes	Determine future plans for the site
Independent cement	Cement and lime distributer and depot	250[1]	Yes	Transition
Kraft Foods	Food production	250[3]	Yes	Transition
Metal Fabrication Works	Sheet metal fabrication	N/A	N/A	None
Piave	Concrete batching facility	100	Yes	Transition
Steel cement	Cement distributer and depot	250[1]	Yes	Transition
South East Water	Sewer mining plant and sewage extraction system	520[4]	Yes	Buffer is dependent on equivalent population of the facility

[1] GHD has applied the cement manufacturing category as the nearest relevant category for cement handling and storage; the smallest throughput category was applied

[2] In lieu of relevant Victorian guidelines the South Australian Buffer guidelines were sourced for vehicle production for greater than 2,000 vehicles a year

[3.] The most relevant category in the Victorian guidelines is under food production 'malt works' as the main ingredient for Vegemite is yeast extract which is a by-product of beer manufacturing

[4.] Based on a capacity of 36 MLD, assuming 250 L per person per day the equivalent population of the facility is 144,000. Applying the EPA separation distance guideline for mechanical/biological wastewater plant (most relevant category) gives a buffer of ~520 m

Paper Size A4

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Industries without recommended default buffers
- Industries with recommended default buffers
- Default buffers
- Freeway

DELWP
Fishermans Bend Buffer Report - Update

Job Number 31-34061
Revision C
Date 11 Aug 2016

Default EPA Buffers within the FBURA

Figure 5

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4.2.2 Buffer constraints within Fishermans Bend

Lorimer

The two main constraints within the Lorimer Precinct are posed by the concrete batching plants (Pronto and Hanson) - each attracting a 100 m buffer.

Figure 5 shows that a portion of the central section of the precinct is encompassed by the 100 m buffers for the concrete batching plants. There are no other constraints within the Lorimer precinct.

Wirraway

No current constraints were identified within the Wirraway precinct. However, Kraft's 250 m buffer extends approximately 180 m into the northern section of the Wirraway Precinct and the 500 m buffer for Holden nominally encompasses a slight sliver of land along the northern boundary, in the western portion of the precinct.

Sandridge

The main constraints within the Sandridge Precinct arise from; (i) the Delta Group's transfer station, Port Phillip Resource Recovery Centre (transfer station) (PPRRC), and (ii) the Colonial Brewery. The transfer stations attract a buffer of 250 m, while the brewery also attracts a 250 m buffer. Figure 5 shows that most of the Sandridge Precinct is encompassed by the four default buffers. It also shows that the buffers are mostly contained within the precinct.

Montague

No constraints were identified within the Montague precinct. The PPRRC nominally encompasses a slight sliver of land along the western boundary of the precinct.

Employment

Figure 5 shows that majority of the Employment Precinct is encompassed by the default buffers for the identified industries.

Kraft's 250 m buffer also extends approximately 180 m into the northern section of the Wirraway Precinct.

The 250 m buffer for Kraft has been taken from the most relevant category in the Victorian guidelines under food production 'malt works' as the main ingredient for Vegemite is yeast extract which is a by-product of beer manufacturing. There is no specific buffer that applies to the Kraft site from the Victorian guidelines or any other state. Further analysis of the site operations to define upset scenarios may modify the buffer size. Discussion should also be had with EPA as to what they consider an appropriate separation distance.

GHD is also aware of plans for a proposed Sewer Mining Plant and sewage extraction system to be operated by South East Water. The plant is at the preliminary design phase and is to be located within the eastern portion of the precinct near the Bolte Bridge (this is subject to change). Applying the EPA separation distance guidelines results in a 520 m buffer, constraining large portions of Fishermans Bend.

Also note that the default buffer for Holden has been scribed from the envelope of potential sources namely the global V6 engine plant and not the entire site boundary as was done for the other industries. This was done as the area enclosed by the site boundary is very large and a buffer scribed from the site boundary would encompass large portions of Fishermans Bend unnecessarily. GHD is of the opinion that all buildings except for the V6 plant on the Holden site are disused. The application of a 500 m buffer for Holden is conservative as the South Australian guidelines are for vehicle manufacturing which includes a paint/body shop, the site at Port Melbourne only manufactures engines; thus the 500 m buffer may be reduced with further analyses of site operations, complaint history and any plans for the manufacturing to completely transition off-site.

For those industries identified by GHD but not within a listed category in the EPA guidelines the next most appropriate measure to assess if they have the potential to constrain the future development of Fishermans Bend and to assess the available separation distance from the industry to the proposed residential uses of Fishermans Bend. Figure 4 shows that the available separation distances to Fishermans Bend is quite large for the industries that might require a larger separation distance. For example, Boeing is 800 m and DSTO is 650 m. Metal fabrication facilities may require a smaller buffer in the order of less than 250 m; however, the available separation to proposed residential uses within Fishermans Bend is greater than 300 m. Therefore, all identified industries not attracting buffers have sufficient separation between the proposed sensitive uses and their site.

4.2.3 Default buffers surrounding Fishermans Bend precinct

Table 12 identifies the recommended buffer distances as specified in the Victorian EPA guidelines for those industries surrounding the precincts of Fishermans Bend. GHD has also recommended buffer distances it considers appropriate for those industries not specifically defined in the Victorian EPA guidelines using other relevant State guidelines. Refer to Figure 6 for the scribing of the default buffers for all relevant industries surrounding the five Fishermans Bend precincts. Auto facilities have not been included due to the sheer number of them within the five precincts. GHD has also defined the available separation distance to Fishermans Bend from each of the identified sources. The potential for a buffer reduction is also assessed and what future actions may be applied to potentially reduce the buffer – refer to Figure 7 .

Table 12 Default Buffers for Industries surrounding Fishermans Bend Precinct (refer to Figure 7 for industries with the potential to have a reduced buffer)

Company	Industry Class	EPA Default Buffer (m)	GHD recommended Buffer (m)	Available Separation distance to Fishermans Bend Precinct (m)	Potential for a buffer reduction	Future actions to potentially reduce the buffer
ACI Operations Pty Ltd	Glass, glass products and rock wool manufacturing	500	500	685	No	None
Albright & Wilson	Other organic and inorganic chemical production	2,000	2,000	405	Yes	Determine what operations occur on site and to be pro-rated based on throughput
Brandon Molasses	Blackstrap sugar cane molasses handling facility	N/A	None	510	N/A	None
Caltex Australia Petroleum	Storage of petroleum and hydrocarbon products	250	250	615	No	None
CSR Gyprock	Plasterboard and plaster article manufacture	100	100	545	No	None
Grainco Ltd	Grain elevator	250	250	710	Yes	To be pro-rated based on throughput
Marstel Terminals Coode Island Pty Ltd	Storage of petroleum and hydrocarbon products	250	250	650	No	None
Mobil Oil Australia	Storage of petroleum and hydrocarbon products (floating roof tanks)	100	100	360	No	None
Sanford Australia	Seafood	500	500	1,500	Yes	Determine what operations occur on site and to be pro-rated based on throughput

Company	Industry Class	EPA Default Buffer (m)	GHD recommended Buffer (m)	Available Separation distance to Fishermans Bend Precinct (m)	Potential for a buffer reduction	Future actions to potentially reduce the buffer
Stolthaven Coode Island	Storage of petroleum and hydrocarbon products	250	250	1,100	No	None
Sugar Australia	Sugar refinery	N/A	1,000[1]	485	Yes	Determine what operations occur on site and to be pro-rated based on throughput
Terminals Pty Ltd	Storage of petroleum and hydrocarbon products	250	250	895	No	None
The Shell Co of Australia Limited	Storage of petroleum and hydrocarbon products	250	250	1,000	No	None

1. GHD has applied the Western Australian guidelines for sugar refining in the absence of an equivalent buffer distance in the Victorian EPA guidelines.

Paper Size A4

0 260 520 1,040

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Industries without recommended default buffers
- Industries with recommended default buffers
- Default buffers
- Freeway

DELWP
Fishermans Bend Buffer Report - Update

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Revision C
Date 11 Aug 2016

Default EPA Buffers surrounding the FBURA

Figure 6

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Data source: DELWP, Vicmap, 2016; GHD, Analysis Data, 2016; CIP, Imagery, 2013. Created by: lrsmith

Paper Size A3

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Freeway
- Contact Industries to Understand Site Operations (Further Investigation)
- Contact Industries to Establish their Future Plans (Transition)

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Fishermans Bend Buffer Report - Update

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Industries with the Potential to Have a Reduced Buffer

Figure 7

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4.2.4 Buffer constraints impacting Fishermans Bend from the surrounding area

Figure 6 shows that only two industries outside of Fishermans Bend pose a potential constraint to Fishermans Bend, those being Albright and Wilson (producer of chemicals - phosphate) and Sugar Australia (sugar refinery). These two buffers not only extend to cover a large area of land within the Employment Precinct but the default buffer for Albright and Wilson extends to encompass 500 m within the western portion of the Wirraway precinct.

The only relevant category in the EPA guidelines for phosphates production would be – 'other organic and inorganic chemical production', requiring a buffer of 2000 m. Note that this is a broad catch-all buffer which can be reduced on the basis of obtaining site operational information which may include throughput information and specific site operational details.

While there is no default buffer given in Victorian EPA's guideline for Sugar Australia's refinery, GHD considers it to be a significant industry requiring a buffer. The Western Australian buffer guidelines recommended a buffer of 1000 - 1500 m depending on the waste water disposal system and size for a sugar refinery. GHD has recommended 1000 m in lieu of any Victorian guidance. Again, the buffer may be reduced on the basis of obtaining site operational information which may include throughput information and specific site operational details.

4.2.5 Overall constraints

Fishermans Bend is abutted to the north by Special Use Zone (SUZ) and Docklands zone land and to the west by Special Use Zone - Port of Melbourne land, on which numerous existing industries operate that attract a buffer distance. Fishermans Bend itself contains Industrial 1 Zoned land within the Employment Precinct, with many industries requiring buffers. This buffer analysis indicates that there is adequate provision to separate the proposed residential components within Fishermans Bend from all existing industries outside Fishermans Bend, using the buffers recommended by EPA. The two exceptions are the Kraft Foods facility and potentially the Albright and Wilson Facility (dependent on operations and throughput) - both constrain portions of the Wirraway Precinct.

Within Fishermans Bend, there are a number of industries that will constrain portions of developable land, with the most prominent constrained precincts being Sandridge and Lorimer. Note however, there are areas within both precincts that would be acceptable for sensitive residential or sensitive non-residential uses without any further investigations into individual industrial operations.

The entire Employment Precinct is currently constrained by buffers from both within and surrounding this precinct. The proposed sewer mining plant also has the potential to constrain a large portion of Fishermans Bend.

An assessment of the current separation available from the existing industries to existing receptors (residential areas) is recommended. Under the Victorian Planning Provisions (VPPs) existing industrial land uses have rights which enable them to operate provided they comply with relevant regulations. One way of assessing if there is a potential issue is to check the complaint history from the residents within these buffers. Large portions of the suburb Yarraville are encompassed by default buffers for industries surrounding Fishermans Bend (Sugar Australia and Albright and Wilson). Should the complaint history within these buffers indicate a lack of complaint, then they may be too large for the current operations on-site and have the potential to be de-rated. While, within Fishermans Bend, the only default buffer that extends to encompass some existing residents is the Delta site transfer station site in the Sandridge Precinct, which extends to encompass some resident's south of the site in Port Melbourne. Again the complaint history will assist in deciding if the buffer is adequate or in fact too large.

Further work is recommended to investigate the potential for reduction of default buffers based on throughput by assessing the actual operations on-site and the possibility and likelihood of upset conditions occurring. This would require co-operation of the industries to provide operational information that may potentially be sensitive or classified. The de-rating may assist in reducing the default buffers for:

- Albright and Wilson
- Sugar Australia
- Colonial Brewery
- Holden
- HWT
- Delta
- PPRRC

However, it is important to remember that the buffers are for upset operations only; routine emissions must meet SEPP (AQM) guidelines. Also, the separation distances apply to recreational areas such as parks '*informal outdoor recreation sites'* which may constrain the development of parks and green space land within Fishermans Bend.

The separation guidelines also state that under the VPPs industrial land uses have rights, which enable the industry to operate, provided they comply with relevant regulations. In this case, when a strategic land use plan is being developed for a precinct transitioning from industrial to mixed use, the planning authority should consult with potentially affected industries in order to develop a stage implementation plan that allows for the smooth transition of land uses over a period of time.

The separation guidelines allow the recommended separation distances to be varied (i.e. reduced) for site specific cases. One of the criteria for varying the separation distances is the case of "transitioning of the industry". In this case, Fishermans Bend is planned to transition from industrial to mixed land use and the relevant industry buffers may be reduced with agreement of the industries and EPA, as the industries transition out of the area over a designated timeframe. During the transitional phase of Fishermans Bend when significant industrial activities will leave the area to be replaced by low environmental impact industries, opportunities will be created to expand the amount of non-residential sensitive land uses within the Employment Precinct.

The separation distance guidelines also allow for buffers to be modified to take account of local meteorology, and the analyses considering the local meteorological influences, is presented as directional buffers in sections 7.8.1 and 8.8.1.

5. Major Hazard Facility identification

GHD understands that there may be a potential for hazardous facilities to impact Fishermans Bend. GHD has checked with WorkSafe Victoria's (WorkSafe) Major Hazard unit to identify facilities under this designation within and surrounding Fishermans Bend and to identify any safety separation distance if applicable.

5.1 What is a Major Hazard Facility (MHF)?

A Major Hazard Facility (MHF) is an industrial site that stores, handles or processes large quantities of hazardous chemicals including dangerous goods, such as petroleum products.

Examples include:

- Oil refineries
- Chemical manufacturing sites
- Gas-processing plants
- LPG facilities
- Some warehouses and transport depots

MHFs require stringent design, operation and regulation so that a serious incident, with effects outside the site, is unlikely. It is the responsibility of the operators of a MHF to reduce the risk to the surrounding area so far as is reasonably practicable where it cannot be eliminated. Also it is important that land use planning minimises exposure of people close to a MHF.

To operate a MHF in Victoria a licence must be granted by WorkSafe Victoria. The licensing process includes assessment, clarification and verification of a Safety Case and other relevant information. WorkSafe then has information about the nature and extent of risks that may potentially affect the surrounding land and is able to provide advice to authorities responsible for planning.

5.2 Planning considerations

Planning authorities should seek WorkSafe's advice as to the development and implementation of appropriate planning zones and determination of planning applications[12]. This advice utilises the concepts of individual and societal risks, which can be expressed quantitatively or qualitatively. WorkSafe's advice on these risk concepts is based on a review of the Safety Case and any other relevant information that allows a reasonable estimate of areas of land affected by potential incidents at a MHF.

WorkSafe believes it is appropriate to present the extent of risk areas around a MHF in the form of planning advisory areas, namely:

1. Inner planning advisory area - the individual risk of fatality from potential foreseeable incidents is greater than or equal to $1x10^{-7}$ per year (one chance in 10 million years)
2. Outer planning advisory area - the consequence of a credible incident is not likely to cause a fatality but persons present may suffer some adverse effects or have difficulty responding to an emergency that may result in injury or harm.

[12] Land Use Planning Near Major Hazard Facilities, WorkSafe, 2010

WorkSafe's advice on proposed land use or developments within these areas takes account of:

- The numbers, occupancy and vulnerability of persons likely to be present at the proposed development
- The ability of those persons present to be organised and to safely respond to an emergency at the nearby MHF
- Potential societal risk that may arise due to the overall impact on developments and people present on land surrounding the MHF

WorkSafe generally advises against the following proposed land use or developments:

- Land use or developments within the inner area, apart from low density industrial uses such as non-retail warehousing or other low employee density business or industrial use. This minimises the numbers of people that might be affected by a low frequency-high consequence incident and maximises the likelihood of people safely responding to an emergency
- Land use or developments within the outer area for residential, business or other use where people likely to be present are not able to safely respond to a potential emergency situation or the proposal may result in unacceptable societal risk e.g. a large number of people present
- Planning scheme amendments that may result in unacceptable societal risk because of the cumulative effects to all developments and persons that may be present on land surrounding a MHF

5.3 MHFs surrounding Fishermans Bend

Victoria has approximately 45 MHF sites, which must comply with stringent legal requirements, including preparation of a Safety Case, to ensure they are operated safely. Table 13 and Figure 8 outlines the existing MHFs in the surrounding suburbs of Fishermans Bend. There were no MHF sites identified within Fishermans Bend Precinct. Table 13 shows that the closest MHF site is the Mobil Oil Australia facility in Yarraville, 360 m from Fishermans Bend precinct.

Table 13 MHF- Licenced and Registered Facilities

Company	Address	Distance to Fishermans Bend (km)	Direction from Fishermans Bend
Caltex Australia Petroleum Pty Ltd	411 Douglas Parade, Newport	615	Southwest
Mobil Oil Australia Pty Ltd	29 Francis Street, Yarraville	360	West
Viva Energy Australia Ltd (	Burleigh Street, Spotswood	900	Southwest
Stolthaven Coode Island Pty Ltd	42-52 MacKenzie Road, West Melbourne	1.0	North
Terminals Pty Ltd	70-78 Mackenzie Road, West Melbourne	895	North

Paper Size A3

0 115 230 460 690 920

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- MajorHazardFacilities
- Freeway

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Fishermans Bend Buffer Report - Update

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Major Hazard Facilities - Surrounding Fishermans Bend

Figure 8

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5.4 Advice available from WorkSafe

WorkSafe is progressively providing maps to each authority responsible for planning. These maps show the planning advisory areas for the MHF in their area affected by low frequency-high consequence events. When read in conjunction with the planning considerations discussed previously, the maps should allow authorities responsible for planning to understand this general advice without the need for additional information.

An example of this safety separation distance map for Coode Island is provided in the WorkSafe attachment in Appendix B. From Appendix B, it can be seen that Fishermans Bend is well outside of the outer planning advisory area for Coode Island's MHFs.

5.5 Development constraints

A number of Major Hazard Facilities (MHFs) were identified surrounding Fishermans Bend Precinct. There were no MHF sites identified within Fishermans Bend Precinct. The separation distance from the identified MHF facilities to Fishermans Bend is adequate not to result in any constraints to the development. GHD is of the opinion that Fishermans Bend will be outside of the outer planning advisory areas for all identified MHFs.

5.6 Further work

Further safety separation distance assessments could be sought by DELWP from WorkSafe for all identified MHF sites nearby Fishermans Bend to confirm that Fishermans Bend will be outside of the outer planning advisory areas of the identified MHFs.

WorkSafe recognises that the planning considerations discussed previously may require further interpretation on specific planning proposals close to a MHF. There is the potential for risks arising from the MHFs identified to impact the area of the proposed Fishermans Bend development, either directly or due to the potential for knock-on effects. These sites typically have licences to operate a MHF from statutory planning bodies through the submission of a Safety Case, which sets out how the facility will be operated safely. GHD could review the Safety Cases of those sites to assess whether the off-site risks have been assessed for the proposed development area against the relevant risk criteria. In the case of off-site risk to the general population, a set of 'interim' criteria have been used in a number of cases in Victoria (i.e. Interim Victorian Risk Criteria – Risk Assessment Guidelines). Although the criteria do not have legal status, they provide guidance on individual and societal risk values.

If required, GHD could carry out an assessment, such as a semi-quantitative risk assessment, to assess whether the proposed Fishermans Bend will be potentially impacted by those MHFs. It involves a consistent approach in defining the likelihood, consequence and severity of major incidents from the MHFs through consequence and risk modelling. This will enable the generation of risk contours that will confirm the risk currently applicable around the sites and that experienced in the area of the proposed development. This will then be assessed against the Victorian "Interim" Risk Criteria to assess whether the risk is acceptable.

6. Site representative meteorology

6.1 Wind pattern

Local wind climate largely determines the pattern of off-site odour and dust impact. The characterisation of local wind patterns requires accurate site-representative hourly recordings of wind direction and speed over a period of at least a year.

GHD has access to high quality meteorological data (nine years at 30 minute intervals) at the original location of the Port of Melbourne control tower. Other stations located in or near the CBD are mounted on 10 m masts and are generally influenced by nearby building wakes. The Port Melbourne data was obtained at height of approximately 50 m, which is clear of wake influences, and accordingly is the only reliable data source for this assignment at Fishermans Bend. GHD has applied a correction factor to reduce the 50 m wind data down to 10 m to be representative of a standard 10 m mast.

The data has been analysed to develop the derived parameters of stability category and mixing height.

GHD selected the year November 1998 – November 1999 as the most representative year i.e. average rainfall – not too dry or wet compared to the long term average rainfall for Melbourne.

The effect of wind on dispersion patterns can be examined using the general wind climate and atmospheric stability class distributions. The general wind climate at a site is most readily displayed by means of wind rose plots, giving the incidence of winds from different directions for various wind speed ranges.

The features of particular interest in this assessment are: (i) the prevailing wind directions and (ii) the relative incidence of more stable light wind conditions and (iii) good dispersion conditions winds over 5 m/s.

Note that the development of Fishermans Bend in the urban form could affect the nature of wind systems at a local level (pedestrian wind comfort). Any proposed buildings would require a wind assessment as part of the permit application process to meet the requirements of AS 1170.2-2011 – Structural design actions Part 2: Wind Action and pedestrian wind comfort criteria.

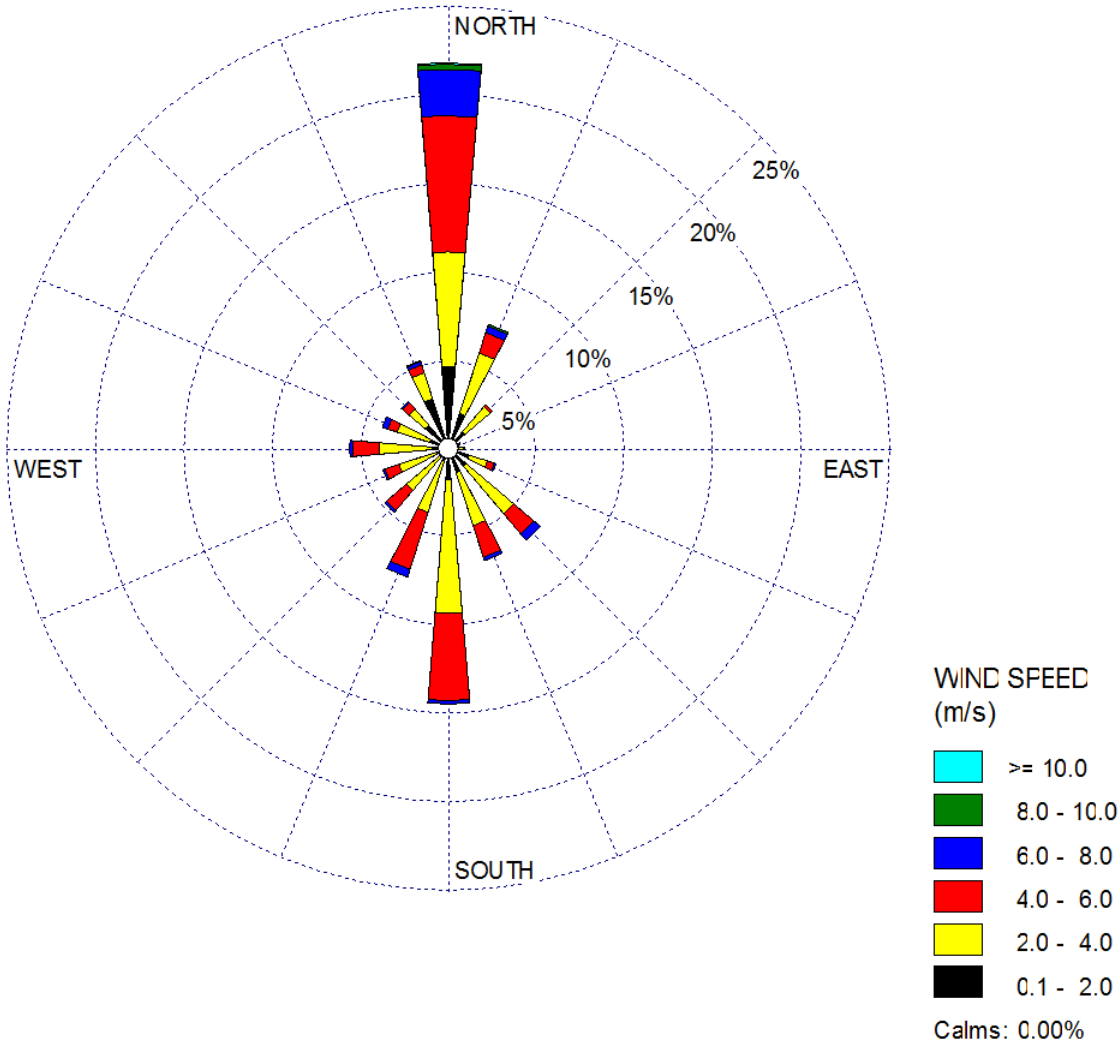
6.1.1 Annual pattern in wind

The average wind rose for the entire data period is shown in Figure 9 and shows the following features:

- The predominant annual average wind directions are from the north and south comprising of 37% of incident winds
- The most frequent winds are on a north-south axis, reflecting the northerly winds due to influence of the Kilmore gap in the north and the extension of winds to the south due to the alignment of the Maribyrnong river valley
- When winds are light and atmospheric conditions are stable, the near-surface air flows are guided by the valley sides
- The incidence of westerly component winds (~5.5%) is substantially higher than easterlies occurring <1% of the time
- The annual average wind speed measured was 3.3 m/s

- The observed wind speed distribution indicates that the largest proportion of high wind speeds (> 5 m/s) are from the north, while the largest proportion of light winds (<2 m/s) are also form the north. This indicates that the good dispersion conditions (winds >5 m/s) would blow dust particles to the south more than any other direction, while for poor dispersion conditions dispersion (winds <2 m/s) odour is likely to disburse to the south more than any other direction. Those industries north of Fishermans Bend have the greatest potential to cause constraints to the precinct.

Figure 9 Annual Wind Rose for Port Melbourne



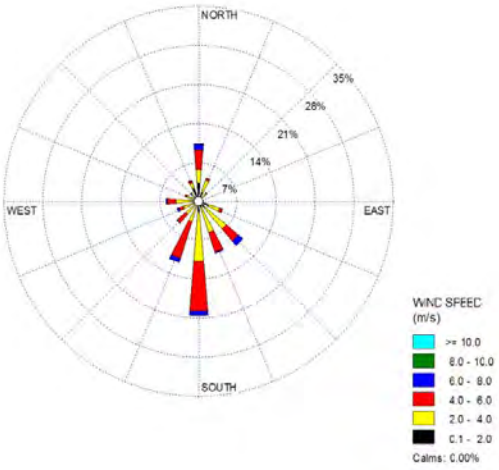
6.1.2 Seasonal variation in wind pattern

The seasonal wind roses in Figure 10 below show that:

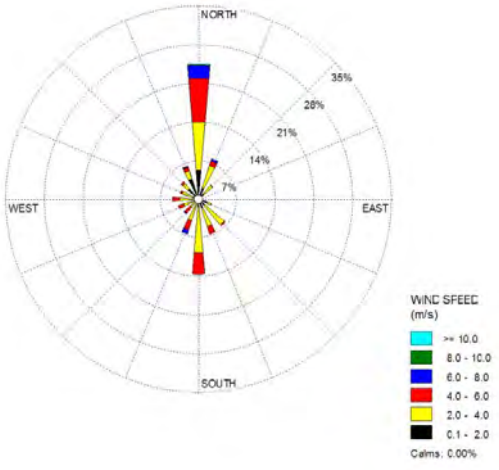
- During winter, northerly winds are the most dominant due to pre-frontal northerlies and cool air drainage flows towards Port Phillip Bay from the hills and mountains from the surrounding land in the north. They comprise ~35% of incident winds
- During summer, the influence of the sea breeze is evident as a result of sea breezes experienced in the late afternoon and evening from the coast, combined with the synoptic sub-tropical ridge migrating to the south of this location during the warmest months of the year. The predominant wind direction is southerly, and including south southwest and south southeast winds, comprises of 43% of total summer winds
- Spring and autumn are transitional periods. During these months both summer and winter patterns are observed, as well as an increase in the frequency of synoptic westerlies
- The seasonal incidence of high winds (>6 m/s) is greatest in winter, and lowest in summer
- The incidence of light (<2 m/s) winds is greatest in winter, followed by autumn
- As with the annual wind rose, there is a lack of easterly winds in all seasons although winds south of east can occur in summer
- The direction and high proportion of light winds in winter is a mixture between north and northeast. These drainage flows are likely to be associated with high stability and can be expected to define the directions of poorest dispersion towards Fishermans Bend.

Figure 10 Seasonal Wind Roses for Port Melbourne

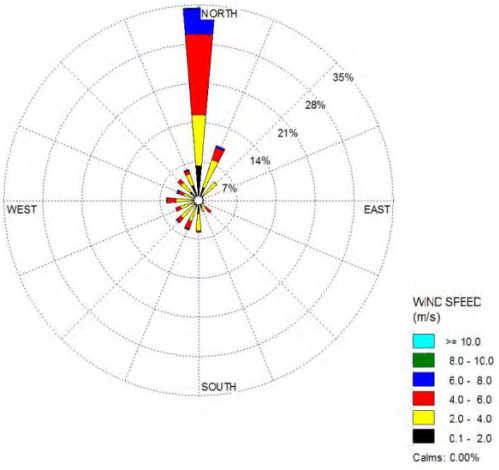
Summer (average speed = 3.4 m/s)



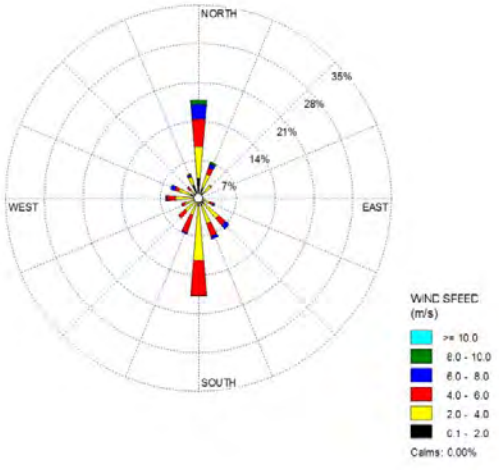
Autumn (average speed = 3.0 m/s)



Winter (average speed = 3.2 m/s)



Spring (average speed = 3.4 m/s)



6.2 Pattern of atmospheric stability

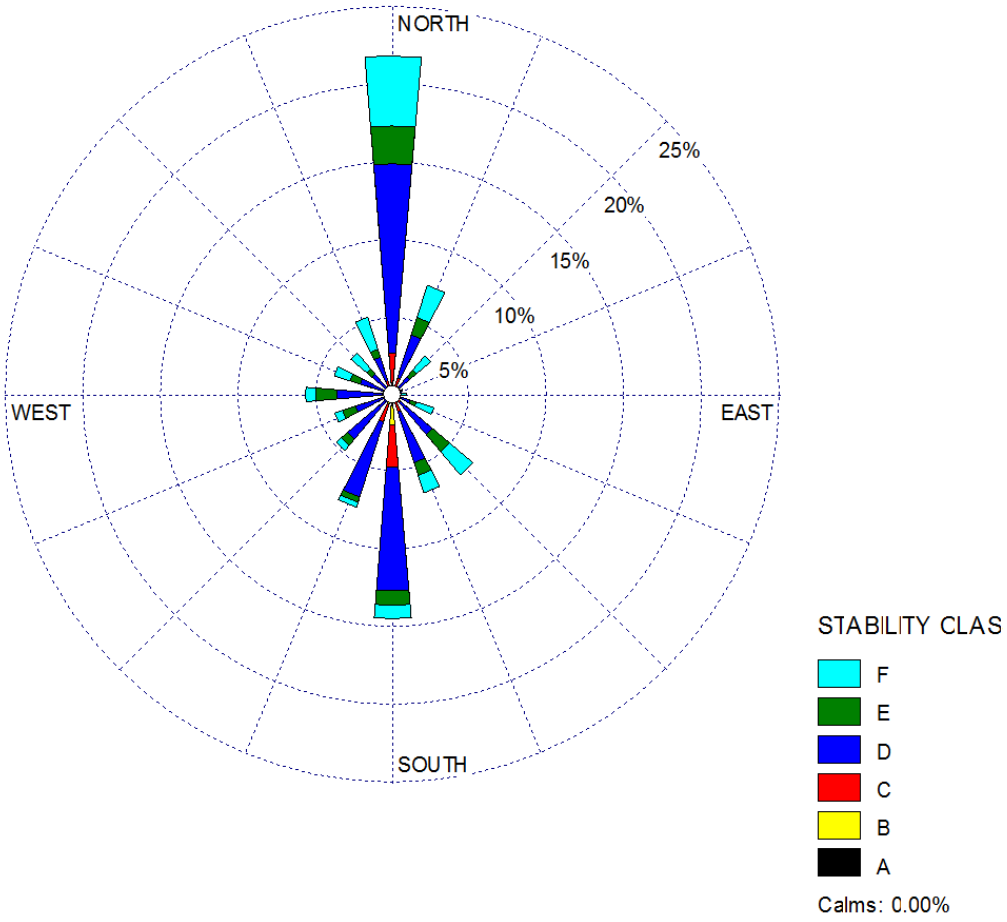
In the Pasquill/Gifford atmospheric stability scheme, stability is classified into six classes A through F. A, B and C stability classes represent strongly, moderately and slightly unstable atmospheres respectively. Under unstable conditions dispersion of emissions from near-ground sources is good due to convectively vertical turbulent mixing. The stability category D denotes neutral atmospheric conditions (strong winds in moderate temperatures or lighter winds on overcast to partly cloudy days). Categories E and F denote slightly and moderately stable atmospheres when dispersion is poorest, as vertical mixing of air is suppressed. Stable atmospheric conditions occur in the absence of strong gradient winds and mostly on nights with clear skies. They are often associated with ground-based radiation forced temperature inversions, sometimes with fog, mist or frost.

Neutral stability (D class) conditions occur most frequently and along with the prevailing wind direction can indicate the most common direction for potential impact. Under night-time E and F class conditions, emissions from ground based sources can result in a downwind plume that is detectable to a greater distance than during the day.

6.2.1 Annual average directional pattern in atmospheric stability

Figure 11 shows the stability rose for the entire data period. Noting that a neutral atmosphere (D) is normally the dominant stability state of the atmosphere at Port Melbourne, D class conditions occur at 49.7% incidence while the A, B and C class contribute unstable 17.5% of the time and the stable E and F conditions occur at a 32.8% incidence. Figure 11 shows that the majority of stable winds are from the north (~7%) and south (~2%). In other words, as expected, the down-valley cool air drainage flow is the dominant stable flow direction.

Figure 11 Annual Stability Rose for Port Melbourne

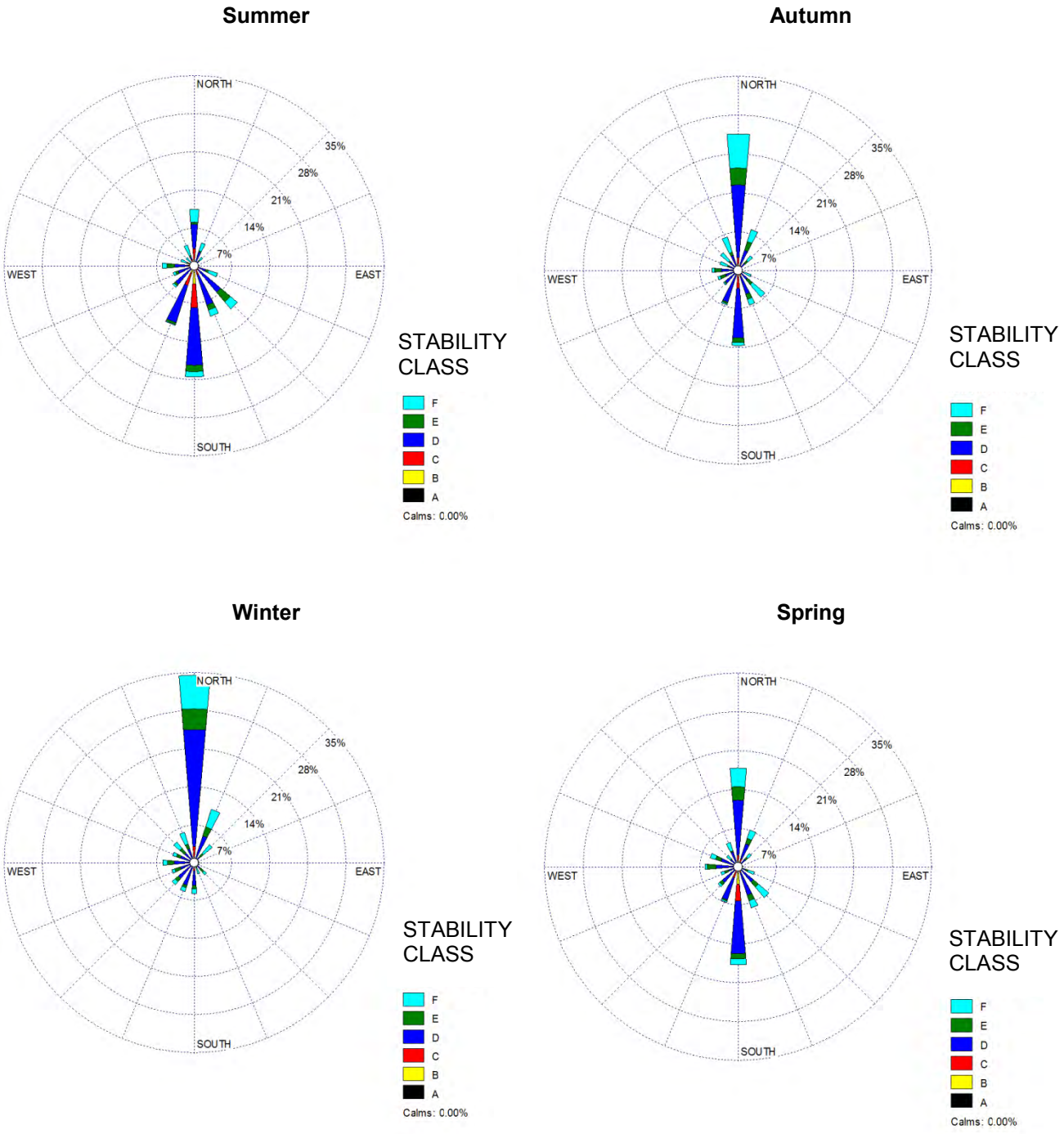


6.2.2 Seasonal variation in atmospheric stability

Error! Reference source not found. shows the following seasonal variation trends in a tmospheric stability

- In summer, the peak occurrence of stable winds is from the south and southeast this would reflect the incidence of the late afternoon sea breeze
- In winter, stable winds predominate from the north
- In autumn, stable winds predominate from the north
- In spring, stable winds predominate from the north

Figure 12 Seasonal Stability Roses for Port Melbourne



7. Desktop odour review

7.1 Overview

In conducting this assessment, those industries requiring buffers based on their potential for off-site odour impact that are located either in or in the vicinity of Fishermans Bend have been identified. The potential for an odour impact within Fishermans Bend is reliant on odour emissions from a premises coinciding with:

- A wind direction placing elements of Fishermans Bend directly downwind
- The occurrence of a 'spike' in odour emissions from the premises
- The occurrence of 'poor dispersion' conditions

These factors can at least in part be assessed for the candidate industry premises, and the likelihood of their concurrence can be estimated.

In conducting the assessment, emphasis is placed on establishing each industry's past performance with respect to off-site odour impact, as gauged by the incidence of complaints lodged with local council or EPA.

The default buffers are normally applied as a radial distance scribed from the envelope of potential odour sources at the premises as detailed in section 4. In effect, a radial buffer distance is resorted to in situations where there is no information on the local meteorology, i.e. the directions of good and poor dispersion are unknown. When site-representative meteorology is available, then these directions of good and poor dispersion can be assessed, and the default buffer can respectively be retracted and extended. When this is done, the directional buffer formed serves to provide the same degree of protection from upset odour events, independent of the direction of the sensitive land use from the emitting premises.

GHD has developed a methodology to develop directional buffers that are representative of the site. A technical paper giving details of the technique was presented at Enviro 04[13]. GHD has applied directional buffers in a wide range of planning scenarios and the analysis has been accepted at Planning Panel and VCAT hearings.

7.2 What is odour?

Odour as defined by the Victorian EPA is as follows: *"An odour is perceived when chemicals in gas form stimulate the human olfactory system (your nose). The human nose has hundreds of receptors, each coded by unique DNA to detect different odours, and therefore accounting for why different people have different sensitivity and reactions to smell. Scientists also suggest that the sense of smell is intimately associated with the formation of memories. Reactions to odours can be very subjective. A smell may be pleasant to one person and unpleasant to someone else. This can make the objective assessment of odour difficult to achieve".*

[13] Clarey P, Pollock T. "Integrating Separation Distances with Dispersion Modelling" Enviro 04

7.3 Victorian odour criterion

The SEPP (AQM) requires that no person pollute the atmosphere to make it offensive to the senses of human beings. For new or expanded industrial premises, the SEPP (AQM) requires that Design Criteria (DC) specified for a wide range of pollutants be met at the 99.9th percentile level. The DC is normally expressed as a concentration that must not be exceeded in the environment. Where a pollutant's DC is based on toxicity, then the DC must be met both within and outside the premises boundaries. However, when the DC is based on odour threshold (i.e. the pollutant is an odorant), then the DC need only be met at and beyond the premises site boundary.

The DC for mixed odorants is specified in Schedule A to the SEPP (AQM), where under 'unclassified' indicators the DC for 'general odour' is set to 1 odour unit (OU). Part C to Schedule C of the SEPP (AQM) requires that the predicted maximum concentration of pollutant should not exceed the 9th highest in the 100 highest table of model results – or the 99.9th percentile level.

However, in the last revision of SEPP (AQM) in December 2001, an odour limit relaxation was allowed for intensive animal husbandry in rural areas (i.e. piggeries, broiler farms, cattle feedlots) where the criterion was set to 5 OU at 99.9th percentile (refer to footnote 9 to Schedule A of SEPP (AQM)).

The legislation does not restrict the emission of odour beyond the boundaries of the premises. The restriction only applies to odour that is offensive or adversely affects local amenity or aesthetic enjoyment (beneficial uses set out in the SEPP) of the air environment. To this end, a discharge of offensive odour from a premise that is not impacting on humans is unlikely to be a breach of the Act or breach of standard licence or notice conditions.

7.3.1 What is offensive odour?

The Environment Protection Act does not define the term 'offensive to the senses of human beings'. The SEPP expands the concept of beneficial uses to include impacts to local amenity or aesthetic enjoyment. People experience odours differently, so only the individual being affected can claim that the odour is offensive (affecting their amenity or aesthetic enjoyment). EPA can, therefore, only trigger an investigation into an odour complaint when odour is reported by a community member as being offensive. Offensive odour affects the general life, health and wellbeing of an individual as a result of the intensity, character, frequency and duration of the odour. The basis for acting against offensive odours may vary according to where the odour occurs. As an example, the normal agricultural odours present in a rural environment may not be considered offensive in an open paddock, but may be considered offensive in a residential area.

7.4 Potential risk odour sources

The greatest potential to odour exposure is during the poorest dispersion conditions (light stable winds). These occur most frequently during the cooler months - winter and autumn, and before sunrise or after sunset. The industries with the potential to emit odour that operate overnight will have a greater potential to impact Fishermans Bend.

Odour exposure resulting in disamenity can be defined as: offensive odour that affects the general life, health and wellbeing of an individual as a result of the intensity, character, frequency and duration of the odour.

7.4.1 Within Fishermans Bend

Identified Industries

Table 14 summarises the identified potential odour sources within Fishermans Bend Precinct.

Table 14 Identified Odour sources within Fishermans Bend Precinct

Company	Operations	Address	Potential Sources
Lorimer Precinct			
Auto Dealerships/Repairs (Volvo, Land Rover, Subaru)	Car and truck sales and repairs	Various	Trucks, cars, spray painting
Wirraway Precinct			
Port Phillip Depot-Citywide	Truck depot, storage of parks equipment, mulch, greenwaste piles and road construction material	47 Graham Street, Port Melbourne	Trucks, building materials, greenwaste, mulch
Melbourne Indoor Paintball	Paintball facility	25 Salmon St. Port Melbourne	Paint guns
Sandridge Precinct			
Auto Dealerships/Repairs	Car and truck sales and repairs	Various	Trucks, cars, spray painting
Port Phillip Resource Recovery Centre	Accepts general household rubbish materials for recycling	Corner of White and Boundary Streets, South Melbourne	Rubbish and recyclable materials
Colonial Brewery	Beer brewing	89 Bertie Street, Port Melbourne	Brewing activities
Montague Precinct			
Auto Businesses/Repairs	Car and truck sales and repairs	Various	Trucks, cars, spray painting
Employment Precinct			
Auto Businesses	Auto Repair/ panel beating	Various	Cars, spray painting
Boeing Aerostructures	Aircraft Assembly	226 Lorimer St, Port Melbourne	Aircraft Assembly equipment, engines
Department of Science and Technology Organisation (DSTO)	Science and technology support for Australia's defence and national security	506 Lorimer Street, Port Melbourne	Aerospace and automotive equipment
Herald and Weekly Times	Printing facility	127 Todd Rd, Port Melbourne	Inks, printing machines
Holden's Global V6 Engine plant	Engine manufacturer	191 Salmon St, Port Melbourne	Engine manufacturing, engines,
Kraft Foods	Food production	Salmon Street, Port Melbourne	Vegemite food manufacturing, logistics
Metal Fabrication Works	Sheet metal fabrication	Various	Steel and machinery
South Easter Water	Sewer mining	Eastern portion of precinct near Bolte Bridge	Odour control unit

Operations and nature of odour

A brief company overview, description of the manufacturing process and the likely nature of odour generated is described below. GHD did not have information regarding the specific operations at each site or its normal operating hours.

Auto Dealerships/Repairs

Potential emissions to air would be odorous VOCs from solvents, fuel emissions from standing cars such as diesel and petrol emissions of (VOCs, CO, NO_x and SO_2) and spray painting of vehicle panels. Most auto repair centres have spray booths with vents and stacks leading to the roof, which would treat emissions via a filter or wet scrubber.

Melbourne Indoor Paintball

Melbourne Indoor Paintball facility is a paintball centre with potential emissions to air being odorous VOCs from paint. The facility would have vents and stacks leading to the roof which would treat emissions via a filter or wet scrubber.

Port Phillip Resource Recovery Centre

The Port Phillip Resource Recovery Centre accepts general household rubbish for disposal and materials for recycling. General household rubbish has the potential to be odorous due to the decay of organic waste, similar to the smell often noticed in household rubbish bins.

Port Phillip Depot - Citywide

The Port Phillip Depot run by Citywide has been used mainly for the storage of parks equipment, bluestone pitchers, mulch and road construction materials. GHD's site visit identified large piles of mulched greenwaste and a mulcher which has the potential to be odorous.

Colonial Brewery

The largest potential source of odour from the existing brewery operations is the evaporation of volatile organic compounds derived from mashing and hops during wort boiling. A vapour compressor is employed in the brewhouse to minimise odours from the brewhouse.

Wastewater diverted to trade waste has the potential for odour emissions where brewery effluent and spills are transported off site via an on-site drainage network.

Boeing Aerostructures

Boeing Aerostructures manufactures composite aircraft components, conducts research and development, design, testing, fabrication and assembly activities of aircrafts and engines. Potential emissions to air would be odorous VOCs from solvent uses, fuel emissions from standing engines (VOCs, CO, NO_x and SO_2) and spray painting. The facility should have vents and stacks leading to the roof which would treat emissions via a filter or wet scrubber.

Department of Science and Technology Organisation (DSTO)

DSTO provides science and technology support for Australia's defence and national security. On-site at Port Melbourne, the potential odour emissions would be emitted from general aerospace and automotive operations such as metal fabrication with emissions of VOCs. The facility should have vents and stacks leading to the roof which would treat emissions via a filter or wet scrubber.

Herald and Weekly Times

Herald and Weekly Times are a large commercial printing company where some amount of heat curing may take place. Emissions to air such as PM_{10} and VOCs could occur during the general printing process, the use of solvent based inks and cleaning solutions to remove excess ink would most likely be controlled and vented. In the event of a process upset, the off-site impact is likely to be odour.

Holden's Global V6 Engine plant

Holden's Global V6 Engine plant manufactures and assembles operation of six-cylinder engines and component manufacturing facilities. GHD understands that majority of the site is now unused including the foundry operations for metal melting works. This new V6 engine plant will have all odours vented and treated before emitting to the air.

Kraft Foods

Kraft manufacture a range of food products at their Port Melbourne plant, which are grouped to four main production 'lines' namely:

- Vegemite
- Cheeses (formerly manufactured on-site, now prepared and packed)
- Snacks (pasta, etc)
- Salads (liquid, viscous and 'oily') lines

Each production line divides into three main areas; preparation, fill and out-pack. In terms of significant odour emissions to air, there are only two areas of concern namely:

- Vegemite preparation
- Cheese drying by the "Glatt" fluidised bed dryer

Raw yeast feed stock is the main ingredient of Vegemite and is a product of fermentation of molasses. There is a significant component of soluble alcohols (principally ethanol), which are volatile and highly odorous. It is the release of these components during the delivery, washing, sieving and separation of the raw yeast that gives rise to substantial odour emissions through the building roof line ventilation system. Odours would be hooded and diverted to a dedicated fan, while other equipment relies on the general building ventilation to remove evolved odour.

Metal Fabrication Works

Metal fabrication works involve fabrication of products in mild steel, stainless steel and aluminium. The workshop would generally consist of precision machinery such as sheet metal cutting and folding equipment, as well as metal punching, plasma cutting and spray painting facilities.

Metal fabricators manufacture a large range of items such as:

- Electrical cabinets
- Tanks and vessels
- Fume extraction and ventilation duct work
- Architectural features and handrails
- Pipe work
- Guarding
- Staircases and platforms
- Handrails and balustrades
- Customised tradespersons vehicle canopies and tool boxes

Emissions generated during steel fabrication process are likely to include metal dust, odour from paint solvents and metal fumes from welding. The potential for nuisance dust and odours are normally controlled by wet scrubbers and fabric filters.

South East Water- Sewer mining plant

The Fishermans Bend sewer mining plant will treat sewage from either the Melbourne Main Sewer (MMS) or Hobsons Bay Main (HBM) sewer and produce Class A recycled water for a dual pipe scheme. A concept design for the plant has recently been developed and included the following key processes:

- Inlet works
- MBRs
- UF
- UV disinfection
- Cl disinfection

Two capacities are currently being considered:

1. 18.5 MLD – to service the Fishermans Bend precinct
2. 36 MLD – to service FM precinct and some other CWW areas e.g. Arden-McCauley

The sewerage treatment plant will be designed and built with a target to control odour within the boundary of the plant. Note that treatment facilities in other countries have managed to contain odour to an acceptable level in an urban context.

7.4.2 Industries surrounding Fishermans Bend

Identified Industries

Table 15 summarises the identified potential odour sources surrounding Fishermans Bend Precinct.

Table 15 Identified Industries Surrounding Fishermans Bend Precinct

Company	Operations	Address	Potential Sources
Coode Island			
Brandon Molasses	Blackstrap sugar cane molasses handling facility	80 MacKenzie Road, Footscray	Molasses, trucks, machinery
Marstel Terminals Coode Island Pty Ltd	Bulk storage facility	42-52 Mackenzie Rd, West Melbourne	Storage of propylene oxide and benzene
Stolthaven Coode Island	Terminals bulk storage facility	Coode Island, West Melbourne	Bulk liquid hazardous chemical storage facility
Terminals Pty Ltd	Terminals bulk storage facility	54-62 Mackenzie Road, West Melbourne (Coode Island)	Storage of flammable and toxic chemicals and combustible and corrosive chemicals

Company	Operations	Address	Potential Sources
Footscray/ Spotswood/Yarraville/Newport			
ACI Operations Pty Ltd	Glass Manufacturing	2 Booker St, Spotswood	Glass, machinery
Albright & Wilson	Phosphates product manufacture	2a Francis St, Yarraville	Phosphate product manufacture
Caltex Australia Petroleum	Petrol Storage	Caltex Newport Terminal 411 Douglas Parade, Newport	Petrol storage tanks
Ecogen Energy	Gas fired power plant	350 Douglas Parade, Newport	Stack emissions
Mobil Oil Australia	Petrol storage	Yarraville Terminal Francis St, Yarraville	Petrol storage tanks
Sanford Australia	fish market	1/29 Youell St, Footscray	Trucks, fish processing and sales
Sugar Australia	Sugar refinery	265 Whitehall St, Yarraville	Sugar refining
The Shell Co of Australia Limited	Petrol storage	Shell Newport Terminal 91-119 Craig St, Spotswood	Petrol storage tanks

Operations and nature of odour

A brief company overview, general manufacturing process and the likely nature of odour generated is described below. GHD did not have information regarding the specific operations at each site and normal operating hours.

Brandon Molasses

Brandon Molasses operate bulk storage and handling facility for blackstrap sugar cane molasses. Odour emissions can arise from ship unloading, road tanker loading and from the storage tanks.

Marstel Terminals Coode Island Pty Ltd

Marstel Terminals provide bulk liquid services (storage, transport, bulk handling, packing and distribution). Storage includes acrylonitrile and propylene oxide, flammable and toxic chemicals (e.g. benzene and ethyl acrylate) and combustible and corrosive chemicals. Odour emissions can arise from ship unloading, road tanker loading and from the storage tanks.

Stolthaven Coode Island

Stolthaven provide bulk liquid services (storage, transport, bulk handling, packing and distribution). Storage includes acrylonitrile and propylene oxide, flammable and toxic chemicals (e.g. benzene and ethyl acrylate) and combustible and corrosive chemicals. Odour emissions can arise from ship unloading, road tanker loading and the storage tanks.

Terminals Pty Ltd

Terminals provide bulk liquid services (storage, transport, bulk handling, packing and distribution). Storage includes acrylonitrile and propylene oxide, flammable and toxic chemicals (e.g. benzene and ethyl acrylate) and combustible and corrosive chemicals. Odour emissions can arise from ship unloading, road tanker loading and the storage tanks.

ACI Operations Pty Ltd – Glass manufacturing

ACI Operations is a glass manufacturer that has the potential to emit odours during the manufacturing process. The facility should have vents and stacks leading to the roof which would treat emissions via a filter or wet scrubber.

Albright & Wilson - Phosphate Production

Albright & Wilson manufacture phosphates for the food & beverage processing industry at its Yarraville site. Odour and dust emissions are generated during the phosphate manufacturing process.

Caltex Australia

The Newport Caltex Terminal is a fuel distribution terminal for petrol, diesel, and aviation fuel. The terminal houses large refined product storage tanks used for bulk storage of fuel products arriving from refineries and from overseas/interstate (via ship). Fuel emissions such as VOCs, benzene and toluene are likely to cause odorous emissions.

Ecogen Energy

Ecogen Energy operates a gas fired power plant at Newport. It uses clean natural gas to generate steam in a boiler which supplies a three-stage steam turbine coupled to a generator to produce up to 510 MW of electrical power. Major emissions to air would be via stack and may include NOx, SOx, CO and particulate matter.

Mobil Oil Australia

The Yarraville Terminal is ExxonMobil's fuels distribution terminal for petrol, diesel, and aviation fuel and heating oil in Victoria. Ethanol-blended petrol is also supplied from the terminal. The terminal houses large refined product storage tanks with a storage capacity of 120 million litres. These tanks are used for bulk storage of fuel products arriving from Mobil's Altona Refinery and Viva Energy's Geelong Refinery (via pipeline) and from overseas/interstate (via ship). At the tank truck fill stand, up to eight trucks can be loaded simultaneously with various fuels stored in the terminal.

Fuel emissions such as VOCs, benzene and toluene are likely to cause odorous emissions.

Sanford Australia

Sanford Australia is a meat and fish market in Footscray. Possible odour sources include fish processing and sales. Fish would be brought in early each morning, possibly processed and then packed in ice crates for sale to retailers or general public.

Sugar Australia – Sugar refinery

Sugar Australia's Yarraville Refinery in Melbourne is Australia's longest-established sugar refinery. The Yarraville Refinery can produce up to 300,000 tonnes per annum. Raw sugar for the Yarraville refinery is sourced from Queensland where it has been milled from Australian - grown sugar cane. The main sugar refining processing steps at Yarraville are: dissolving and heating to 82 ºC, clarification by phosphatation, deep bed filtration, decolourisation over granular activated carbon, crystallisation, separation of crystals from syrup by centrifuging, drying, crystal size classification by sieving and then packaging.

A substantial amount of refined sugar is delivered to customers in bulk road tankers in both crystal and liquid form. The site receives bulk raw sugar from wharf facilities on the Maribyrnong River. Typical odour emissions can arise from ship unloading, road tanker loading and the storage tanks.

Shell

The Newport Shell Terminal is a fuel distribution terminal for petrol, diesel, and aviation fuel. The terminal houses large refined product storage tanks used for bulk storage of fuel products arriving from refineries and from overseas/interstate (via ship). Fuel emissions such as VOCs, benzene and toluene are likely to cause odorous emissions.

7.5 EPA licenced sites to discharge to Air (Odour)

EPA has provided GHD a list of all licenced premises permitted to discharge to air within and surrounding the Fishermans Bend/Port Melbourne industrial precinct (suburbs including Newport, Spotswood, West Melbourne and Yarraville). The following lists those industries with a licence to discharge to air (odour) and which are required to meet amenity conditions (no offensive odours discharged beyond the site boundary) within Fishermans Bend precinct:

- Boeing –Schedule L01- General Emissions to Air
- Holden –Schedule I02 Metal Melting Works

Those industries licenced to discharge to air and meet amenity conditions (no offensive odours discharged beyond the site boundary) which are located outside of the five Fishermans Bend precincts are:

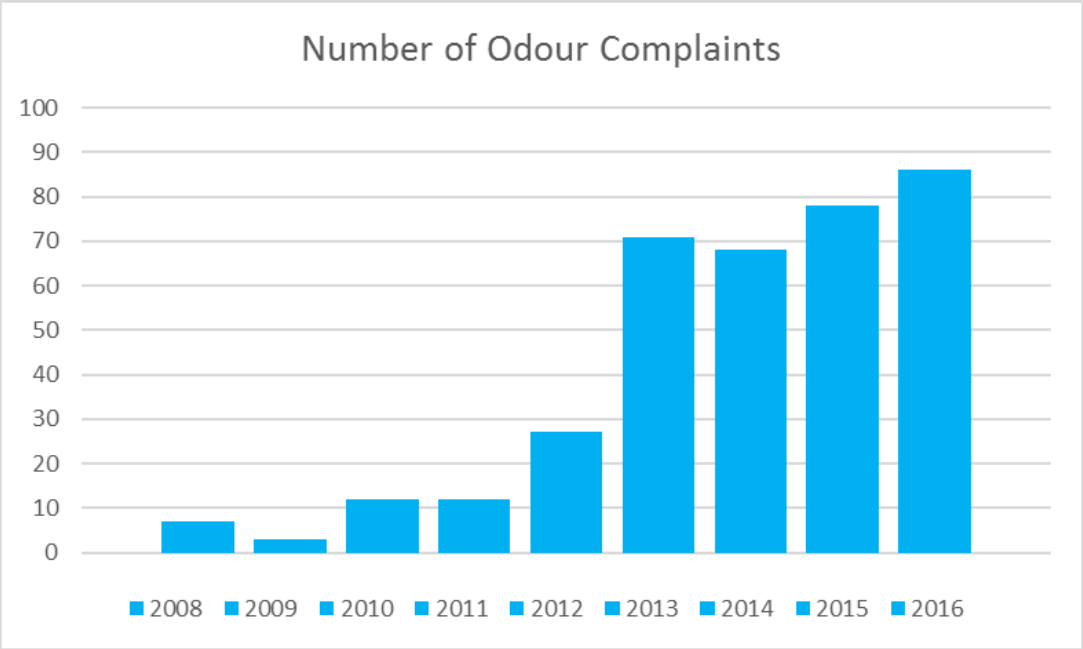
- Mobil Oil Australia Schedule G04 –Bulk Storage
- Albright & Wilson (Australia) Limited) schedule G01 - Chemical Works
- Sugar Aust Pty Ltd schedule D06 – Food Processing Work
- ACI Operations Pty Ltd schedule H05 – Glass Works;
- The Shell Co of Australia Limited schedule G04 - Bulk Storage
- Caltex Australia Petroleum Pty Ltd schedule G04 - Bulk Storage
- Ecogen Energy Pty Ltd schedule K01 - Power Stations
- Terminals Pty Ltd schedule G04 – Bulk Storage
- DP World Australia Limited schedule A03 - Sewage Treatment
- Stolthaven Coode Island Pty Ltd is scheduled by the Regulations as G04 - Bulk Storage

Over the 2012/13 and 2013/14 financial year (from the most recent annual performance statements available from EPA), all of the licensed sites met their air and amenity (odour) environmental performance conditions.

7.6 EPA odour complaint history

EPA has previously provided GHD a map and list of all odour complaints in the Fishermans Bend area between mid-2008 and mid-2011. GHD requested the most recent complaint data from EPA for the Fishermans Bend area to also include the surrounding suburbs including of Port Melbourne, Spotswood, Yarraville, Newport and West Melbourne. Hence, the number of odour complaints received by EPA has increased over the period, with over 364 complaints lodged between August 2008 and May 2016. A summary of complaints received by EPA is provided in Figure 13 and Appendix C.

Figure 13 Fishermans Bend – Summary of Odour Complaints



To verify the odour complaints (June 2008 – June 2011) to assess whether or not they can be attributed to any of the sources within the Fishermans Bend area, GHD requested the EPA to provide the location, time and date of each complaint. Using the EPA's Footscray AQMS as the nearest current operational air quality monitoring station, GHD retrieved the wind speed and wind direction for each complaint in order to validate (or exclude) the complaints by assessing if the wind direction places elements of the complainant site directly downwind of a particular source.

Note that for the most recent data provided by EPA did not include a detailed time and location but instead a 'Meshblock' showing the area of complaints. GHD has reviewed this data to help assess what areas (suburbs) may have a current odour issue based on surrounding complaint data.

The validation led to a number of complaints being attributed to sources within the Fishermans Bend Precinct. The primary sources of concern were from two industries no longer in operation, namely:

- Symex with 13 complaints
- Detmold with six complaints

The more recent EPA data indicates that there has been a number of complaints within the Wirraway Precinct (south of Kraft). Outside of Fishermans Bend, Yarraville and Seddon were identified as suburbs with a high number of odour complaints. These complaints are west of Sugar Australia, Albright and Wilson, Mobil and Coode Island. There are also a number of complaints within Spotswood and Newport, west and south west of ACI, Caltex and Shell.

7.7 Potential odour constraints to Fishermans Bend development

7.7.1 Within Fishermans Bend

The significant potential odour constraints within Fishermans Bend to the future development are:

- Port Phillip Resource Recovery Centre - Waste Facility requiring a 250 m buffer (Sandridge)
- Colonial Brewery requiring a maximum 250 m buffer (Sandridge)
- Kraft Foods – Vegemite production requiring a buffer of at least 250 m which intrudes some 180 m into the northern portion of the Wirraway Precinct (employment)
- Herald and Weekly Times printing facility requiring a buffer of 500 m (employment)
- South East Water Sewer mining plant requiring a default buffer of over 500 m (employment)

Section 4 showed that most of the Sandridge Precinct and Employment Precinct are encompassed by default buffers along with part of the Lorimer Precinct.

From GHD's previous experience on other projects, it is likely that a significant source of odour surrounding Fishermans Bend would be the Kraft Foods facility. On numerous occasions under the right wind conditions, GHD has detected odour from this premise hundreds of metres (greater than 200 m) downwind (odour levels greater than five Odour Units (OU)).

Five OU is commonly taken as a conservative measure of the odour concentration that can be clearly detected against background levels and which could potentially give rise to complaint.

On numerous occasions, odour has been detected driving on the Westgate Freeway past the Kraft facility by GHD staff members. Even on the day of GHD's site visit when dispersion was good, odour was detected along Woolboard Road in the Wirraway precinct.

Note that the odour detected from Kraft is from routine emissions. It should be noted that the EPA guidelines allow buffers to be used to minimise odour impact only in the event of a process upset/malfunction or extreme weather conditions. The implication is that emissions under routine operations should be controlled so that there is no adverse impact off-site. However, it is apparent that Kraft exceeds the odour criterion under routine operations and has yet to treat all the significant odour sources on-site.

To the extent that existing industries are likely within the zone of potential odour impact from Kraft under routine operations (greater than 1 OU), it may be the case that they have acclimatised to the occasional exposure – for these workers, in effect it has become part of the background palette of ambient odour and do not complain. This situation may not be replicated with the development of new residential areas within Fishermans Bend closer to the Kraft facility. New residents may find odour from Kraft unusual and objectionable and this may result in an increased percentage of complaints from these new residents.

Given that there have been some odour complaints to date within Fishermans Bend and the current separation of the industries to sensitive uses, it may well be the case that should new residential premises be allowed to establish within a buffer, it may lead to complaint as the background odour may be deemed offensive by a newcomer not used to living in a mixed use development.

The buffer for the proposed sewer mining plant may be significantly reduced, given it is a sewer mining plant and not a traditional waste water treatment plant. Once the design parameters of the plant have been finalised along with the location, an assessment should be conducted to assess the appropriate buffer required.

7.7.2 Surrounding Fishermans Bend

The potential odour constraints to Fishermans Bend development from the industries surrounding Fishermans Bend area are:

- Albright and Wilson – Phosphate production (requiring a buffer of 2,000 m)
- Sugar Australia - Sugar refinery (requiring a buffer distance of 1,000 m)

Both of these buffers may be able to be reduced should site specific operational details be known and the annual throughput.

7.8 Directional buffer for odour sources

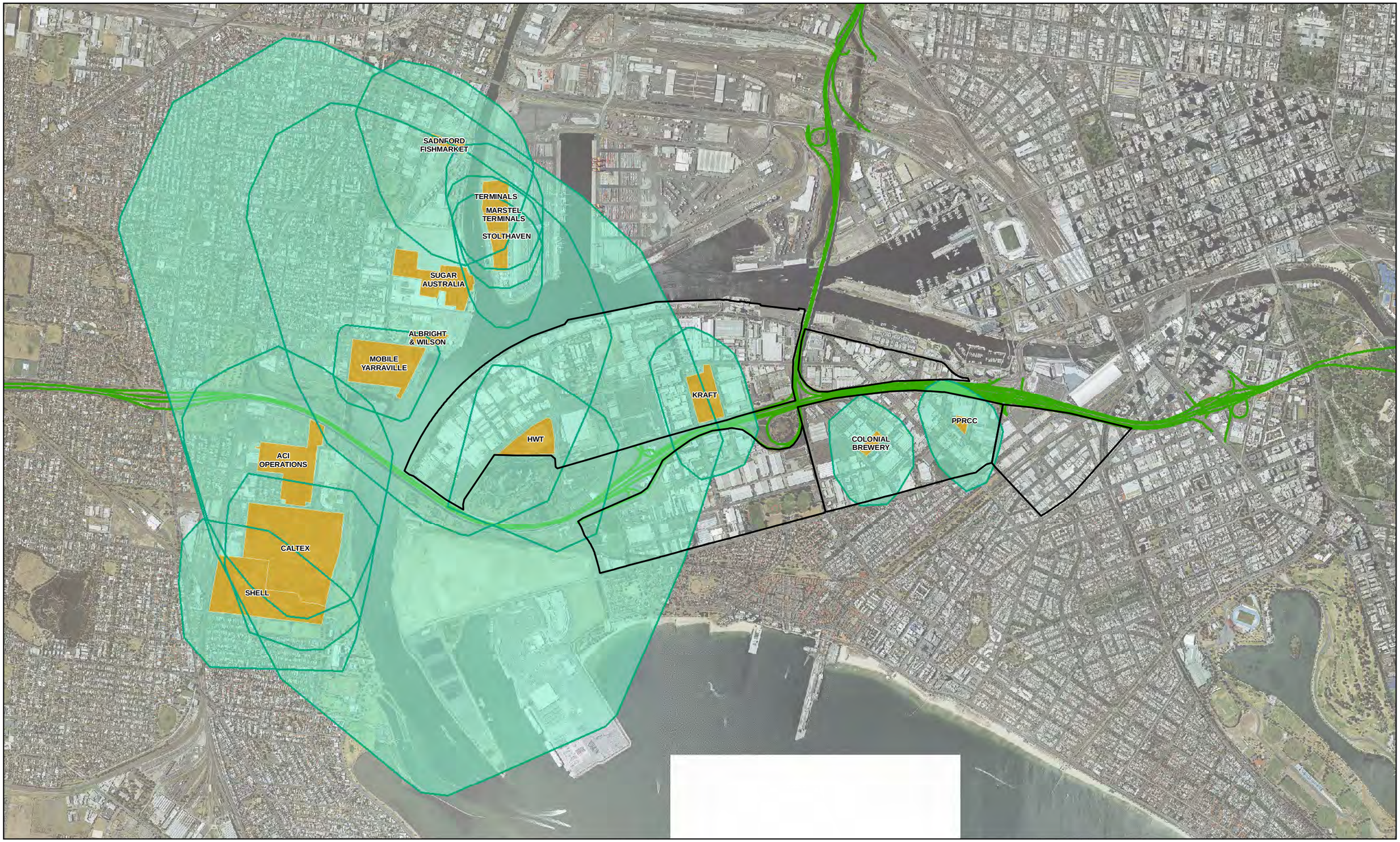
Where site-representative meteorological data is available, the directions of good and poor dispersion can be identified as shown in section 6. Furthermore, if the 12-month dataset is configured to dispersion modelling format (deriving atmospheric stability category and mixing height), then dispersion modelling can be conducted using a nominal source emission rate (odour) to assess the directional change in extent from a default buffer.

This was performed using the Port Melbourne meteorological dataset and adopting a nominal 10 m x 10 m area source with a nominal emission rate. The 99.5% contour that provides the same enclosed area as a 100 m radius circle (i.e. 31,415 m^2) was selected and is presented in Table 16. Table 16 shows the extent of the contour is greater than the all-direction mean of 100 m in the southerly sector – out to 155 m. Similarly, the extent of the contour to the west is significantly less than 100 m, down to 55 m. The contour effectively gives the departure from the fixed 100 m radius that would be required if an equal exposure to disamenity was to be given in the event of an upset/malfunction at any of the potential odour emitting sites.

The angular change in buffer distance is given as a function of direction in Table 16. This information has also been used to demonstrate the effect on the 100 m buffer when applied to the envelope of a potential odour source. As shown in Figure 14, the directional buffers are scribed for each of the identified odour emitting industries in section 4 that attract a default buffer distance. Note that the directional buffers were applied only to those industries identified to severely constrain the devolvement of Fishermans Bend.

Table 16 Directional Variation in Buffer in Response to Local Meteorology – Port Melbourne

Direction Sector (Degrees)		Range (m)	Percent (%) of mean range	Direction Sector (Degrees)		Range (m)	Percent (%) of mean range
N	0	81	81	S	180	155	155
NNE	22.5	66	66	SSW	202.5	124	124
NE	45	66	66	SW	225	98	98
ENE	67.5	72	72	WSW	247.5	54	54
E	90	80	80	W	270	55	55
ESE	112.5	101	101	WNW	292.5	108	108
SE	135	112	112	NW	315	114	114
SSE	157.5	143	143	NNW	337.5	110	110



Paper Size A3

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Odour Source Industries
- Directional Buffers

DELWP
Fisherrmans Bend Buffer Report - Update

Job Number	31-34061
Revision	A
Date	11 Aug 2016

Directional Buffer for Odour Sources Figure 14

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Data Source: Imagery, NearMap, extracted 23/04/2016, Image Date 05/02/2015 and VicMap, DELWP (2016).

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7.8.1 Directional Buffer Constraints

Figure 14 shows the directional buffers with the retracted and extended distances of good and poor dispersion for the identified constraining odour facilities within and surrounding Fishermans Bend.

Within Fishermans Bend

Figure 14 shows that there are no odour constraints within the Lorimer, Montague or Wirraway Precincts, only the Sandridge and Employment Precincts contain odour constraining industries. The directional buffers for PPRRC and the Colonial brewery, within the Sandridge precinct, extend further south by approximately 125 m, while contracting to the north, east and west reflecting the directions of poor dispersion. These directional buffers contain less land within the Sandridge precinct but also extend to encompass a small amount of existing residents to the south within Port Melbourne. The directional buffer for PPRRC also extends to encompass a portion of the North Port Oval.

The directional buffers for Kraft and HWT both extend further south to constrain additional land within the Wirraway Precinct. Both directional buffers extend an additional ~140 m into the Wirraway Precinct.

For the Kraft facility, placement of sensitive land uses within the directional buffer may lead to an increase in odour complaints from new residents as they may find the odour generated unusual. During GHD's site visit, odour was detected from Kraft south of the facility within the directional buffer in the Wirraway Precinct. Mitigation strategies would need to be developed and applied to develop sensitive land uses within this buffer.

Surrounding Fishermans Bend

For the industries surrounding Fishermans Bend, Sugar Australia poses a potential odour constraint to western portion of the Employment Precinct, while Albright and Wilson poses a potential odour constraint to more than half of the Employment Precinct and half of the Wirraway precinct. All other industries with the possibility of emitting odour off-site under upset conditions outside of Fishermans Bend do not pose a constraint.

Figure 14 indicates that many existing residences would be within the zone of potential upset odour events from Sugar Australia and Albright and Wilson, given that there have been some complaints registered within this zone, it may be the case that one of these industries have had a significant upset/malfunction resulting in odour issues or under normal operations odour may be an issue for the existing residents within the zone of potential impact.

However, the registered complaints may only be attributed to one particular industry, thus it may be case that the buffers prescribed in this assessment for a particular industry may be too large and can be refined once operational details are known.

However, once Fishermans Bend begins development, the potential for reverse amenity issues may arise, with new residents potentially having different expectations regarding amenity as they may be within the possible zone of impact under routine operations, which may lead to complaints.

Further work is recommended be conducted to investigate the reduction of buffer sizes via de-rating for HWT, Albright and Wilson and Sugar Australia, based on throughput and assessing what the actual operations are on-site, the possibility and likelihood of upset conditions occurring and the individual detailed complaint history.

7.9 Potential odour mitigation strategies to Fishermans Bend

It is assumed that the development of Fishermans Bend will occur incrementally over time, and therefore it is important that the management of the transition of industrial land to residential uses is conducted so as to minimise any short term impacts of non-compatible uses.

7.9.1 Recommended odour mitigation strategies

Land-use Planning Controls

Separating odour-producing activities from sensitive areas using a setbacks strategy (e.g. open space design adjacent to odour sources to provide odour reduction through setback distances to residential uses) is commonly adopted. The recommended and directional buffers would assist in implementing this strategy.

Staged development

Staging development to maintain the recommended separation distance between residents and industry while industry is still operational within Fishermans Bend (to the extent possible as the area is predominately in private ownership) is a desirable aim. The recommended and directional buffers indicate what portion of land would be constrained for development or lead to amenity issues.

An initial development stage of Fishermans Bend could target and remove those industries likely to cause a constraint before sensitive uses are built nearby, which would then free up a large portion of land. This can also be extended to any plans to place non-residential sensitive uses.

GHD recommends that DELWP contact those affected industries in order to develop a staged implementation plan that allows for a smooth transition of land use from industrial to residential over a period of time.

Control of Odours at Source

Odour emissions at source in an industrial premises can be reduced by odour treatment/control. This can be required by EPA (via PANs (Pollution Abatement Notices) and PINs (Penalty Infringement Notices)). For those industries identified to cause a constraint to Fishermans Bend, it is the EPA's responsibility to enforce those sites to comply with the SEPP –AQM criteria and not to cause off-site impact under normal operations resulting in odour complaints. EPA is also responsible for validating and investigating any odour complaints that they receive.

7.9.2 Potential constraints to the mitigation strategies for Fishermans Bend

- Land-use controls mitigation strategy through setback distances could compromise land value and land utilisation which may not be practicable
- Purchasing the constraining industries within Fishermans Bend before development may not be possible with contracts and leasing arrangements
- Established existing industries with private ownerships – control at source mitigation strategy without EPA enforcement would be a challenge as cooperation with industry would be required when they have no incentive or directive to do so

7.10 Future key actions for Fishermans Bend development

Recommended future key actions include:

- DELWP should contact those affected industries to develop a staged development plan to the extent possible as the area is predominantly in private ownership. This should include land use planning controls to allow for a smooth transition from industrial to residential
- Buffers identified in this assessment may be able to be reduced due to lower throughputs or emissions compared with larger facilities
- Odour/buffer impact assessments to assess odour levels at Fishermans Bend from identified facilities posing buffer constraints under routine operations
- The industries with the potential for a buffer reduction include:
  - Colonial Brewery
  - Sugar Australia
  - Albright and Wilson
  - Port Phillip Resource Recovery Centre
  - Herald and Weekly Times
- Mitigation measures to be enforced by EPA for any of the above industries found to have an odour impact under normal, routine operations
- Once the design parameters of the South East Sewer mining plant have been finalised along with the location, an assessment should be conducted to develop the appropriate buffer required
- Site Specific Buffer Assessment - A buffer that accounts for; (i) meteorology, and (ii) plausible upset scenarios has been developed by GHD[14] to assess the odour exposure of proposed sensitive land uses. This might be appropriate to apply to those industries likely to remain. This would entail further work and would require cooperation from the industries and EPA.

[14] Lewis A, Pollock T. "A Method to Determine Site-Specific Buffer Distances for Upsets/Malfunctions in Industrial Premises" Enviro 06, 9 -11 May 2006 Melbourne

8. Desktop dust review

8.1 Overview

In conducting this dust assessment, those industries requiring buffers based on their potential for off-site dust impact that are located either in or in the vicinity of Fishermans Bend were identified. The potential for a dust impact is reliant on dust emissions from a premises coinciding with:

- A wind direction placing elements of Fishermans Bend directly downwind
- The occurrence of a 'spike' in dust emissions from the premise
- Either the occurrence of 'good dispersion' conditions i.e. strong winds able to erode exposed dusty surfaces, thereby increasing dust emission rates
- Or the occurrence of 'poor dispersion' i.e. light stable winds for mechanically generated dust sources, thereby increasing dust levels downwind because of poor dispersion in the dust plume

These factors for the candidate industry premises and the likelihood of their occurrence can be estimated.

Again, as with the odour impact review, GHD has modified the recommended buffers to take account of local meteorology, forming directional, non-radial buffers that more uniformly distribute the potential off-site dust impact in the event of an upset.

In conducting the assessment, emphasis was placed on establishing each industry's past performance with respect to off-site dust impact, as gauged by the incidence of complaints lodged with council or EPA. Information was sought from EPA.

The dust impact assessment review follows the same approach as outlined in the odour impact review, with the following differences:

- Dust impact can arise from the re-suspension of particles that had been deposited earlier either within or outside the premises of the dust source (requiring good dispersion – strong winds)
- Alternately, if dust emissions are being generated by process units within the premises, then the impact of those emissions would be assessed (being a maximum in poor dispersion – light stable winds)

8.2 What is dust?

Dust particles may be solid matter or liquid droplets (aerosol). Particle sizes are measured in micrometres (or micron, µm) which equals 1/1000 of a millimetre. Particle levels are measured in terms of the total mass of particles in a cubic metre of air, in units of micrograms per cubic metre (µg/m^3).

Coarse particles (> 40 µm) typically drop out of the air column forming a deposit on horizontal surfaces. These deposits can pose a nuisance and buffers are sized to avoid this impact. Fine particles remain suspended in the air column and are typically categorised into:

- Total suspended (TSP) (< 40 µm)
- Inhalable (< 10 µm)
- Inspirable (<2.5 µm) fractions.

Small dust particles can penetrate into the lung to cause harm. Particles can aggravate existing lung and heart diseases, and sometimes cause premature death. Airborne particles have also been associated with decreases in lung function, worsening of asthma and alteration in the body's defences and lung clearance mechanisms. Sensitive members of the population include the elderly, children and people with existing lung or heart disease.

Particles can result from combustion of all types (e.g. wood smoke, engine emissions). They are emitted from industrial processes, motor vehicles, domestic fuel burning and industrial and domestic incineration. Dust particles can also be entrained into the air as cars and trucks travel on roads, especially unpaved roads. Natural sources of particles include bushfires, windblown dust and salt spray from the oceans.

8.3 Victorian dust criteria

Victorian EPA in SEPP-AQM provide dust concentration design criteria for; $PM_{2.5}$, PM_{10} and TSP. Of these, the PM_{10} criterion (80 µg/m^3, 1 -our average, 99.9th percentile) is generally the most stringent. TSP has the criterion 330 µg/m^3, 3-minute average, 99.9th percentile.

Air-shed air quality goals relating to dust are also specified in SEPP – Ambient Air Quality (AAQ). The current 24-hour average for PM_{10} is 50 µg/m^3. There are also advisory reporting standards for $PM_{2.5}$, which are 25 µg/m^3 (24-hours average) and 8 µg/m^3 (one-year average).

Separate dust criteria for non-point sources of dust are also specified in the Mining and Extractive Industries Protocol for Environmental Management (PEM), these being:

- PM_{10} at 60 µg/m^3, 24 hour average
- $PM_{2.5}$ at 30 µg/m3, 24 hour average
- Nuisance deposited dust, 4 g/m^2/month (including background)

8.4 Potential dust sources

Unlike odour, it is good dispersion conditions (winds over 5 m/s) that increases the potential for off-site dust emissions for those premises where erodible surfaces are present, or where coarse fraction dust has deposited from previous emissions. The potential dust sources are listed in Table 17.

8.4.1 Within Fishermans Bend Identified Sources

Table 17 below summarises the identified potential dust sources within Fishermans Bend Precinct.

Table 17 Identified Dust sources within Fishermans Bend Precinct

Company	Operations	Address	Potential Sources
Lorimer Precinct			
Hanson	Concrete batching facility	Boundary Street, Port Melbourne	Trucks, stockpiling, concrete batching process
Pronto	Concrete batching facility	Rogers Street, Port Melbourne	Trucks, stockpiling, concrete batching process
Wirraway Precinct - None			
Port Phillip Depot - Citywide	Truck depot, storage of parks equipment, mulch, greenwaste piles and road construction material	47 Graham Street, Port Melbourne	Trucks, building materials, greenwaste, mulch
Sandridge Precinct			
Delta Group	Refuse transfer station	577 Plummer St, Port Melbourne	Trucks, building materials
Port Phillip Resource Recovery Centre	Accepts general household rubbish materials for recycling	Corner of White and Boundary Streets, South Melbourne	Rubbish and recyclable materials
Montague Precinct			
Port Melbourne Metals	Metal recycling facility	201 Normanby Road, South Melbourne	Trucks, machines, scrap metal
Employment Precinct			
Boral	Plasterboard manufacturing	251 Salmon Street, Port Melbourne	Plasterboard and machinery
Cement Australia	Cement product depot	465 Lorimer St Port Melbourne	Trucks, cement
Holden's Global V6 Engine plant	Engine manufacturer	191 Salmon St, Port Melbourne	Engine manufacturing, engines,
Independent cement	Cement and lime distributer and depot	750 Lorimer St, Port Melbourne	Trucks, stockpiling, cement
Metal Fabrication Works	Sheet metal fabrication	Various	Steel and machinery
Piave	Concrete batching facility	262 Salmon St, Port Melbourne	Trucks, stockpiling, Concrete batching process
Steel cement	Cement depot	469-591 Lorimer Street, Port Melbourne	Trucks, cement

Operations and nature of dust

A brief company overview, general manufacturing process and the likely nature of dust generated are described below. GHD did not have information regarding the specific operations at each site or their normal operating hours.

Hanson Concrete Batching Plant

A typical concrete batching plant contains silos, storage bins, a conveyor system with a fabric filter connected to hopper, concrete truck parking area and raw feed stockpiles.

Typical operations for a concrete batching plant will not vary substantially, with cement delivered by road tanker and pneumatically transferred to silos. Sand and aggregate are transferred by truck from the on-site stockpiles in a damp condition to in-ground bins. Transfer from the bins is metered onto a bin conveyor and transferred to the loading tower via a covered conveyor and then into an agitator. Cement and water are mixed with the aggregate in the agitator, and batches are checked before loading into delivery trucks through a rubber loading sock.

There is potential for dust emissions to occur from fines in spillage on the road and yard, fugitive emissions from bunkers and conveyors, aggregate stored in stockpiles and fabric filters.

Pronto Concrete Batching Plant

As above, there is potential for dust emissions to occur from the road and yard, fugitive emissions from bunkers and conveyors, aggregate stored in stockpiles and fabric filters.

Delta Group

Delta Group in Port Melbourne is a refuse transfer station for building materials including timber and metal which are salvaged from demolition sites across Victoria. Dust emissions are likely to be created in the drop off and crushing of materials.

Port Phillip Resource Recovery Centre

The Port Phillip Resource Recovery Centre accepts general household rubbish for disposal and materials for recycling. General material for recycling has the potential to emit dust particles during drop-off and the crushing process.

Port Phillip Depot - Citywide

The Port Phillip depot run by Citywide stores has been used mainly for the storage of parks equipment, bluestone pitchers, mulch and road construction materials. GHD’s site visit identified large piles of mulched greenwaste and a mulcher which has the potential to generate dust.

Port Melbourne Metals

Port Melbourne Metals accepts, processes and supplies scrap metal of all grades of recycled ferrous and non-ferrous metals to industrial customers throughout Melbourne and Victoria. Scrap metal has the potential to emit dust particles during the drop-off and crushing process.

Boral

Boral Port Melbourne is a plasterboard manufacture. The potential for dust emissions would be from the manufacturing process which utilises gypsum.

Cement Australia

Cement Australia is bulk cement handing facility. Fugitive dust emissions are likely from the unloading process.

Holden's Global V6 Engine plant

Holden's Global V6 Engine plant manufactures and assembles operation of six-cylinder engines and component manufacturing facilities. GHD understands that majority of the site is now unused including the foundry operations for metal melting works. There is still a potential for dust emissions to be created from metal. This new V6 engine plant will have all dust particles vented and treated before emitting to the air.

Independent cement

Independent Cement is a specialist supplier of cement, cement blended products, and agricultural lime to a wide variety of industries, major retail outlets, and agricultural markets throughout Victoria and New South Wales. The site in Port Melbourne is a bulk cement handing facility. Fugitive dust emissions are likely from the unloading and loading process.

Metal Fabrication works

Metal Fabrication works involve the fabrication of products in mild steel, stainless steel and aluminium. The workshop would generally consist of precision machinery such as sheet metal cutting and folding equipment, as well as metal punching, plasma cutting and spray painting facilities.

Metal Fabricators manufacture a large range of items such as:

- Electrical cabinets
- Tanks and vessels
- Fume extraction and ventilation duct work
- Architectural features and handrails
- Pipe work
- Guarding
- Staircases and platforms
- Handrails and balustrades
- Customised tradesman vehicle canopies and tool boxes

Emissions generated during the steel fabrication process are likely to include metal dust, odour from paint solvents, and metal fumes from welding. The potential for nuisance dust and odours are normally controlled by wet scrubbers and fabric filters.

Piave

Piave operates a concrete batching facility. There is potential for dust emissions to occur from the road and yard, fugitives from bunkers and conveyors and aggregate stored in stockpiles.

Steel cement

Steel cement is a subsidiary of Independent cement. The site in Port Melbourne is a bulk cement handing facility. Fugitive dust emissions are likely from the unloading process.

8.4.2 Surrounding Fishermans Bend

Identified Sources

Table 18 summarises the identified potential dust sources surrounding Fishermans Bend Precinct.

Table 18 Identified dust sources surrounding Fishermans Bend Precinct

Company	Operations	Address	Potential Sources
Coode Island			
Grainco Ltd	Grain elevator	Enterprize Road, West Melbourne	Grain handling
Spotswood/Yarraville/Newport			
ACI Operations Pty Ltd	Glass manufacturing	2 Booker St, Spotswood	Glass, machinery
Albright & Wilson	Phosphates product manufacture	2a Francis St, Yarraville	Phosphate product manufacture
CSR Gyprock	Plasterboard Manufacturing	277 Whitehall Street, Yarraville	Machinery, trucks, plasterboard manufacturing
Ecogen Energy	Newport Power Station	350 Douglas Parade, Newport	500 MW gas-fired Power generator
Sugar Australia	Sugar refinery	265 Whitehall St, Yarraville	Sugar refining

Operations and nature of dust

A brief company overview, general manufacturing process and the likely nature of dust generated is described below. GHD did not have information regarding the specific operations at each site and normal operating hours.

Grainco Ltd

Grainco is a grain handling facility. Fugitive dust emissions are likely from the unloading and loading process.

ACI Operations Pty Ltd

ACI Operations is a glass manufacturer that had the potential to emit dust during the manufacturing process. The facility would have vents and stacks leading to the roof which would treat emissions via a filter or wet scrubber.

Albright & Wilson - Phosphate Production

Albright & Wilson manufacture phosphates for the food & beverage processing industry at its Yarraville site. Dust particle emissions can be generated during the phosphate manufacturing process such as raw phosphate.

CSR Gyprock

Gyprock plasterboard is a machine-made sheet composed of a gypsum core encased in heavy-duty linerboard. The linerboard is folded around the long edges to reinforce and protect the core while board ends are cut square. In the event of a process upset, the off-site impact is likely to be dust.

Ecogen Energy

Ecogen Energy operates a gas fired power plant at Newport. It uses clean natural gas to generate steam in a boiler which supplies a three-stage steam turbine coupled to a generator to produce up to 510 MW of electrical power. Major emissions to air would be via stack and may include NOx, SOx, CO and particulate matter.

Sugar Australia – Sugar refinery

Sugar Australia's Yarraville Refinery in Melbourne is Australia's longest-established sugar refinery. The Yarraville Refinery can produce up to 300,000 tonnes per annum. Raw sugar for the Yarraville refinery is sourced from Queensland where it has been milled from Australian - grown sugar cane. A substantial amount of refined sugar is delivered to customers in bulk road tankers in both crystal and liquid form. The site receives bulk raw sugar from wharf facilities on the Maribyrnong River. Typical dust emissions can arise from ship unloading and road tanker loading.

Transport Dust emissions

Additional sources of particulate emissions are contained in vehicle exhaust from the following transport related sources surrounding and within Fishermans Bend:

- Westgate Freeway (car and truck exhaust)
- CityLink Tollway (car and truck exhaust)
- Port of Melbourne (Ship exhaust)
- Local Traffic (car and truck exhaust

Motor vehicles are the major source of urban air pollution. In Melbourne in 2006, motor vehicle emissions contributed the following levels of pollutants to the overall air quality[15]:

- 31 per cent of all emissions of $PM_{2.5}$
- 27 per cent of all emissions of PM_{10}

8.4.3 Other potential dust sources

Dust during construction of Webb Dock

The proposed Webb Dock Port Capacity Project includes construction of large areas of hardstand, development of the land just to the west of Fishermans Bend and construction of a significant length of road. This work has the potential to generate a significant volume of dust from excavations, erosion of excavated surfaces and stockpiles of soil and road construction materials. The main issues during construction from an air quality perspective are dust and the emission of combustion particles by heavy construction equipment. The latter can be controlled by ensuring the equipment used on the project is fitted with appropriate filters and emission control systems. Appropriate mitigation management measures should be implemented by Webb Dock including a range of “good practice” procedures. These will include relevant measures listed in EPA Publication 480 “Environmental Guidelines for Major Construction Sites”. These include:

- Limiting the extent of open excavation
- Regular watering of exposed soil surfaces
- Covering stockpiles of soil and recently placed material
- Management of construction in relation to weather (avoiding excavation in periods of strong winds)
- Real-time dust monitoring used to identify periods with high dust levels, as a basis for controlling dust impacts

[15] EPA Website: http://www.epa.vic.gov.au/your-environment/air/vehicle-emissions-and-air-quality

8.5 EPA Licenced sites to discharge to air (particles)

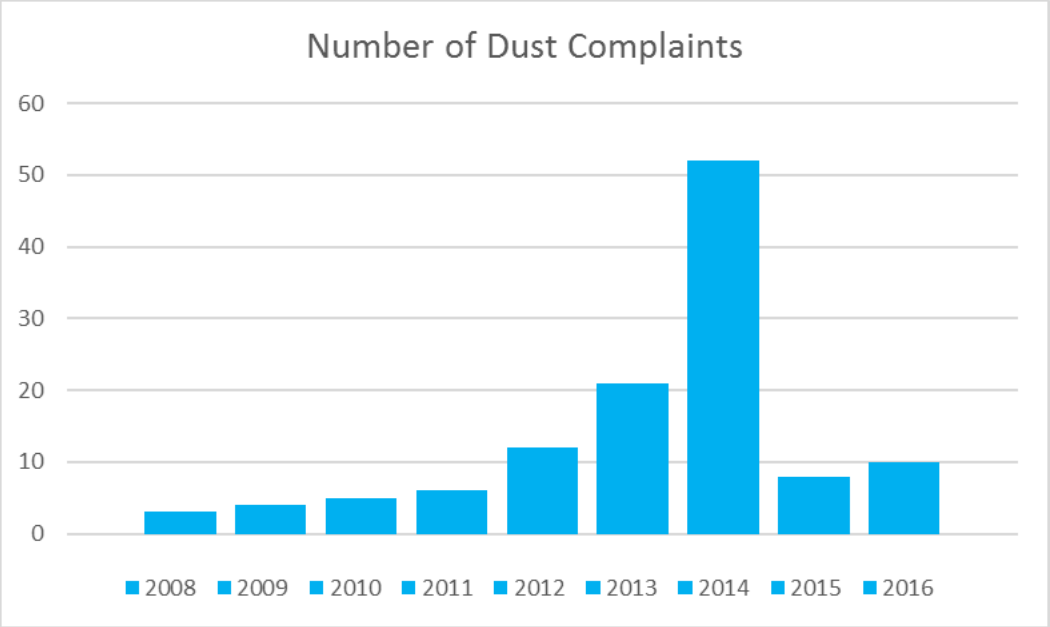
EPA has provided GHD a list of all licenced premises permitted to discharge to air within and surrounding the Fishermans Bend/ Port Melbourne industrial precinct (suburbs including Newport, Spotswood, West Melbourne and Yarraville). The following lists those industries with a licence to discharge to air (dust/particles) within and surrounding Fishermans Bend precinct.

- Steel Cement – Schedule H01 Cement Works
- Holden –Schedule I02 Metal Melting Works
- Albright & Wilson (Australia) Limited) schedule G01 - Chemical Works
- Sugar Aust Pty Ltd schedule D06 – Food Processing Works
- ACI Operations Pty Ltd schedule H05 – Glass Works

8.6 Dust complaint history

EPA has previously provided GHD a map showing the approximate locations and list of all dust complaints in the Fishermans area between mid-2008 and mid-2011. GHD requested the most recent complaint data from EPA for the Fishermans Bend area to also include the surrounding suburbs including of Port Melbourne, Spotswood, Yarraville, Newport and West Melbourne. The number of dust complaints received by EPA have remained fairly constant except for 2014 which saw a large spike in the number of complaints (cause is unknown). In total there have been 121 complaints lodged between August 2008 and May 2016. A summary of complaints received by EPA is provided in Figure 15 and Appendix C.

Figure 15 Fishermans Bend – Summary of Dust Complaints



To verify the dust complaints to determine whether or not they can be attributed to any of the sources within Fishermans Bend area, GHD requested the EPA to provide the location and time and date of each complaint. Using the EPA's Footscray AQMS as the nearest current operational air quality monitoring station, GHD retrieved the wind speed and wind direction for each complaint in order to validate the complaints by assessing if the wind direction places the complainant's residence directly downwind of a particular source.

Note that for the most recent data provided by EPA did not include a detailed time and location but instead a 'Meshblock' showing the area of complaints. GHD has reviewed this data to help assess what areas (suburbs) may have a current dust issue based on surrounding complaint data.

This validation process led to number of complaints that could be attributed to sources within the Fishermans Bend Precinct. The primary dust sources of concern were:

- Steel and Independent Cement handling facility with nine complaints
- Boral Plasterboard – complaints made but none decisive
- Port Melbourne Containers - complaints made but none decisive

The map of complaints provided by EPA indicated that the dust complaints attributed to the Steel and Independent Cement handing facilities are all within the current industrial area (Employment Precinct). A significant amount of the identified dust complaints are within the existing industrial areas, with minimal dust complaints from the existing residents to the south of the site (south of Williamstown Road).

However, once Fishermans Bend begins development the potential for reverse amenity issues arises.

As Fishermans Bend is progressively developed to residential the available separation distance from sensitive receptors to industries such as the cement handing facilities will decrease which will result in residents being closer to the dust sources, thereby increasing the potential to be exposed to dust.

Currently Fishermans Bend is an industrial area where people work but do not reside. There may be occurrences where workers are exposed to dust levels above the criterion from some industries under routine operations. However, it may be the case that they have acclimatised to the occasional exposure – for these workers in effect it has become part of the background ambient conditions and does not occasion complaint. This situation may not be replicated with the development of new residential areas within Fishermans Bend – new residents may find exposure to dust unusual and objectionable and this may result in an increased percentage of complaints from these new residents.

The other sites with complaints within Fishermans Bend include the Boral Plasterboard cement Australia's and Port Melbourne containers, while surrounding Fishermans Bend there have been complaints in Yarraville west of Sugar Australia, Albright and Wilson and CSR Gyprock. The remaining complaints cannot be attributed to any source decisively.

8.7 Potential dust constraints to Fishermans Bend development

8.7.1 Within Fishermans Bend

The potential dust constraints within Fishermans Bend to Fishermans Bend development are:

- Pronto Concrete Batching Plant (Lorimer)
- Hanson Concrete Batching Plant (Lorimer)
- Delta Group Transfer Station (Sandridge)
- Port Phillip Resource Recovery Centre (Sandridge)
- Steel, Independent and Cement Australia's cement handling facilities including ship unloading (Employment)

- Holden – only if metal melting works still occur on site (use of the foundry). GHD's understanding is majority of the site is now unused including the foundry operations. If only the new V6 plant is operational then no dust constraints would be imposed on Fishermans Bend (employment)
- Boral plasterboard manufacturing (employment)
- Piave Concrete Batching Plant (employment)

Section 4 shows that all these sites constrain Fishermans Bend with their default recommended buffers.

From the dust complaint analyses, a number of complaints can be sourced to the Employment Precinct due to activities such as the cement handling facilities. The placement of sensitive uses in the vicinity of those industries within the areas of complaint may result in further dust complaints and a constraint to Fishermans Bend development (reverse amenity issues).

It is the responsibility of the EPA to enforce compliance to dust criteria and to ensure that no off-site dust impacts occur under routine operations from industries.

8.7.2 Surrounding Fishermans Bend

The potential dust constraints to Fishermans Bend development from the industries surrounding Fishermans Bend area are:

- Albright and Wilson – Phosphate production (requiring a buffer of 2,000 m)
- Sugar Australia - sugar refinery requiring a buffer distance of 1,000 m

Both of these buffers may be able to be reduced should site specific operational details be known with regards to the exact day to day operations occurring and the annual throughput.

8.7.3 Other

The residential areas of Port Melbourne are located to the east of Webb Dock and south of Fishermans Bend Precinct. Dust emissions are not expected to be significantly influenced by day-to-day emissions from vehicles travelling to and from Webb Dock, as the dispersion over that distance will reduce the effects to a relatively minor contribution.

Emissions from the vehicles travelling on the Westgate Freeway and CityLink would contribute to the background dust levels within and surrounding Fishermans Bend. From GHD's experience this is unlikely to exceed SEPP –AQM levels nor will they constrain Fishermans Bend development. However, if further work to determine the magnitude of these impacts is required, then this could be achieved by modelling vehicle emissions on these roads using the AUSROADS model.

Fuel use associated with the operation of equipment, as well as the air pollutants attributed to fuel combustion such as sulphur dioxide (SO_2), particulate matter, and oxides of nitrogen (NO_X) all occur at an operating Port (once Webb dock is completed will be a large container port).

Ocean-going vessels are the dominant emission source in the port precinct, accounting for over 90% of the SO_2, 80% of particular matter, and almost 70% NO_X. Non-road equipment, including cargo and bulk handling equipment, are the largest landside source of emissions.

8.8 Directional buffer for dust sources

Where site-representative meteorological data is available the directions of good and poor dispersion can be identified as shown in Section 6. Furthermore, if the 12-month dataset is configured to AUSPLUME format (deriving atmospheric stability category and mixing height), then dispersion modelling can be conducted using a nominal source emission rate (dust) to determine the directional change in extent from a default buffer.

This was performed for the using the Port Melbourne meteorological dataset, and adopting a nominal 10 m x 10 m area source with a nominal emission rate. The 99.5% contour that provides the same enclosed area as a 100 m radius circle (i.e. 31,415 m^2) was selected and is presented in Table 19. From Table 19 it is seen that the extent of the contour is greater than the all-direction mean of 100 m in the southerly sector – out to 155 m. Similarly, the extent of the contour to the west is significantly less than 100 m, down to 55 m. The contour effectively gives the departure from the fixed 100 m radius that would be required if an equal exposure to disamenity was to be given in the event of an upset/malfunction at any of the potential dust emitting sites.

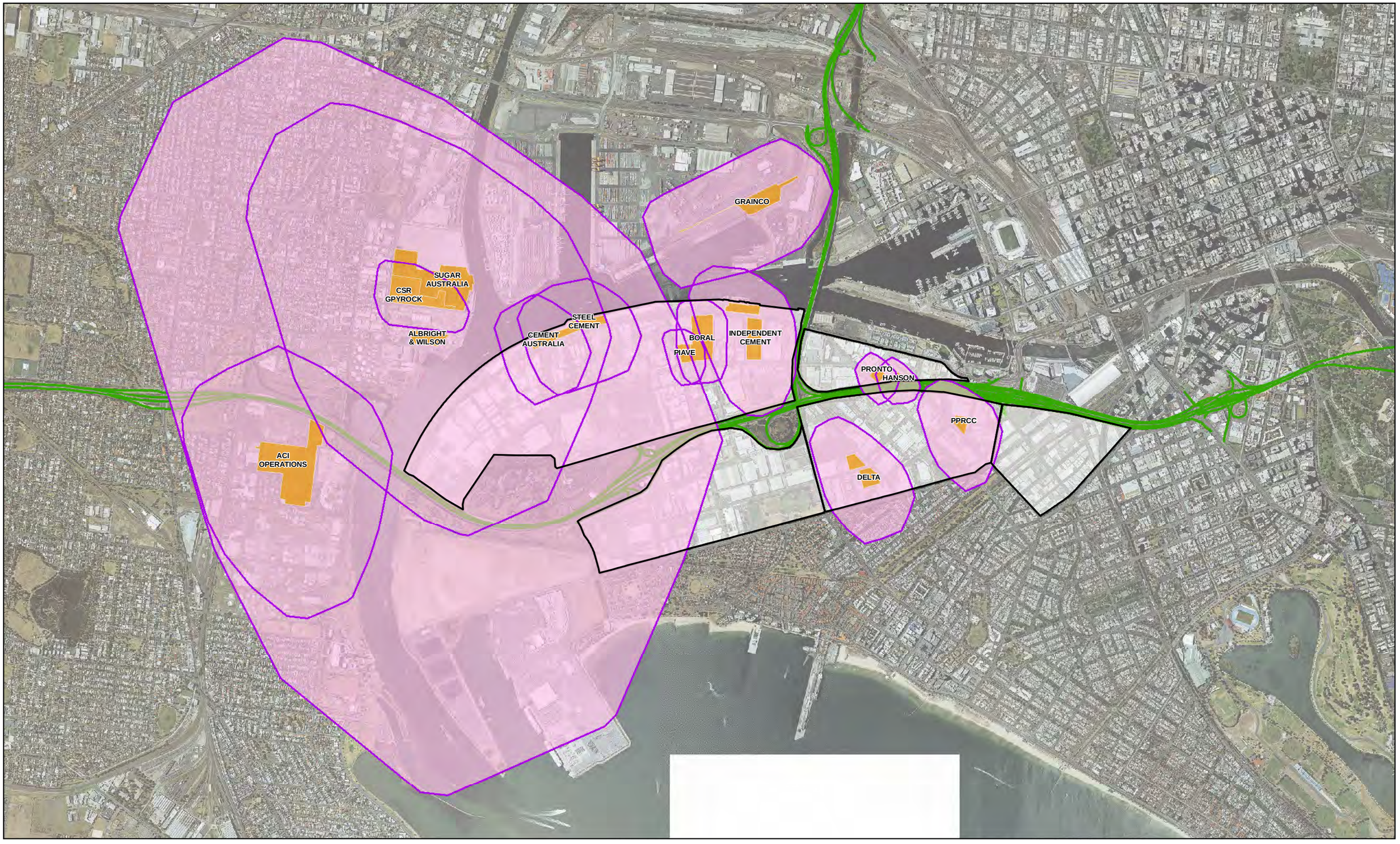
The angular change in buffer distance is given as a function of direction in Table 19. This information has also been used to demonstrate the effect on the 100 m buffer when applied to the envelope of a potential dust source. As seen in Figure 16 the directional buffers are scribed for each of the identified odour emitting industries in Section 4 that attract a default buffer distance. Note that the directional buffers were only applied to those industries with the potential to constrain Fishermans Bend.

Table 19 Directional Variation in Buffer in Response to Local Meteorology – Port Melbourne

Direction Sector (Degrees)		Range (m)	Percent (%) of mean range	Direction Sector (Degrees)		Range (m)	Percent (%) of mean range
N	0	81	81	S	180	155	155
NNE	22.5	66	66	SSW	202.5	124	124
NE	45	66	66	SW	225	98	98
ENE	67.5	72	72	WSW	247.5	54	54
E	90	80	80	W	270	55	55
ESE	112.5	101	101	WNW	292.5	108	108
SE	135	112	112	NW	315	114	114
SSE	157.5	143	143	NNW	337.5	110	110

Note: Directional buffers only apply to those emissions that are carried off-site by the ambient wind - so that buffers for fine dust produced by both the cement handling facilities and the concrete batching plants can be influenced by the directional effect of local meteorology.

A distinction can also be made for fugitive erodible sources – dust entrained in strong wind (greater than 5 m/s) as opposed to dust emissions from process sources where the emission rate is independent of local wind conditions. If a directional buffer were to be modelled for fugitive erodible sources such a buffer would have a different shape and would apply to an area sources of unpaved surfaces. Thus buffers for dust re-suspension will be different to buffers based on poor dispersion. There were no erodible dust sources from the identified industries requiring this type of buffer distinction.



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Freeway
- Dust Source Industries
- Directional Buffers

DELWP
Fisherrmans Bend Buffer Report - Update

Job Number	31-34061
Revision	A
Date	11 Aug 2016

Directional Buffer for Dust Sources Figure 16

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Data Source: Imagery, NearMap, extracted 23/04/2016, Image Date 05/02/2015 and VicMap, DELWP (2016).

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8.8.1 Directional buffers constraints

Figure 16 shows the directional buffers with the retracted and extended distances of good and poor dispersion for the identified constraining dust facilities within and surrounding Fishermans Bend.

Within Fishermans Bend

Directional buffers have been scribed for the concrete batching plants within the Lorimer Precinct, for the Delta Group transfer station and Port Phillip Resource Recovery Centre (PPRRC), within the Sandridge Precinct. They have also been scribed for Boral and Piave concrete batching plants, Cement Australia, Steel Cement and Independent Cement.

Figure 16 shows the directional buffers from the concrete batching plants within the Lorimer Precinct extend further south into the Sandridge Precinct constraining additional land, while contracting to the north, east and west constraining less land in those directions within the Lorimer Precinct.

The Delta Group's and PPRRC's 250 m directional buffers contract to the north, east and west constraining less land within Fishermans Bend Sandridge Precinct compared to the default buffers. The directional buffer for PPRRC also extends to encompass a portion of the North Port Oval. The directional buffer also encompasses additional existing residences to the south of Fishermans Bend. It is important to assess the dust complaint history within this buffer zone to establish if there have been any past issues from these sites. The provided EPA complaint history indicates that there have been no dust complaints attributed to PPRRC, however there has been a complaint from within the Delta buffer zone.

The directional buffers for the Independent Cement, Steel Cement and Cement Australia extend further south but remain within the Employment Precinct boundary, as does the 100 m buffer for the Piave concrete batching plant. The complaint history for these industries does suggest that there may be a dust issue from one or all of the sites, with a number of dust complaints registered within the existing industrial area. Therefore, it would be unwise to place sensitive uses within these buffers.

Holden is not considered to be a dust issue as GHD understands it no longer uses the foundry at its site (however this should be confirmed by DELWP). As discussed earlier, the intermediate 500 m may be reduced. Holden has also announced plans to transition out of the area in 2017 and cease manufacturing at the site, reducing its requirement for a buffer.

Surrounding Fishermans Bend

For the industries surrounding Fishermans Bend, Sugar Australia poses a potential dust constraint to western portion of the Employment Precinct, while Albright and Wilson poses a potential dust constraint to more than half of the Employment Precinct and half of the Wirraway precinct. All other industries with the possibility of emitting dust off-site under upset conditions outside of Fishermans Bend do not pose a constraint.

Figure 16 indicates that most of the existing residences would be within the zone of potential upset dust events from Sugar Australia and Albright and Wilson. The complaint data provided by EPA suggests that there have been a few sporadic complaints west of these two sites. It may be the case that these complaints are attributed to an upset/malfunction. Given the lack of complaints in this buffer zone, it may be case that the buffers prescribed in this assessment are too large and can be refined once operational details are known. However, once Fishermans Bend begins development, the potential for reverse amenity issues may arise, with new residents potentially having different expectations regarding amenity as they may be within the possible zone of impact under routine operations which may lead to complaints.

A significant amount of land within the Employment Precinct is sequestered by the dust directional buffers. However, during the transitional phase of Fishermans Bend, where significant industrial activities will leave the area to be replaced by low environmental impact industries, opportunities will be created to expand the amount of non-residential sensitive land uses within the Employment Precinct.

Also, as with the odour constraining industries, further work is recommended be conducted to investigate the reduction of buffer sizes via de-rating for Albright and Wilson and Sugar Australia, based on throughput and assessing what the actual operations are on-site and the possibility, likelihood of upset conditions occurring and individual complaint history. Reduced buffers for these facilities may also result in creating opportunities to expand the amount of non-residential sensitive land uses within the Employment Precinct.

8.9 Potential dust mitigation strategies to Fishermans Bend

It is assumed that the development of Fishermans Bend will occur incrementally over time and therefore, the management of the transition of industrial land to residential uses is likely to result in short term impacts of non-compatible uses.

8.9.1 Recommended dust mitigation strategies

Land-use Planning Controls

Separating dust-producing activities from sensitive areas i.e. setbacks strategy (e.g. open space design adjacent to dust sources to provide dust reduction through setback distances to residential uses). The recommended and directional buffers would assist in implementing this strategy.

Staged development

Maintain the recommended separation distance between residents and industry while industry is still operational within Fishermans Bend to the extent possible as the area is predominately in private ownership. The recommended and directional buffers indicate what portion of land would be constrained for development or lead to amenity issues.

An initial development stage of Fishermans Bend could target and remove those industries likely to cause a constraint before sensitive uses are built nearby which would free up a large portion of land.

Again GHD recommends that DELWP contact those affected industries to develop a staged implementation plan that allows for a smooth transition of land use from industrial to residential over a period of time.

Control of Dust Emissions at Source

Two available measures to control or reduce the dust emissions at source include:

- Use of BPEM (Best Practice Environmental Management) measures for each industry to mitigate dust on site
- Reduce the dust output of the source via dust mitigation measures (may require EPA enforcement via PANs and PINs)

8.9.2 Potential mitigation constraints to Fishermans Bend

- Land-use controls mitigation strategy through setback distances could compromise land value and land utilisation
- Purchasing the constraining industries within Fishermans Bend may not be possible with contracts and leasing arrangements
- Established existing industries with private ownerships – control at source mitigation strategy would be a challenge without EPA enforcement, as cooperation with industry would be required

8.10 Future key actions for Fishermans Bend development

Recommended future key actions:

- DELWP should contact those affected industries to develop a staged development plan to the extent possible, as the area is predominantly in private ownership. This should include land use planning controls to allow for a smooth transition from industrial to residential
- Some buffers identified in the assessment have the possibility of a reduction due to lesser throughputs compared with larger facilities
- Check with Holden, Sugar Australia and Albright and Wilson to understand what operations currently occur on site
- Conduct a dust impact assessment to assess off-site dust impact at Fishermans Bend from identified industries (for example the ship unloading of bulk grains, powdered construction products or the operation of concrete batching plants)
- Mitigation measures to be enforced by EPA for any of the above industries found to have a chronic dust impact
- This further work would require cooperation from the industries/EPA

9. Desktop noise and vibration review

9.1 Overview

The industries identified in section 3, as well as transportation activities, have the potential to generate environmental noise and vibration impacts onto Fishermans Bend precinct without the implementation of specific mitigation measures.

The purpose of this assessment is to undertake a desktop review of potential noise and vibration impacts associated with development within Fishermans Bend.

A desktop review of potential noise and vibration impacts has been conducted based on the following scope of work:

- Identification of potential noise and vibration sources within and surrounding the existing Fishermans Bend precinct and discussion of the noise and vibration characteristics associated with different types of industrial as well as transportation operations
- A review of the relevant noise and vibration guidelines and standards potentially applicable to the site, including but not limited to:
  - City of Melbourne – Noise and Vibration Management Guidelines (June 2013)
  - EPA Victoria: State Environment Protection Policy – Control of Noise from Commerce, Industry and Trade No. N-1 (SEPP N-1)
  - EPA Victoria: State Environment Protection Policy – Control of Music Noise from Public Premises No. N-2 (SEPP N-2)
  - EPA Victoria: Noise Control Guidelines Publication 1254 (2008)
  - EPA Victoria: Environmental Guidelines for Major Construction Sites Publication 480 (1996)
  - Victorian Government: Passenger Rail Infrastructure Noise Policy (April 2013)
  - Australian Standards AS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors
  - Australian Standards AS 3671:1989 Acoustics – Road Traffic Noise Intrusion, Building Site and Construction
  - Australian Standards AS 2631.2:2014 – Mechanical vibration and shock – Evaluation of human exposure to whole-body vibration – vibration in buildings (1 Hz to 80 Hz)
  - Australian Standard 2436:2010 – Guide to noise and vibration control on construction, demolition and maintenance sites
- A review of potential noise and vibration impacts associated with the identified sources
- General recommendations to optimise the use and development of the subject site
- Identification of requirements for further assessment work at the subject site

9.2 What is noise?

Noise is generally defined as unwanted sound which may be hazardous to health, interfere with speech and could potentially be disturbing, irritating or annoying. Noise could be generated from various sources, such as industrial/commercial premises, musical instruments and transport operations.

Noise sources can contain certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content. There is evidence to suggest that it can cause greater annoyance than other noise at the same noise level (NSW INP, 2000).

9.2.1 Tonal noise

Tonal noise as defined by the NSW Industrial Noise Policy (INP) is as follows: "*A noise containing a prominent frequency and characterised by a definite pitch*". Tonal noise is generally generated from rotating parts or equipment such as compressor, fan blades, engine pistons, etc.

9.2.2 Impulsive noise

Impulsive noise as defined by the NSW INP (2000) is as follows: "*A noise having a high peak of short duration or a sequence of such peaks*". Impulsive noise could be generated from sudden activities, such as gunshots, punch press, heavy material dropped at height, blasting, pulse cleaning system, etc.

9.2.3 Intermittent noise

Intermittent noise as defined by the NSW INP (2000) is as follows: "*A noise level where is suddenly drops to that of the background noise several times during the assessment period, with a noticeable change in noise level of at least 5 dB*". Intermittent noise could be generated from machinery that operate in cycles, such as vehicles and rail pass by.

9.2.4 Dominant low-frequency noise (Infrasound)

Low-frequency noise as defined by the NSW INP (2000) is as follows: "*A noise containing major components within the low frequency range (20 Hz – 250 Hz) of the frequency spectrum*". Low frequency noise could be generated from typical large diesel engines in trains, ships and power plants, since the noise characteristic emanating from these sources is hard to muffle and spreads easily in all directions.

Overall, some or all of the above noise characteristics may occur as a result of the various range of industrial and transportation activities within and nearby Fishermans Bend precinct. The potential primary noise sources within and nearby Fishermans Bend precinct have been identified in section 9.3.

9.3 Existing potential primary noise sources

A preliminary review of the existing Fishermans Bend precinct through aerial photography has indicated that there are existing potential noise sources within the vicinity of the area. Identification of existing potential noise sources within Fishermans Bend vicinity has been conducted for the five different Fishermans Bend precincts, as well as nearby Fishermans Bend (refer to Figure 3 and Figure 4). Note, only major sites have been identified in the figures. Relatively small or general factories and warehouses have not been included.

9.3.1 Lorimer Precinct

The Lorimer Precinct comprises a mixture of industrial and commercial premises. Some of the identified major industrial and commercial facilities, which may have a potential for noise impacts include:

- Pronto concrete batching plant (Rogers Street, Port Melbourne)
- Hanson concrete batching plant (Boundary Street, Port Melbourne)
- Melbourne City Volvo dealership (Ingles Street, Port Melbourne)
- Melbourne City Land Rover (Ingles Street, Port Melbourne)
- Subaru dealership (Lorimer Street, Port Melbourne)
- Numerous commercial/logistics offices and warehouses

Other than from the above industries, ambient noise environment within the Lorimer Precinct would also potentially be dominated by the traffic noise associated with West Gate Freeway and CityLink Tollway. The West Gate Freeway and CityLink Tollway bound the southern and the western boundaries of the precinct respectively.

Local traffic noise such as Ingles Street and Lorimer Street would also have the potential to contribute to the local ambient noise environment.

9.3.2 Wirraway Precinct

The Wirraway Precinct comprises a mixture of industrial and commercial premises. Some of the identified major industrial and commercial facilities, which may have a potential for noise impacts include:

- Port Phillip Depot Citywide – Recycling facility (Graham Street, Port Melbourne)
- Melbourne Indoor Paintball (Salmon St, Port Melbourne)
- Port of Melbourne Containers (Prohasky Street, Port Melbourne)
- Bambra Press (Rocklea Drive, Port Melbourne)
- AusCarts Racing – Indoor Go karting (Salmon Street, Port Melbourne)
- Industrial Hydraulic Services (Plummer Street, Port Melbourne)
- Electrical substation (Plummer St, Port Melbourne)
- National Tiles Co (Graham Street, Port Melbourne)
- Numerous other factories, warehouse and logistic activities

Other than from the above industries, ambient noise environment within the Wirraway precinct would also potentially be dominated by Webb Dock activities to the west, as well as traffic noise associated with West Gate Freeway. West Gate Freeway bounds the northern boundary of the precinct.

Local traffic noise such as that associated with Salmon Street, Plummer Street and Williamstown Road would also have the potential to contribute to the local ambient noise environment.

9.3.3 Montague Precinct

Currently, there are various private light industries/commercial businesses within the Montague Precinct. The following have been identified and considered as potential primary noise sources within the precinct:

- Various auto mechanical businesses, including repairs, services and workshops
- Factories and warehouses
- Light rail corridor associated with tram Route 109 (across the precinct)
- Light rail corridor associated with tram Route 96 (to the east of the precinct)
- Southbank Tram Depot (Normanby Road, South Melbourne
- Port Melbourne Metals (Normanby Road, South Melbourne);
- West Gate Freeway (to the north of the precinct)
- Traffic noise associated with City Road and Montague Street

Local traffic noise such as Normanby Road and Johnston Street would also have the potential to contribute to the local ambient noise environment.

9.3.4 Sandridge Precinct

The Sandridge Precinct comprises a mixture of industrial and commercial premises. Some of the identified major industrial and commercial facilities, which may have a potential for noise impacts include:

- Colonial Brewery (Bertie Street, Port Melbourne)
- Specsavers Head Office (Graham Street, Port Melbourne)
- Bunnings Warehouse (Bridge Street, Port Melbourne
- Delta Group Recycled Timber (Plummer Street, Port Melbourne);
- Specsavers (boundary Street, South Melbourne)
- Council Depot and Transfer Station (Boundary Street, Port Melbourne)
- Port Phillip Resource Recovery Centre (Boundary Street, South Melbourne)
- Fulton Hogan Depot (Boundary Street, South Melbourne)
- Electrical substation (Governor Road, Port Melbourne
- Various auto services and workshops
- Various logistics activities

Other than from the above industries, ambient noise environment within the Sandridge Precinct would also potentially be dominated by the traffic noise associated with West Gate Freeway. West Gate Freeway bounds the northern boundary of the precinct.

Local traffic noise such as that associated with Williamstown Road, Plummer Street and Ingles Street would also have the potential to contribute to the local ambient noise environment.

9.3.5 Employment Precinct

The Employment Precinct comprises a mixture of industrial and commercial premises. Some of the identified major industrial and commercial facilities, which may have a potential for noise impacts include:

- Aerostaff Australia (Network Drive, Port Melbourne)
- Antec Engineering (Turner Street, Port Melbourne)
- Boeing Aerostructures (Lorimer Street, Port Melbourne)
- Boral (Salmon Street, Port Melbourne)
- Cement Australia (Lorimer Street, Port Melbourne)
- Department of Science and Technology Organisation (DSTO) (Lorimer Street, Port Melbourne)
- Logistics Engineering Services (Salmon Street, Port Melbourne)
- Futuris Automotive Interiors (Turner Street, Port Melbourne)
- Herald and Weekly Times (Todd Road, Port Melbourne)
- Independent Cement (Lorimer Street, Port Melbourne)
- GM Holden's Global V6 Engine Plant (Salmon Street, Port Melbourne)
- SP Ausnet Terminal Station (Terminal Station, Port Melbourne)
- Steel Cement (Lorimer Street, Port Melbourne)
- South East Water (nearby Bolte Bridge, Port Melbourne)

- Kraft Foods (Salmon Street, Port Melbourne
- Melbourne International Karting Complex – outdoor karting complex (Cook Street, Port Melbourne)
- Melbourne International Shooting Club (Todd Road, Port Melbourne). Based on GHD on-site inspection, it was observed that outdoor shooting activities may potentially occur within the site
- Piave concrete batching plant facility (Salmon Street, Port Melbourne)
- PrintLinx (Lorimer Street, Port Melbourne)
- Numerous auto businesses, medium-sized factories, warehouses, logistics, electrical substations, metal fabrication activities

Other than from the above industries, ambient noise environment within the Employment Precinct would also potentially be dominated by transportation noise associated with

- Helipad at Pier 35 Marina
- West Gate Freeway
- CityLink Tollway
- Port of Melbourne
- Local traffic within the Fishermans Bend area, such as Lorimer Street, Todd Road and Salmon Street

9.3.6 Nearby Fishermans Bend

Industrial activities surrounding Fishermans Bend would also have the potential to create noise impacts onto the proposed Fishermans Bend. In particular, the following industries have been identified:

- ACI Operations Pty Ltd (Booker Street, Spotswood)
- Brandon Molasses (MacKenzie Road, Footscray)
- CSR Gyprock plasterboard manufacturing (Whitehall Street, Yarraville)
- Ecogen Energy Pty Ltd – Newport Power Station (Douglas Parade, Newport)
- Grainco Ltd (Enterprize Rd, West Melbourne)
- DP World (West Swanston Terminal/MacKenzie Road, West Melbourne)
- Westgate Port Services (Enterprize Road, West Melbourne)
- Patrick Stevedores – container terminals (Coode Island and 3-5 Dockside Rd Port Melbourne)
- DP World – container terminals (Coode Island, West Melbourne)
- Sanford Australia – fish market (Youell St, Footscray)
- Toll Shipping (Williamstown Road, Port Melbourne)
- Webb dock (Williamstown Road, Port Melbourne)
- Numerous medium-sized factories, warehouses and logistics activities

Other related noise sources have also been identified surrounding Fishermans Bend, which include:

- Footscray Road traffic noise
- Shipping cranes
- West Gate Freeway
- CityLink Tollway
- Port of Melbourne
- Rail freight facilities
- Light rail corridor

9.3.7 Summary of identified potential primary noise sources

Table 20 and Table 21 summarise the above-identified potential primary noise sources within and surrounding Fishermans Bend precincts. GHD has assessed the existing separation distances to Fishermans Bend precinct from each of the identified sources nearby Fishermans Bend (refer to Table 21).

GHD has also provided indicative a Noise Impact Risk ranking for Fishermans Bend development. The Noise Impact Risk is categorised into three levels, namely; “Low”, “Medium” and “High”, to reflect the type of industries and magnitude of impacts they may generate. Figure 17 identifies the potential high risk noise sources within and surrounding Fishermans Bend.

Table 20 Identified Primary Noise Sources within Fishermans Bend Precinct

Company/ Infrastructure	Operations	Address	Potential Noise Sources	Noise Impact Risk for Fishermans Bend
Lorimer Precinct				
Pronto	Concrete batching facility	Rogers Street, Port Melbourne	Trucks, stockpiling, concrete batching process	High
Hanson	Concrete batching facility	Boundary Street, Port Melbourne	Trucks, stockpiling, concrete batching process	High
Auto Dealerships (Volvo, Land Rover and Subaru)	Car and truck sales and repairs	Various	Delivery trucks, cars and workshop activities	Low
Factories and warehouses	Various factories and warehouses	Various	Trucks, manufacturing and logistics activities	Medium
West Gate Freeway	Arterial Road	-	Traffic noise, truck engine braking	High
CityLink Tollway	Arterial Road	-	Traffic noise, truck engine braking	High
Lorimer Street	Arterial Road	-	Traffic Noise	Medium
Wirraway Precinct				
AusCarts Racing	Indoor Go karts track	50 Salmon Street, Port Melbourne	Vehicular engine noise, patron noise	Medium

Company/ Infrastructure	Operations	Address	Potential Noise Sources	Noise Impact Risk for Fishermans Bend
Port Phillip Depot Citywide	Recycling facility	477 Graham Street, Port Melbourne	Mulching, stockpiling, trucks	Medium
Bambra Press	Printing facility	6 Rocklea Drive, Port Melbourne	Delivery trucks and printing process	Low
Electrical Substation	Substation	422-430 Plummer Street, Port Melbourne	Electrical noise	Medium
Factories and warehouses	Numerous factories and warehouses	Port Melbourne Industrial Estate and various others	Trucks, cranes, forklifts	Medium
Industrial Hydraulic Services	Hydraulic equipment manufacturer, services and marketer	371 Plummer Street, Port Melbourne	Manufacturing process and various logistics activities	Medium
National Tiles Co	Tiles retailer	525 Graham Street, Port Melbourne	Various logistic activities	Medium
Melbourne Indoor Paintball	Paintball sport	Corner of Salmon Street and Plummer Street, Port Melbourne	Patron noise	Low
Port Melbourne Containers	Servicing Containers	37 Prohasky Street Port Melbourne	Trucks, cranes, container forklift	High
West Gate Freeway	Arterial Road	-	Traffic Noise	High
Plummer Street	Arterial Road	-	Traffic Noise	Medium
Williamstown Road	Arterial Road	-	Traffic Noise	Medium
Salmon Street	Arterial Road	-	Traffic Noise	Medium
Montague Precinct				
Auto Businesses	Car and truck sales and repairs	Various	Trucks, cars and workshop activities	Medium
City Road	Arterial Road	-	Traffic Noise	High
Factories and warehouses	Numerous factories and warehouses	Various	Delivery trucks, workshop and various logistic activities	Medium
Montague Street	Arterial Road	-	Traffic noise	Medium
Port Melbourne Metals	Metal Recycling facility	201 Normanby Road, South Melbourne	Various logistic and workshop activities	High
Southbank Tram Depot	Trams	Normanby Road, South Melbourne	Trams movements and maintenance activities	Medium
Tram line and stations (Route 96 and 109)	Trams	Montague Street Light Rail	Trams movements	Medium

Company/ Infrastructure	Operations	Address	Potential Noise Sources	Noise Impact Risk for Fishermans Bend
West Gate Freeway	Arterial Road	-	Traffic noise	High
Sandridge Precinct				
Auto Businesses	Car and truck sales and repairs	Various	Delivery trucks, cars and workshop activities	Medium
Bunnings Warehouse	Homeware retailer	501 Williamstown Road, Port Melbourne	Car and delivery trucks	Medium
Colonial Brewery	Brewery	89 Bertie Street, Port Melbourne	Brewery processing activities, trucks	Medium
Delta Group Recycled Timber	Refuse transfer station	577 Plummer St, Port Melbourne	Logistic activities and recycling process	High
Electrical substation	Substation	90-96 Johnson Street, Port Melbourne	Electrical noise	Medium
Fulton Hogan Depot	Truck depot	101 Boundary Street, South Melbourne	Heavy vehicles	High
Port Phillip Resource Recovery Centre	Accepts general household rubbish materials for recycling	Corner of White and Boundary Streets, South Melbourne	Recycling process and activities	High
Specsavers Head Office	Eye glasses manufacturing facility	520 Graham St, Port Melbourne	Manufacturing process and logistic activities	Low
Various logistic Services	Container operations	Various	Vehicular movements	Medium
West Gate Freeway	Arterial Road	-	Traffic noise	High
Plummer Street	Arterial Road	-	Traffic Noise	Medium
Ingles Street	Arterial Road	-	Traffic Noise	Medium
Williamstown Road	Arterial Road	-	Traffic Noise	Medium
Employment Precinct				
Aerostaff Australia	Research and design in the aerospace and automotive sectors	32 Network Dr, Port Melbourne	Manufacturing process and workshop activities	Medium
Antec Engineering	Manufacturer and supplier of mining, minerals processing, construction and industrial products	90 Turner Street, Port Melbourne	Manufacturing process, workshop activities and logistics	medium
Boeing Aerostructures	Aircraft Assembly	226 Lorimer St, Port Melbourne	Aircraft Assembly equipment, engines	Medium

Company/ Infrastructure	Operations	Address	Potential Noise Sources	Noise Impact Risk for Fishermans Bend
Boral	Plasterboard manufacturing	251 Salmon Street, Port Melbourne	Manufacturing process and logistic activities	Low
Cement Australia	Cement product depot	465 Lorimer St Port Melbourne	Delivery trucks, pouring cement	Low
Department of Science and Technology Organisation (DSTO)	Science and technology support for Australia's defence and national security	506 Lorimer Street, Port Melbourne	Aerospace and automotive equipment, workshop testing activities	Medium
Logistics Engineering Services	Research and design in the aerospace and automotive sectors	Lorimer Street, Port Melbourne	Aerospace and automotive workshop activities	Low
Futuris Automotive Interiors	Automotive Interiors	80 Turner Street, Port Melbourne	Automotive workshop activities	Low
Herald and Weekly Times	Printing facility	127 Todd Rd, Port Melbourne	Printing	Low
Independent cement	Cement and lime distributer and depot	750 Lorimer St, Port Melbourne	Trucks, stockpiling, logistics	Medium
Holden's Global V6 Engine plant	Engine manufacturer	191 Salmon St, Port Melbourne	Engine manufacturing process, engine testing and various workshop activities	Low
SP Ausnet	Terminal Station	132-140 Turner Street, Port Melbourne	Electrical noise	Medium
Steel cement	Cement depot	469-591 Lorimer Street, Port Melbourne	Trucks, stockpiling, logistics	Low
South East Water	Sewer Mining Plant and sewage extraction system	The eastern portion of the precinct near the Bolte Bridge (this is subject to change).	Mechanical noise, such pumps, blowers, etc.	Medium
Kraft Foods	Food production	Salmon Street, Port Melbourne	Vegemite, food manufacturing and logistic activities	High
Melbourne International Karting Complex	Go karts complex	50 Salmon Street, Port Melbourne	Go karts	High
Melbourne International Shooting Club	Shooting Club	120 Todd Rd, Port Melbourne	Small arms weapons	High
Piave	Concrete batching facility	262 Salmon St, Port Melbourne	Trucks, stockpiling, concrete batching process	Medium

Company/ Infrastructure	Operations	Address	Potential Noise Sources	Noise Impact Risk for Fishermans Bend
PrintLinx	Printing industry	706 Lorimer Street, Port Melbourne	Printing machinery	Low
Helipad at Pier 35 Marina	Helipad	Pier 35 Marina	Helicopter noise	Low to Medium (depending on helicopter route)
West Gate Freeway	Arterial Road	-	Traffic noise	High
CityLink Tollway	Arterial Road	-	Traffic noise	High
Port of Melbourne	Port facility	Port Melbourne	Port operations, such as trucks, cranes, cars.	High
Salmon Street	Arterial Road	-	Traffic Noise	Medium
Todd Road	Arterial Road	-	Traffic Noise	Medium

Table 21 Identified Primary Noise Sources nearby Fishermans Bend

Company/ Infrastructure	Operations	Address	Potential Noise Sources	Noise Impact Risk to Fishermans Bend
ACI Operations Pty Ltd	Glass Manufacturing	2 Booker St, Spotswood	Manufacturing process	Low
Auto Businesses	Auto Repair/ panel beating	Various	Automotive workshop activities	Medium
Brandon Molasses	Blackstrap sugar cane molasses handling facility	80 MacKenzie Road, Footscray	Machinery processing and logistic activities	Low
CSR Gyprock	Plasterboard manufacturing	Whitehall Street	Machinery processing and logistic activities	Low
DP World	Container Terminals	Coode Island	Terminal operations such as container logistics, ships, cranes trucks, etc.	Medium
Ecogen Energy Pty Ltd	Newport Power Station	350 Douglas Parade, Newport	500 MW gas-fired Power generator	Medium
Factories and warehouses	Numerous factories and warehouses	Various	Machinery processes and logistic activities	Medium
Grainco Ltd	Grain storage and handling facility	Enterprize Road, West Melbourne	Logistics, train, cranes	Low
Patrick Stevedores	Container Terminals,	Coode Island and 3-5 Dockside Rd Port Melbourne	Containers, ships, cranes trucks	Medium
DP World	Container Terminals,	Coode Island, West Melbourne	Containers, ships, cranes trucks	Medium

Company/ Infrastructure	Operations	Address	Potential Noise Sources	Noise Impact Risk to Fishermans Bend
Small and medium businesses	Numerous factories and warehouses	Portside Business Park, Bridge side Business Park, Lorimer Business Park, Dockside Business Park, Port-It-at-Turner Business Park	Trucks, logistics, etc.	Medium
Toll Shipping	Container terminal,	120-150 Williamstown Road, Port Melbourne	Various logistic activities	Medium
Webb dock	Automotive and container terminal	50 Williamstown Road Port Melbourne	Dock and port operations, such as trucks, cranes, cars, ships,	High
Westgate Port Services	Port facility	Enterprize Road, West Melbourne	Port operations, such as trucks, cranes, cars.	Low
Rail Freight Facilities	Melbourne Freight Terminal	Footscray Road, West Melbourne	Freight trains	Low
Light rail corridor	Yarra trams	Route 96 and 109 trams	Tram noise	Medium

Paper Size A3

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Potential High Risk Noise Sources

DELWP
Fisherrmans Bend Buffer Report - Update

Job Number	31-34061
Revision	A
Date	11 Aug 2016

Potential High Risk Noise Sources Figure 17

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Data Source: Imagery, NearMap, extracted 23/04/2016, Image Date 05/02/2015 and VicMap, DELWP (2016).

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9.4 Existing potential primary vibration sources

Primary vibration sources within and nearby Fishermans Bend were identified to be sourced from the following activities:

- Occasional light rail movements along Routes 96 and 109
- Local heavy traffic movements (especially from heavy vehicles)
- Some industrial activities

9.5 Legislation, guidelines and standards

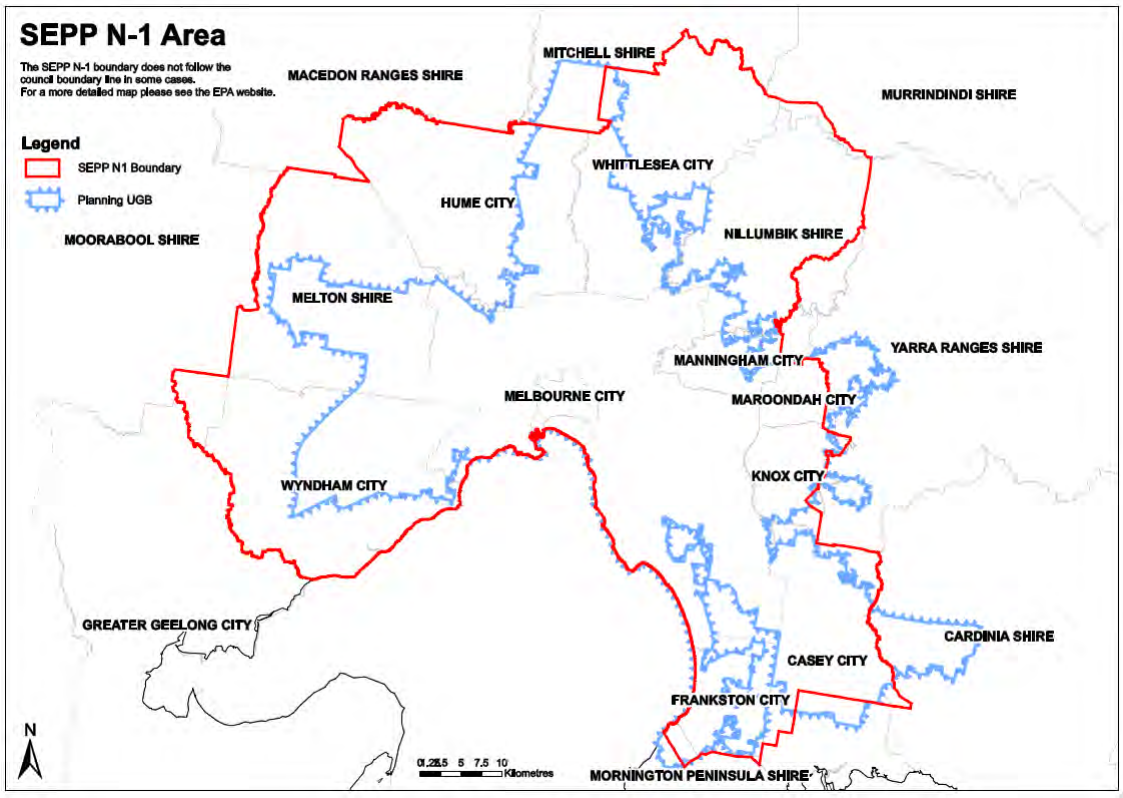
The noise regulations and standards outlined within this section are considered to be applicable to Fishermans Bend Project.

9.5.1 Environmental noise criteria

State Environment Protection Policy No. N-1 (Victorian Government, 1989)

Noise from industry in Metropolitan Melbourne and/or Victoria's Major Urban Area (as shown on Figure 18) is managed using the *State Environmental Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* (Victorian Government, 1989). Hence, the noise level criteria for industrial noise impact to the sensitive receptors within Fishermans Bend would be assessed following the procedures outlined in SEPP N-1.

Figure 18 Areas covered by SEPP N-1 (EPA Victoria, 2011)



SEPP N-1 manages the impact of noise on residential and other noise-sensitive uses and should be applied when siting or designing new or expanded industry or plant and when government authorities assess applications for the industry.

SEPP N-1 sets the maximum noise level allowed in a noise-sensitive area from commercial/industrial premises depending on the time of day, land use zoning and existing background noise levels. The first step in developing the noise limit is to calculate the prescribed upper noise limit (Zoning Level or Zoning Limit) for the particular land use as opposed to noise sensitive areas[16] (i.e. residential zoned land around the site). Once the zoning level has been defined, the background noise level (refer to Glossary) is assessed to decide whether the background levels are neutral (i.e. not significantly higher than the zoning levels) or otherwise.

If the background level is neutral, the noise limit adopted is the zoning level. If, on the other hand, the background level is found to be significantly lower or higher than the zoning level then the noise limit is reduced or increased respectively.

State Environment Protection Policy No. N-2 (Victorian Government, 1989)

GHD assumes that there is a potential for music entertainment venues, such as cafes, bars, etc. to be proposed as part of Fishermans Bend future development plan.

Noise impact from musical entertainment venue is managed using the *State Environmental Protection Policy (Control of Music Noise from Public Premises) No. N-2* (Victorian Government, 1989). SEPP N-2 manages the impact of music noise on residential and other noise-sensitive uses and should be applied when siting or designing new or expanded musical entertainment venue and when government authorities assess applications for the development.

The noise limit at nearby sensitive receivers prescribed under the SEPP N-2 has been summarised in Table 22 for indoor venue and Table 24 for outdoor venue below.

Table 22 SEPP N-2 noise limit – Indoor venues

Time period[a]	Noise limit at noise sensitive receivers
More than or equal to 10 operations per year	
Day/Evening	Music noise (L_{Aeq}) shall not exceed background noise (L_{A90}) + 5 dB
Night	Music noise (L_{Aeq}) shall not exceed background noise (L_{oct90}) + 8 dB in any octave band (63 Hz – 4 kHz)
Less than 10 operations per year	
Day/Evening	Music noise (L_{Aeq}) shall not exceed background noise (L_{A90}) + 8 dB
Night	Music noise (L_{Aeq}) shall not exceed background noise (L_{oct90}) + 8 dB in any octave band (63 Hz – 4 kHz)

[a] The operating period for the indoor venues vary according to the number of operations per week and the day of the week on which an operation occurs (refer to Table 24).

[16] In accordance with Part VI of SEPP N-1, "noise sensitive area" is defined as *'part of the land within the apparent boundaries of any piece of land which is within a distance of 10 metres outside the external walls of any dwelling or residential building'* (Victorian Government1989). Therefore, it can be defined that the sensitive receiver distance is the shortest distance between the noise emitter and the location at 10 m away from the dwelling or residential building façade.

Table 23 SEPP N-2 Indoor Venue Prescribed Operating Period

Venues	Number of Operations Per Week	Day	Operating Period	
			Day/Evening time	Night-time
Indoor Venues	One	Friday	9 AM to 12 PM	12 PM to 9 AM
		Saturday	10 AM to 12 PM	12 PM to 10 AM
		Sunday	11 AM to 10 PM	10 PM to 11 AM
		Other	9 AM to 11 PM	11 PM to 9 AM
	Two or three	Thursday	9 AM to 11 PM	11 PM to 9 AM
		Friday	9 AM to 11 PM	11 PM to 9 AM
		Saturday	10 AM to 11 PM	11 PM to 10 AM
		Sunday	11 AM to 10 PM	10 PM to 11 AM
		Other	9 AM to 10 PM	10 PM to 9 AM
	More than three	Saturday	10 AM to 10 PM	10 PM to 10 AM
		Sunday	12 AM to 9 PM	9 PM to 12 AM
		Other	9 AM to 10 PM	10 PM to 9 AM

Table 24 SEPP N-2 noise limit – Outdoor venues

Outdoor operating period		Noise limit at noise sensitive receivers	
for duration of operation less than or equal to five (5) hours	for duration of operation greater than five (5) hours	Outdoor measurement	Indoor measurement
12 NOON to 11 PM	12 NOON to 10 PM	65 dB(A)L_{eq}	55 dB(A) L_{eq}

9.5.2 Noise criteria from passenger rail infrastructure noise

Review of the composite plan for Fishermans Bend indicates that there is a potential Metro Rail Station to be built within Fishermans Bend. Victorian Government publication of '*Passenger Rail Infrastructure Noise Policy*' (Victorian Government, April 2013) provides a policy to assist in managing rail noise impacts from three rail infrastructure scenarios, namely:

- Improved passenger rail infrastructure
- New passenger rail infrastructure
- Changes to land use near existing and planned rail corridors

Table 25 to Table 27 detail the summary of the investigation thresholds of the above proposed infrastructure scenarios.

Table 25 Investigation Thresholds for New Passenger Rail Infrastructure or Change in Land Use near a Planned Rail Corridor

Time	Type of Receiver	Investigation Threshold(s)
Day (6 AM to 10 PM) dB(A) External	• Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks • Noise sensitive community buildings including schools, kindergartens, libraries	60 L_{Aeq} **or** 80 L_{Amax}
Night (10 PM to 6 AM) dB(A) External	• Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks	55 L_{Aeq} **or** 80 L_{Amax}

Table 26 Investigation Thresholds for Change in Land Use near an Existing Rail Corridor

Time	Type of Receiver	Investigation Threshold(s)
Day (6 AM to 10 PM) dB(A) External	• Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks • Noise sensitive community buildings including schools, kindergartens, libraries	65 L_{Aeq} **or** 85 L_{Amax}
Night (10 PM to 6 AM) dB(A) External	• Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks	60 L_{Aeq} **or** 85 L_{Amax}

Table 27 Investigation Thresholds for Redevelopment of Existing Passenger Rail Infrastructure

Time	Type of Receiver	Investigation Threshold(s)
Day (6 AM to 10 PM) dB(A) External	• Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks • Noise sensitive community buildings including schools, kindergartens, libraries	65 L_{Aeq} **and** change in L_{Aeq} of 3 dB(A) or more or 85 L_{Amax} **and** change in L_{Amax} of 3 dB(A) or more
Night (10 PM to 6 AM) dB(A) External	• Residential dwellings and other buildings where people sleep including aged person homes, hospitals, motels and caravan parks	60 L_{Aeq} **and** change in L_{Aeq} of 3 dB(A) or more or 85 L_{Amax} **and** change in L_{Amax} of 3 dB(A) or more

9.5.3 Noise control guidelines for helicopters

With regards to the existing helipad situated at Pier 35 Marina, this section discusses the relevant noise control guidelines.

EPA Victoria Publication 1254 – *Noise Control Guidelines* (EPA Vic, October 2008) provides noise level criteria for helicopter noise. The stipulated noise criteria comprise of three separate components, which should be satisfied at the nearest noise sensitive receivers' building. The three components are:

- The measured $L_{Aeq,T}$ (measured over the entire daily operating time of the helipad) shall not exceed 55 dB(A) for a residence
- The measured maximum noise level LAmax shall not exceed 82 dB(A) at the nearest residential premises
- Operation outside the hours between 7 am and 10 pm shall not be permitted except for emergency flights

EPA Victoria has noted that the above levels will generally be achieved by a buffer distance of 150 m between the landing site and the residential premises for helicopters of less than two tonnes gross weight, and 150 m for helicopters of less than 15 tonnes gross weight.

9.5.4 Construction noise criteria

A part of the proposed Fishermans Bend new developments and infrastructure, construction noise would need to be managed to assist with minimising potential noise impacts at surrounding sensitive receivers. The EPA *Noise Control Guideline* (Publication 1254) (EPA Victoria, 2008) makes provision for the control of construction noise. EPA Publication 1254 states the following:

Normal working hours

The EPA Publication 1254 guideline places no restriction on construction noise during *normal working hours*. However, it requires that noise management and mitigation measure be implemented to minimise the construction noise impact.

The period for *normal working hours* is defined as the following:

- 7.00 am to 6.00 pm, Monday to Friday
- 7.00 am to 1.00 pm, Saturdays

Weekend/Evening working hours

Noise levels at any residential premises should not exceed background noise by:

- 10 dB(A) or more for **up to** 18 months after project commencement
- 5 dB(A) or more **after** 18 months

during the hours of:

- 6.00 pm to 10.00 pm, Monday to Friday
- 1.00 pm – 10.00 pm, Saturdays
- 7.00 am – 10.00 pm, Sundays & public holidays

Night period

Noise should be inaudible within a habitable room of any residential premises during the hours of:

- 10.00 pm to 7.00 am, Monday to Sunday

The EPA *Noise Control Guideline* (Publication 1254) makes an allowance for unavoidable construction works through the night provided that residents are notified of the intended work, its duration and times of occurrence.

The EPA *Noise Control Guideline* (Publication 1254) and EPA *Environmental Guidelines for Major Construction Sites (Publication* 480) provide mitigation measures that need to be considered.

9.5.5 Internal noise levels

Fishermans Bend is proposed to have a strategic mix of well-designed housing types, local gathering places, community facilities, offices, shopping and entertainment venues. The maximum external noise intrusion into the indoor spaces of the building is recommended to comply with Australian Standard AS 2107:2000 "*Acoustics – Recommended design sound levels and reverberation times for building interiors*" (AS 2107: 2000). Table 28 details some of the typical recommended internal spaces noise levels from the external noise intrusion. External building envelopes are recommended to be designed to comply with the recommended internal noise levels below. Internal spaces not mentioned in Table 28 are recommended to be designed to comply with AS 2107:2000.

Table 28 Typical Recommended Design Internal Noise Levels

Designated Area	Recommended Design Internal Noise Levels L_{Aeq} dB(A)	
	Satisfactory	Maximum
Houses and Apartments (near minor road)		
Bedroom	30	35
Living Room, Dining Room	30	40
Lobby, Foyer, Corridor	45	55
Houses and Apartments (near major road)		
Bedroom	30	40
Living Room, Dining Room	35	45
Lobby, Foyer, Corridor	45	55
Hotels and Motels		
Sleeping Areas (near minor road)	30	35
Sleeping Areas (near major road)	35	40
Foyers	45	50
Toilets	45	55

Designated Area	Recommended Design Internal Noise Levels L_{Aeq} dB(A)	
	Satisfactory	Maximum
Educational Buildings		
Conference Rooms	35	40
Lobbies, Corridor	45	50
Lecture Theatres	35	45
Libraries (General areas)	40	50
Office Areas	40	45
Teaching Spaces (Primary School)	35	45
Teaching Spaces (Secondary Schools)	35	45
Indoor Sports Buildings		
General Indoor Sports	45	50
Office Buildings		
General Office Areas	40	45
Private Offices	35	40
Board Rooms	30	40
Lobbies, Corridor	45	50

Note that AS 2107:2000 is applicable only to quasi-steady state noise sources and is not intended for use in evaluating occupancy noise, transient or variable noises, such as:

- Aircraft noise (refer to AS 2021)
- Construction noise such as jackhammers and pile-drivers (refer to AS 2436)
- Railway noise
- Crowd noise, e.g. from parades and sporting events
- Emergency vehicle warning devices

Internal Noise Criteria from Rail Noise

Should there be potential residential development constructed within Fishermans Bend that is subject to future rail noise impact, this section details the internal noise criteria for rail noise.

The Victorian Government publication of '*Passenger Rail Infrastructure Noise Policy*' (Victorian Government, April 2013) has made no reference to building internal noise criteria impacted by rail noise. There are currently no internal noise assessment criteria documented by a Victorian Authority in specifically assessing train noise impact. In the absence of Victorian guidance, train noise impact assessment is generally based on the criteria nominated by the NSW Government Department of Planning requirements, which nominate criteria for residential development in accordance with their publication '*Development near rail corridors and busy roads – Interim guideline* (NSW DoP, 2008). Residential type development requires an internal noise level of 40 dB(A) $L_{eq,1hr}$ daytime in living and sleeping areas and 35 dB(A) $L_{eq,1hr}$ night time in sleeping area as shown in Table 29.

Table 29 Recommended Internal Railway Noise Criteria

Designated Area	Recommended Internal Noise Levels $L_{Aeq\ (1\text{-}hour)}$ dB(A)	
	Day/Evening time (7 AM to 10 PM)	Night-Time (10 PM to 7 AM)
Living and Sleeping Areas	40	35

9.5.6 Specific noise characteristics

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency and irregularity, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. The Victorian Government, through SEPP N-1, sets out the corrections to be applied for tonal, impulsive, and intermittent noise.

9.5.7 Low frequency noise

In the absence of a Victorian guideline, the NSW *Industrial Noise Policy* (NSW INP, 2000) is considered to address noise sources with inherent dominant infrasound or (very) low frequency noise characteristics. Industrial operations, such as Newport Power Station, can have the potential to generate low frequency noise components below 200 Hz. The procedure for the initial screening to decide if a more detailed assessment is required is as follows:

- If the dB(Linear) measurement exceeds the dB(A) measurement by more than 15 dB, a one-third octave band measurement in the frequency range 20 to 200 Hz should be carried out

The correction specified in the INP is to be added to the measured or predicted noise levels at the receiver before comparison with the criteria. Correction of 5 dB is to be applied if the difference between the measurements of C-weighted and A-weighted levels over the same period is 15 dB or more

9.5.8 Vibration criteria

This section discusses the vibration criteria applicable to Fishermans Bend development.

Human Comfort Vibration Criteria

Previously for large infrastructure projects, Australian Standards AS 2670.2:1990 – *Evaluation of human exposure to whole body vibration* was used to provide guidance on satisfactory magnitudes of building vibration with respect to human response. This standard is now withdrawn at the time of writing this document. SAI Global has advised that it has been replaced with ISO AS 2631.2:2014 – *Mechanical vibration and shock – Evaluation of human exposure to whole-body vibration – Part 2: Vibration in buildings (1 Hz to 80 Hz)*. However, this document does not include magnitudes of vibration for human comfort.

The British Standard BS 6472:2008 - *Guide to evaluation of human exposure to vibration in buildings - Part 1: Vibration sources other than blasting* (BS 6472, 2008) is commonly recognised in Australia as the preferred standard for assessing human comfort criteria for residential receptors in buildings. Table 30 includes the acceptable values of vibration dose for residential receptors during daytime and night-time periods.

These values represent the best judgement available at the time the standard was published and may be used for both vertical and horizontal vibration, providing that they are correctly weighted. As there is a range of values for each category, a certain amount of judgement is required.

Table 30 Vibration Dose Value (VDV) ranges and probabilities for adverse comment to intermittent vibration ($m/s^{1.75}$)

Location	Low probability of adverse comment[a]	Adverse comment possible	Adverse comment probable[b]
Residential buildings 16 hour day (7.00 am to 11.00 pm)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hour night (11.00 pm to 7.00 am)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Notes:
[a] Below these ranges adverse comment is not expected.
[b] Above these ranges adverse comment is very likely.

Whilst the assessment of response to vibration in BS 6472:2008 is based on vibration dose value (VDV) and weighted acceleration respectively, for construction related vibration, it is considered more appropriate to provide guidance in term of peak particle velocity (PPV) in millimetres per second, since this parameter is likely to be more routinely measured based on the more usual concern over potential building damage.

Humans are capable of detecting vibration at levels which are well below those causing risk of damage to a building. The degree of perception for humans is suggested by the vibration level categories given in BS 5228-2:2009 – *Code of practice for noise and vibration control on construction and open sites: Part 2 Vibration* (BS 5228.2, 2009), as shown in Table 31.

Table 31 Guidance on the effects of vibration levels

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.30 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration at this level in residential environments will cause complaints, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Based on Table 31 above, human response to vibration could be summarised as below:

- Vibration level in the range between 0.14 mm/s to 0.3 mm/s would generate low probability of adverse comment or complaints
- Vibration level in the range between 0.3 mm/s to 1 mm/s would generate the possibility of adverse comment or complaints
- Vibration level greater than 1 mm/s would likely cause adverse comment or complaints

Structural Damage Vibration Criteria

Currently, there is no Australian Standard that set the criteria for the assessment of building or other structural damage caused by vibration. Australian Standard 2436:2010 – *Guide to noise and vibration control on construction, demolition and maintenance sites;* does refer to the control of vibration in section 4.8.1. The supplied information in AS 2436 is general in nature and refers to other Standards and guidelines if a more detailed assessment is required, i.e. quantification of vibration exposure. British Standard BS 7385.2:1993 – *Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to damage levels from ground borne vibration;* and British Standard BS 5228.2:2009 – *Code of Practice for noise and vibration control on construction and open sites: Part 2 Vibration*; are referenced in AS 2436 as being able to supply detailed vibration quantification.

In addition to the detailed British Standards, the German Standard DIN 4150.3:1999 – *Structural vibration – Part 3: Effects of vibration on structures* (DIN 4150.3, 1999) provides more stringent vibration criteria as opposed to BS 7385.2:1993 for above ground structures, but less stringent criteria for below ground structures when compared to BS 5228.2:2009. Therefore, a combination of the German and British Standards is recommended, as shown in Table 32.

Table 1 of Section 5 of DIN 4150.3:1999 presents guideline values for the maximum absolute value of the velocity "*at the foundation and in the plane of the highest floor of various types of building. Experience has shown that if these values are compiled with, damage that reduces the serviceability of the building will not occur. If damage nevertheless occurs, it is to be assumed that other causes are responsible."*

Measured values exceeding those listed in Table 32 "*… does not necessarily lead to damage; should they be significantly exceeded, however further investigations are necessary."*

Table 32 Guidance values for short term vibration on structures

Line	Type of structure	Guideline values for velocity v(t)[a] (mm/s)		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[b]
At Grade Structures (DIN 4150.3:1999)				
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 to 40	40 to 50
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10
Underground Structures (BS 5228.2:2009)				
Competent structure such as steel or concrete pipeline		30		
Dilapidated brickwork		15		

[a] The term vi refers to vibration levels in any of the x, y or z axis.

[b] Where frequencies are above 100 Hz the values given in this column may be used as minimum values.

The vibration criteria presented in German Standard DIN 4150.3:1999 exceed human comfort criteria presented in Table 32. Therefore, for facilities that people occupy, the human comfort criteria should over-ride the structure damage criteria for the assessment of any vibration.

9.6 Potential noise and vibration impacts

9.6.1 Noise impact

The nature of noise sources from industrial and transportation activities have the potential to include continuous, tonal, intermittent and impulsive characteristics depending on individual sites. This section discusses the nature of the noise impact from different types of major noise sources within and nearby Fishermans Bend.

Industrial Noise

As mentioned earlier, noise characteristics emanating from industrial activities may vary depending on the nature of the industry.

In general, outdoor as well as roof-top mechanical plant and equipment from an industry, could generate continuous noise emission to the surrounding vicinity. These plant and equipment may generally operate 24-hour per day, however depending on the type of industry, they may only operate at a specific period of the day. The extent of the noise impact from outdoor mechanical plant and equipment would be assessed based on the mechanical layout installation (direction of openings, etc.), operating duration, equipment type, etc.

The noise emission from rotating mechanical plant and equipment could also have tonal characteristic. Any unbalanced impact during the course of the rotating movement could potentially cause vibration, where its energy is transmitted through surfaces into the air and could be heard as tones at particular frequency.

Noise within the Lorimer Precinct would potentially be sourced from concrete batching plants. The emitted noise could be intermittent in nature. Moreover, there could potentially be other noise sources associated with the concrete batching facility, such as stockpiling and truck movements.

Noise from major industries within the Fishermans Bend, such as Pronto and Hanson concrete batching plants, DSTO, Port Phillip Resource Recovery, Port Melbourne Metals, Kraft Foods, Webb Dock, Melbourne International Karting Complex, Melbourne Shooting Complexes and others, would require further noise investigation to assess the potential impact to Fishermans Bend.

Noise from various factories, warehouses, and container services facilities within and surrounding Fishermans Bend is sourced from workshops and logistics related activities, which involve trucks, forklifts, cranes, metal clanging, stockpiling, and many others. These would also result in different characteristics of noise, from intermittent and impulsive, to continuous.

Heavy vehicle movements within Fishermans Bend, as a result of the existing industrial operation, would also affect the local traffic noise within the precinct.

Overall, the noise generated by various types of industries within and nearby Fishermans Bend could cause cumulative noise impacts to Fishermans Bend. Hence, it is critical to assess the extent of these impacts when undertaking more detailed noise assessment of Fishermans Bend precinct.

Transportation Noise

In relation to transportation noise impact, parts of Fishermans Bend ambient noise environment are likely to be dominated by traffic noise, mainly associated with West Gate Freeway and CityLink Tollway. Any Fishermans Bend development that is proposed to be situated nearby these roadways would potentially result in exposure to high noise levels that require substantial local acoustic treatment to preserve any sensitive receiver's amenity.

Noise from freeway/tollway and major roads could involve low frequency engine braking noise from heavy vehicles that could cause annoyance to the surrounding sensitive receivers.

In addition, the June 2008 media release from the Minister for Roads and Ports talked about '*New Bypass to reduce Williamstown Road Truck Traffic'* (Supply Chain Victoria, 2008). This involves a construction of new Plummer Street Local Truck bypass, connecting to West Gate Freeway, to reduce traffic and congestion on the local road, namely Williamstown Road. Plummer Street is currently situated within the proposed Sandridge and Wirraway precincts of Fishermans Bend. The Plummer Street bypass construction work began in January 2007 and was completed in 2008. Traffic noise associated with heavy vehicles along Plummer Street, including that from engine braking, would have the potential of local impact to these Fishermans Bend precincts.

GHD acknowledges that other than the existing light rail corridors within the Montague Precinct, review of the composite plan for Fishermans Bend indicates that there is a potential Metro Rail Station to be built within Fishermans Bend precinct.

Rail noise usually generated from the noise emitted by the engine of trains, wheel rolling/friction, wheel passing rail joints and train horn/tram bell. These noise sources may contain certain characteristics, such as intermittency and tonality (horn/bell, squeaky noise from wheel rolling/friction, etc.) and dominant low-frequency noise (in the case of trains) that may cause amenity disruption to the surrounding sensitive receivers. However, in assessing the overall noise exposure to a particular sensitive receiver or a development, it will depend on the type of trains/trams and the number of trains/trams passing by for any given time.

Potential excessive noise impact from the adjacent rail/road operation may cause sleep disturbance, annoyance, hearing issues, impact on social activities and working performance, and discomfort to human hearings.

Helicopter noise due to the operation of the Helipad at Pier 35 has the potential to generate noise impacts onto Fishermans Bend. Engine and rotor blade noise of the helicopter could produce low frequency noise with intermittent and tonal emissions. It is recommended that further investigation be conducted to assess the potential noise impact to Fishermans Bend, based on flight path, schedule of operations and types of helicopters.

9.6.2 Vibration impact

With regards to vehicle movements, typical ground vibration from heavy trucks passing over normal road surface generate low vibration levels in the range of 0.01 – 0.2 mm/s at the building's footings located 10-20 m from the roadway. The rattling of windows or the like is sometimes more likely to be caused by airborne low-frequency noise radiation from truck exhaust or vibrating truck trailer bodies.

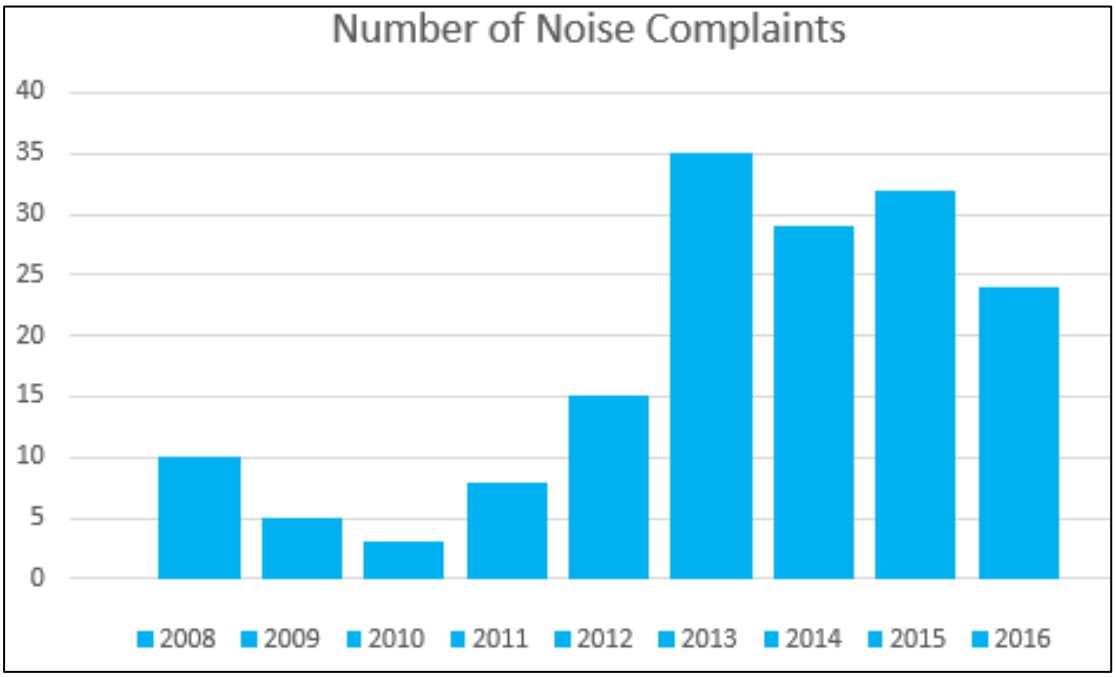
Also, train/tram vehicles passing along the rail corridor will induce ground borne vibration transmitted through the subsoil which may cause intermittent vibration nuisance to the surrounding sensitive receivers, depending on the distance between the rail line and the sensitive receivers. If not addressed, potential vibration impacts arising of rail operations may include sleep disturbance, discomfort due to excessive vibration exposure, and damage to infrastructure.

Vibration impacts at sensitive receivers would depend on various factors such as type of industry, distance to receivers and ground soil properties.

9.7 Noise complaint history

The EPA has provided GHD a map and list of recorded noise complaints in the Fishermans Bend area between mid-2008 and mid-2016. The number of noise complaints received by EPA has fluctuated over the period, with over 161 complaints lodged between July 2008 and May 2016. A summary of complaints received and verified by EPA is provided in Figure 19.

Figure 19 Fishermans Bend – Summary of Noise Complaints



To further analyse the noise complaints and their origin, GHD requested the EPA to provide the location, time and date, and reason of each complaint. However, EPA has categorised previous noise complaints into three types between period of 2008 and 2011, namely:

- Noise complaints relating to a construction site (10 complaints)
- Noise complaints relating to dock activity (seven complaints)
- Noise complaints relating to general activities (10 complaints)

No further detailed information is available for the complaints between 2012 and 2016

In the absence of detailed information regarding noise complaints, identification of specific noise sources relating to the complaint cannot be decisively attributed to a particular activity or site. Based on the above information, it is not possible to identify particular noise sources within the Fishermans Bend area that potentially caused complaints. Further investigation would be required to validate the complaints based on community consultation, noise monitoring, etc.

The identified noise complaints provided by EPA are shown in Appendix C of this report.

9.8 Noise mitigation strategies

The noise mitigation strategies could generally be divided into four different areas, from the most preferred to least preferred rankings (NSW INP, 2000):

- *Land-use controls* (separating the location of noise-producing activities from sensitive areas)
- *Control at source* (reduce the noise output of the source to provide protection surrounding environment)

- *Control in transmission* (reduce noise level at the receiver but not necessarily the environment surrounding the source, e.g. noise barrier, etc.)
- *Receiver control* (localised acoustic treatment at sensitive receiver)

Where required, noise mitigation measures should be implemented as much as reasonable and feasible. Other side factors such as visual amenity, lighting, security and economic factors should be taken into consideration in investigating the appropriate and practicable noise mitigation measures.

9.8.1 Land-use controls

There are several strategies involved in using the land-use control measures.

- **Setbacks strategy** (e.g. Open space design adjacent to noisy industries, busy road and/or railway corridor to provide noise reduction through setback distances to residential uses)
- **Setback distances** between the noise source and the noise sensitive receiver could be one of the treatments in reducing the noise exposure level at the proposed Fishermans Bend development. Setback strategy would also be effective in mitigating ground-borne vibration impact from nearby rail corridor or other vibration sources
- **Building locations and height controls.** For example, higher rise buildings could be located adjacent to primary noise sources to provide noise shielding effect to residential uses or the overall Fishermans Bend
- **Expansion of cycle and pedestrian facilities**, to discourage the use of motor vehicles and encourage the use of bicycles, scooters or walking, which would result in less noise emission within the area
- **Impose acoustic control planning conditions on new developments.** This could be in the form of council's planning permit conditions for specific acoustic treatment on noise sensitive developments

9.8.2 Control at source

There are several strategies involved in using the control at source measure.

- Promoting the use of low pavement surfaces on new roads. The type of road surface has a significant effect on the level of noise generated by the tyre/road interface. Austroads Technical Report "*Austroads Review Report: Traffic Noise/Long-life Surfacings*" (Austroads, January 2011) provides relative noise emission levels of conventional road surfacings in Australia, based on studies conducted by (Campbell & Isles, 2001), (Parnell, 2006) and (Samuels, 2008) (refer to Table 33).

Table 33 Relative noise emission levels of conventional surfacings in Australia

Surfacing type	Noise level variation dB(A)		
	Traffic Noise	Individual vehicles pass-by noise	
		Cars	Trucks
Size 14 single/single seal	+4.0	+4.0	+4.0
Size 7 single/single seal	+1.0	-	-
Portland cement concrete (PCC) tyned and dragged	0 to +3.0	+1.0 to +3.5	=1.0 to +1.0
Cold overlay	+2.0	+2.0	+2.0
Dense Graded Asphalt (DGA)	0	0	0
Portland Cement Concrete (PCC): exposed aggregate	-0.5 to -3.0	-0.1	-6.7
Stone Mastic Asphalt (SMA)	-2.0 to -3.5	-2.2	-4.3
Open Graded Asphalt (OGA)	0 to -4.5	-0.2 to -4.2	-4.9

In general, seal surfacings would not be recommended for low noise surfacings purposes as they tend to generate higher traffic noise levels compared to asphalt surfacings. Similar to concrete surfacings, they tend to generate higher noise levels than asphalt surfacings. However, there are a number of surface treatments that could be applied to reduce road noise levels, such as tyning or hessian dragging in a longitudinal direction to improve pavement unevenness (Austroads, January 2011).

Moreover, ageing of pavement and its construction quality could affect the noise performance. Austroads Research Report: "A*ustroads Research Report: Modelling, Measuring and Mitigating Road Traffic Noise. AP-R277/05*" (Austroads, 2005) has mentioned that "*It should also be noted that the noise generation characteristics of surfacings changes over time in particular as the wear, weathering and roughness of the road changes. In addition, noise generated from open graded asphalt pavement types will also increase as the voids within the surface become clogged over time. As an example,* (Dash, Bryce, Moran, & Samuels, 2001) *indicate that the clogging of surface voids in open-graded asphalt may lead to noise level increases of around 4 dB(A)."* Table 34 details the change in acoustic performance of road pavement due to ageing.

Table 34 Change in acoustic performance due to aging

Road surface	Noise level variation dB(A)		
	When fresh	Several years old	Change
mom sprayed seal	+4	+2	-2
Dense Graded Asphalt (DGA)	0	+1	+1
Open Graded Asphalt (OGA)	-4	-2	+2

- Installation of traffic calming schemes, such as speed humps, runabouts, etc. Austroads Research Report (Austroads, 2005) has provided factors to consider in designing traffic calming schemes, which are detailed in Table 35.

Table 35 Factors to consider in design of traffic calming schemes (Austroads, 2005)

Factor	Consideration
Distance between devices	Distance between traffic calming devices should promote constant speed along the road. Acceleration followed by braking and swerving can increase community annoyance where devices are spaced too far apart.
Height of device	Raised devices, such as mid-block platforms and speed humps have strong traffic calming effects. However, the height of the device can limit its effectiveness. A 3 cm increase in height can provide the equivalent noise increase of moving the device 40 m closer to the noise receiver.
Chicanes	Chicanes can reduce speed annoyance however; they do not reduce the sense of danger that a calming device should achieve. This is mostly a result of noise generated by swerving and acceleration.
Roundabouts	Roundabouts generally provide the greatest benefit in noise reduction. Noise from roundabouts appears to create less community annoyance than other traffic calming devices.
Mid-block platforms	Mid-block platforms are not effective at reducing speed annoyance. Squeaking noise, caused mostly by the vertical displacement of the device, tends to increase noise annoyance at sensitive receivers. This can be reduced by keeping the device height lower than 75 mm.
Speed humps	Speed humps have noticeably lower annoyance levels than mid-block platforms, although device height should be lower than 75 mm to minimise potential annoyance.
Driver behaviour	Implementation of traffic calming devices should be aimed for the minority of drivers who 'challenge' devices, as these drivers create the most noise. Measures that reduce line of sight may be more effective than those that create a vehicle disturbance.
Traffic volume and mix	Traffic volume and mix, particularly at night time (between 10:00 pm – 7:00 am) may affect noise annoyance to sensitive receivers. Unladen heavy vehicles and light trucks crossing these devices can cause sleep disturbance in the early morning hours.
Pavement surface	Contrasting pavement surfaces such as cobblestones or rumbled pavements, often used to highlight devices, can increase the noise at the tyre/road interface.
Emergency vehicle access	It should be noted that emergency vehicle access and response time must be carefully considered when designing and installing calming devices. Emergency vehicles, particularly ambulances, have more difficulty with vertical devices such as speed humps than with horizontal devices such as chicanes.

- Smooth any gaps or uneven rail track joints in the area close to the sensitive receivers. This would not only provide reduction in noise impact, but also reduction in vibration impact to the nearby sensitive receivers
- Traffic management to reduce the need for multiple heavy vehicle deliveries to one location
- Acoustic treatment to specific noise sources from specific nearby industry

9.8.3 Control in transmission

The noise reduction strategy used to control noise transmission generally involves the installation of noise barriers. Noise barriers may include an existing feature, such as:

- An elevated road or a natural slope (e.g. earth mound)
- A purpose designed feature such as a solid boundary fence
- A purpose designed feature of the building, such as a partially enclosed carport
- A purpose designed building which acts as a barrier block

Figure 20 and Figure 21 illustrate different noise barrier configurations, sourced from NSW Department of Planning "*Development near rail corridors and busy roads – Interim guideline*" (NSW DoP, 2008).

Figure 20 Noise Barrier Features (NSW DoP, 2008)

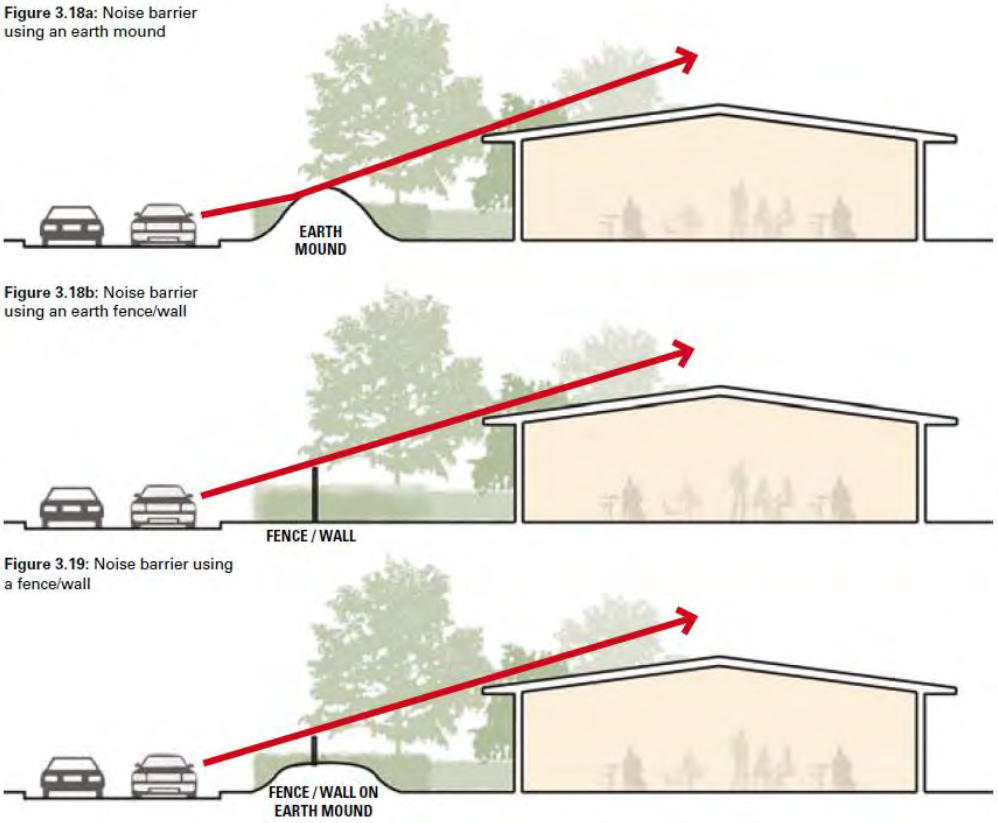
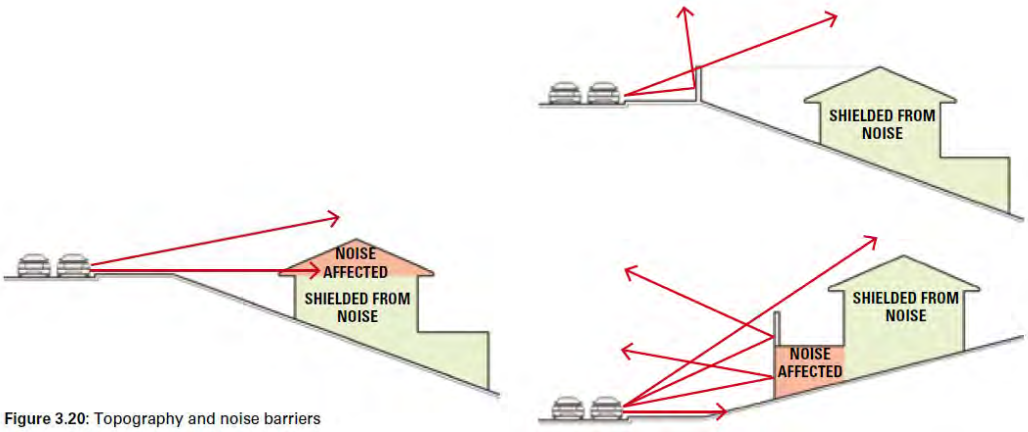


Figure 21 Noise Barrier Features (NSW DoP, 2008)



The barrier should be installed in a manner such that it covers the noise sources from direct line-of-sight to the sensitive receptors. In general, the barrier should provide sufficient screening to avoid direct line-of-sight between the shielded noise sources and the protected sensitive receptors. Noise barriers would not be effective in reducing noise impacts if the line of sight from the noise source to the residence is not reduced. Hence, it may not be practical to install a noise barrier for elevated sensitive receivers.

9.8.4 Receiver control

There are several strategies involved in using the Receiver Control measure:

- Building orientation layout. This involves configuring the development's floor plan to have sleeping areas/habitable areas facing away from the noise sources. Figure 22 and Figure 23 illustrate samples of building orientation layout strategies to minimise local noise intrusion, which is sourced from NSW Department of Planning "*Development near rail corridors and busy roads – Interim guideline*" (NSW DoP, 2008);

Figure 22 Sample of Building Layout Strategies 1(NSW DoP, 2008)

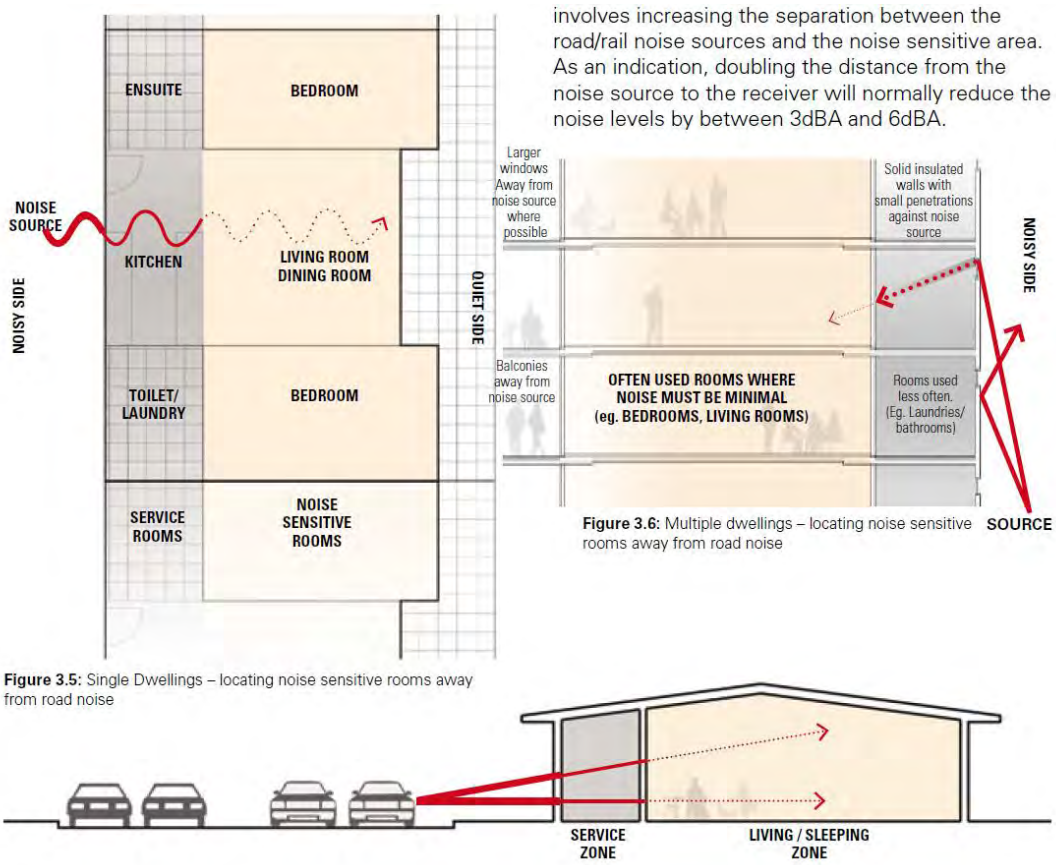
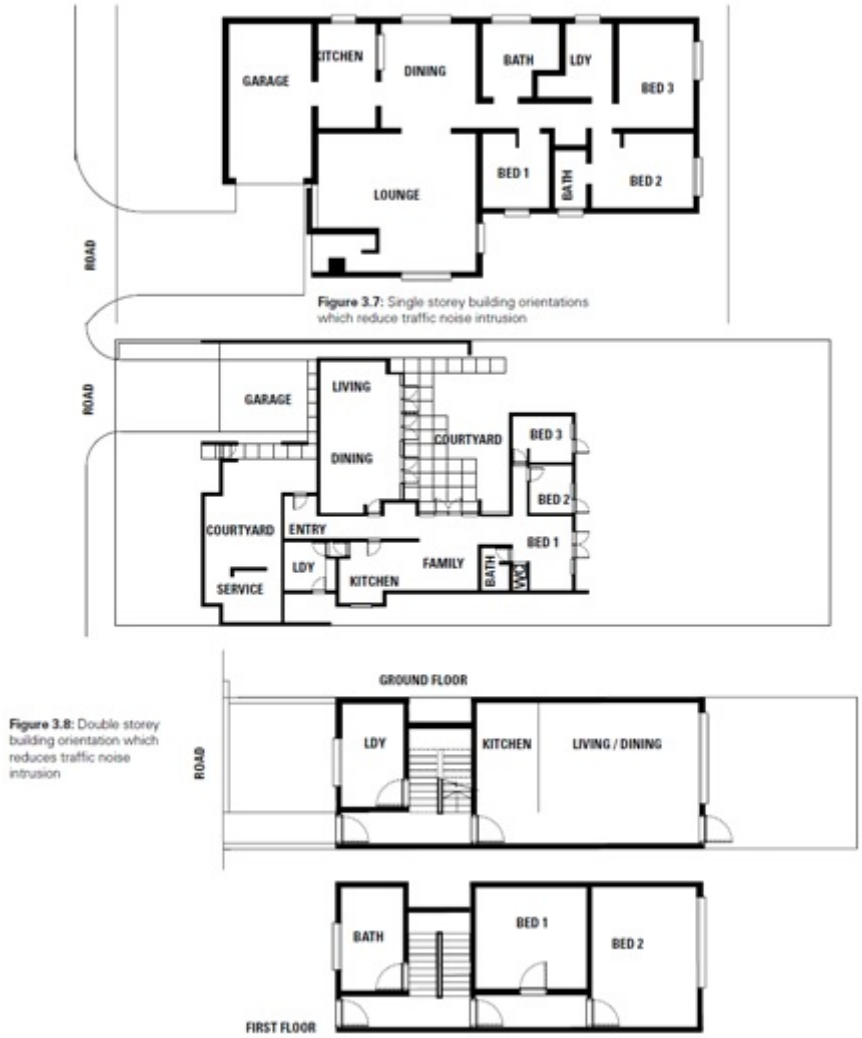


Figure 3.5: Single Dwellings – locating noise sensitive rooms away from road noise

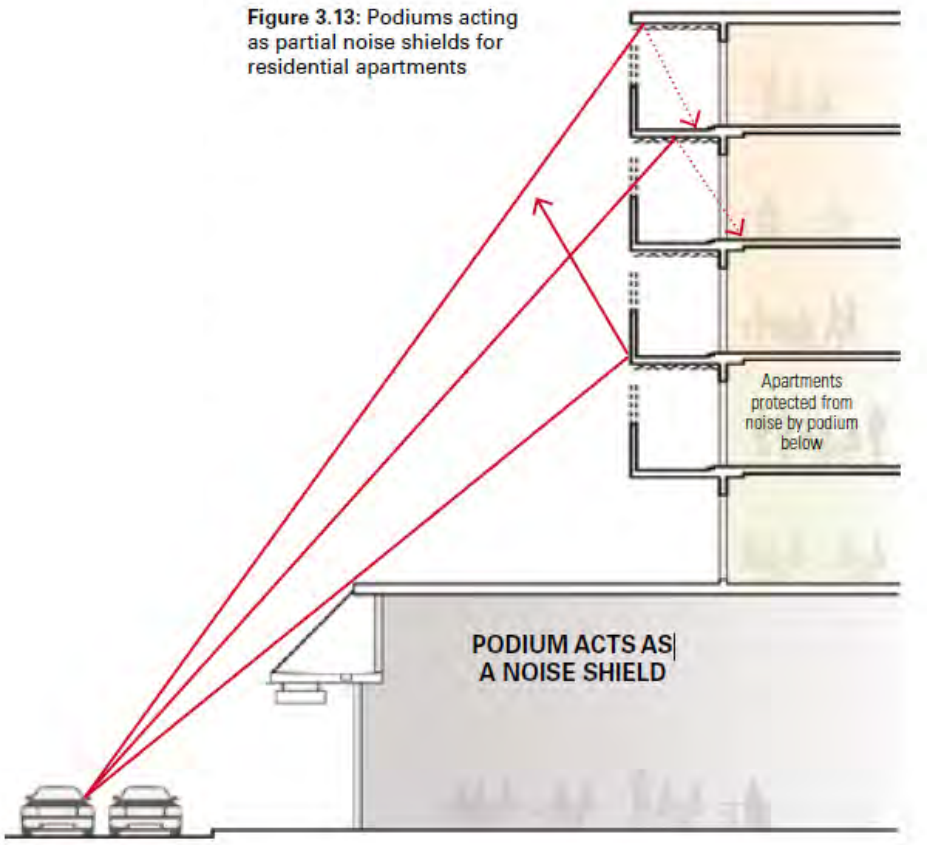
Figure 3.6: Multiple dwellings – locating noise sensitive rooms away from road noise

Figure 23 Sample of Building Orientation Layout Strategies 2 (NSW DoP, 2008)



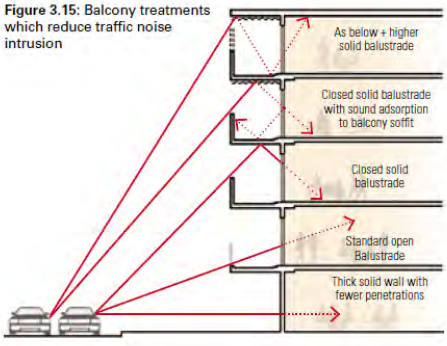
- Minimise lightweight external wall construction facing the dominating noise sources
- Thicker glazing construction for the window façade
- Minimise window size and maximise masonry external wall construction
- Minimise the use of openable window construction
- Configure any discharge/intake duct grill layout (above ceiling level) facing away from the noise sources
- Balustrade/balcony design/configuration to avoid direct line of sight from the balcony to the noise sources (this shall be confirmed following the design of the development and landscape layout). Figure 24 below illustrates samples of balustrade/balcony design strategies to minimise local noise intrusion, which is sourced from NSW Department of Planning "*Development near rail corridors and busy roads – Interim guideline*" (NSW DoP, 2008)
- Installation of foam rubber pad along the required building foundation plate, where necessary, depending the magnitude of the potential exposed vibration across the building structures

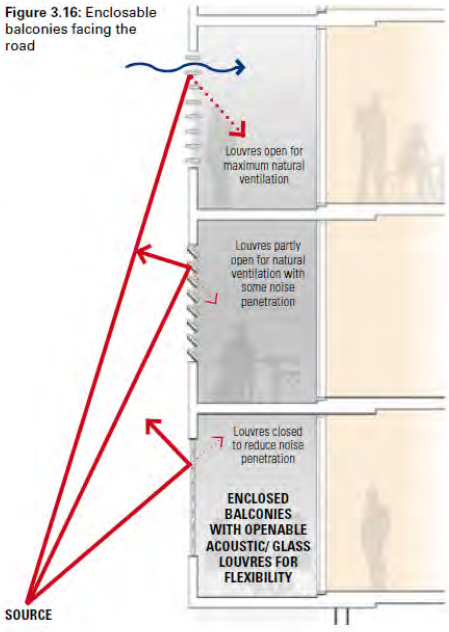
Figure 24 Sample of Balustrade/Balcony Design Strategies (NSW DoP, 2008)



Where balconies are required, solid balustrades with sound absorption material added to the underside of balconies above is a good means of reducing noise entering the building.

Providing enclosed balconies (or winter gardens) is another means of reducing the noise entering a building. Where enclosed balconies are used ventilation may need to be considered. By installing acoustic louvres ventilation requirements and reduced noise can be addressed. These approaches are shown in **Figure 3.16**.





9.9 Potential constraints to the mitigation strategies

The following details the identified potential key constraints for noise mitigation measures in Fishermans Bend.

- Established existing industries with private ownerships – control at source mitigation strategy may be a challenge
- Land-use controls mitigation strategy through setback distances could compromise land value and land utilisation
- While noise from industries and transportation are typically addressed separately, cumulative impacts may be a concern for precinct users, in terms of perception
- Noise control in transmission, through the installation of noise barriers, could have some limitations as follows:
  - Noise barriers are not effective to reduce transmission to receivers on a hillside or high rise buildings overlooking a road
  - Noise barriers generally creates perceptions such as view restriction, confinement feeling, loss of air circulation, loss of sunlight and lighting and could potentially increase local crime due to visual shielding
- Noise control at individual receivers may involve substantial acoustic treatment along with the associated cost

9.10 Recommended further work and investigation

This section discusses some recommended future key actions, in principle, to address potential noise and vibration impact to Fishermans Bend.

- Undertake a detailed noise and vibration survey in the subject area, including on-site attended and unattended noise and vibration monitoring to determine the characteristics of the existing background/ambient noise and vibration levels. Based on the measurements and detailed Fishermans Bend development design layout, noise and vibration impacts from existing operations could be assessed against the applicable standards and statutory requirements
- Based on the noise survey results, confirm noise specific criteria for Fishermans Bend development
- Review masterplans and/or proposed layouts and land use distribution of Fishermans Bend and identify high risk areas
- Where needed, prepare a detailed noise and vibration impact assessment of the proposed Fishermans Bend precinct. This may include noise modelling of some of the potential high risk operations/industries within or in the vicinity of Fishermans Bend, such as tollway/highway noise potentially impacting on proposed adjacent developments
- Based on the monitoring/ modelling results and knowledge of the subject area, identify cost-effective mitigation measures and possible recommendations for ensuring compliance and amenity preservation

10. Desktop lighting review

10.1 Overview

GHD has based Fishermans Bend development lighting impact review study on Australian Standard AS 4282. The objective of AS 4282 is to provide a common basis for assessment of the likely obtrusive effects that adversely affect amenity involving the provision of outdoor lighting. GHD has considered two basic aspects, namely the effects of external lighting on the proposed precinct as well as possible effects in reverse; from Fishermans Bend onto neighbours.

With any outdoor lighting installation, the light within the boundaries of the property on which the lighting system is installed is unlikely to be contained. Some light may spill outside the property boundaries, either directly or by reflection. The assessment of when the spill light becomes obtrusive to the amenity of others is difficult as both physiological and psychological effects are involved. AS 4282 provides guidance with respect to lighting spill. Guidelines to assist with this determination are provided in AS 4282.

The potential obtrusiveness of lighting installations includes elements such as:

- Assumed residential uses in each precinct
- The light falling on surrounding properties
- The brightness of luminaires in the field of view of nearby residents
- The zoning of the area abutting the Port of Melbourne location: there is a greater potential for complaints where the area is zoned for residential development
- The glare to users of adjacent transport systems and the effects on astronomical observations

10.2 Technical basis

Elements that must be taken into account when assessing visual amenity and lighting obtrusiveness include:

- The level of “other” lighting existing in the area
- The times that the lighting in question operates
- The type of lighting technology available to light the activity
- The use of readily available and easily understood technical data on the lighting installations which can easily be verified at both design and assessment stages

Public lighting, typically street lighting, has been excluded from AS 4282 because such lighting is provided to facilitate all-night safety and security for the public at large. Nevertheless, GHD has considered public lighting effects in this review.

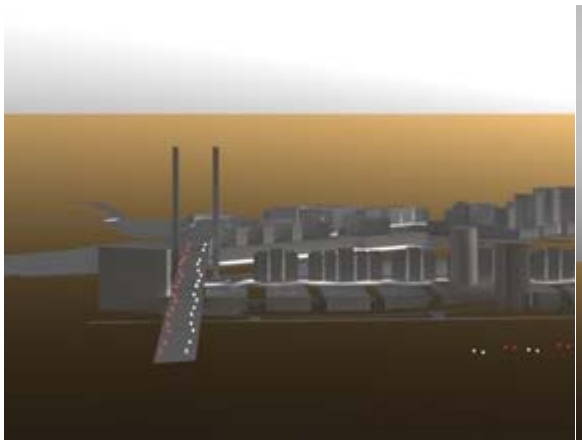
10.3 Potential light sources

Fishermans Bend is subject to spill light from a number of potential sources such as:

- The port (wharves and parking zones)
- Shipping
- Traffic on elevated roadways and bridges
- Local traffic
- Local adjacent operations such as Independent Cement
- The cityscape

Figure 26 and Figure 25 show the nuisance lighting sources with the potential to affect Fishermans Bend.

Figure 25 Potential Nuisance Light Sources



Bolte Bridge

Westgate Bridge

Paper Size A3

0 75 150 300 450 600

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Freeway
- Nuisance Lighting Sources

DELWP
Fisherrmans Bend Buffer Report - Update

Job Number	31-34061
Revision	A
Date	11 Aug 2016

Nuisance Lighting Sources

Figure 26

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Data Source: Imagery, NearMap, extracted 23/04/2016, Image Date 05/02/2015 and VicMap, DELWP (2016).

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10.4 Design and assessment parameters for desktop study

Lighting parameters on which obtrusiveness assessments are based are:

- Illuminance in the vertical plane (Ev)
- Luminous intensity emitted by luminaires (I)

Two sets of limiting values are given in AS 4282. The first with higher values is for application before a nominated or curfew hour and the second, with lower values, is for application after the curfew hour.

GHD has carried out the desk top lighting impact review based on:

- Considering the Fishermans Bend Urban Renewal Area as smaller manageable zones based on the five nominated precincts rather than as a monolithic site
- Simplified representations of sources
- Only major area lighting installations have been considered. Minor light fittings have not been considered

10.5 Effects of external lighting on the proposed precinct

Table 36 shows the potential effects of lighting on the Lorimer Precinct of Fishermans Bend.

Table 36 Lighting Effects in the Lorimer Precinct

Source	Time of Use	Lamp/Source Type	Issue
Vehicular Traffic: Bolte Bridge ramps	24/7	Vehicle headlights	Intermittent nuisance directed towards sensitive “wedge”.
Vehicular Traffic: West Gate Fwy	24/7	Vehicle headlights	Intermittent nuisance directed generally towards precinct
Port: docks and wharf	24/7	High Mast HID	Potential for excessive spill light nuisance.
Independent Cement Elevated structure	24/7 (varies)	High mast, floodlight, area lights.	Potential for spill light nuisance. Relatively distant.

Recommended additional analysis/review includes:

- Volume of potential buildings affected by vehicular headlights and the type of shielding that may be require
- Measure of spill light generated from Port operations
- Measure of spill light generated from Independent Cement and other nearby operations

After additional analysis/review, recommendations can be made requiring actions by owners of offending light sources or the construction of shielding structures or other forms of controls.

Table 37 shows the potential effects of lighting on the Sandridge Precinct of Fishermans Bend.

Table 37 Lighting Effects in the Sandridge Precinct

Source	Time of Use	Lamp/Source Type	Issue
Vehicular Traffic: Bolte Bridge ramps	24/7	Vehicle headlights	Intermittent nuisance directed towards sensitive “wedge”.
Vehicular Traffic: West Gate Fwy	24/7	Vehicle headlights	Intermittent nuisance directed generally towards precinct

Recommended additional analysis/review includes:

- Volume of potential buildings affected by vehicular headlights and the type of shielding that may be required

After additional analysis/review, recommendations can be made requiring actions by owners of offending light sources or the construction of shielding structures or other forms of controls.

Table 38 shows the potential effects of lighting on the Wirraway Precinct of Fishermans Bend.

Table 38 Lighting Effects in the Wirraway Precinct

Source	Time of Use	Lamp/Source Type	Issue
Vehicular Traffic: Bolte Bridge ramps	24/7	Vehicle headlights	Intermittent nuisance directed towards sensitive “wedge”
Vehicular Traffic: West Gate Fwy	24/7	Vehicle headlights	Intermittent nuisance directed generally towards precinct
Vehicular Traffic: Westgate Bridge and ramps	24/7	Vehicle headlights	Intermittent nuisance directed towards sensitive “wedge”
Port: Webb dock and Toll shipping	24/7	High Mast HID	Potential for excessive spill light nuisance
Shipping	Intermittent 24/7	HID, various	Intermittent nuisance but infrequent

Recommended additional analysis/review includes:

- Volume of potential buildings affected by vehicular headlights and the type of shielding that may be required
- Measure of spill light generated from Webb dock and Toll operations
- Measure of light generated by shipping and ferry operations

After additional analysis/review, recommendations can be made requiring actions by owners of offending light sources or the construction of shielding structures or other forms of controls.

Table 39 shows the potential effects of lighting on the Montague Precinct of Fishermans Bend.

Table 39 Lighting Effects in the Montague Precinct

Source	Time of Use	Lamp/Source Type	Issue
Build up and breakdown operations at Exhibition Centre	24/7 (varies)	Headlights, portable floodlights	Intermittent nuisance directed generally towards precinct
Vehicular Traffic: West Gate Fwy	24/7	Vehicle headlights	Intermittent nuisance directed generally towards precinct

Recommended additional analysis/review includes:

- Volume of potential buildings affected by vehicular headlights and the type of shielding that may be required

After additional analysis/review, recommendations can be made for input into buffer zones or shielding structures or other forms of controls.

Table 40 shows the potential effects of lighting on the Employment Precinct of Fishermans Bend.

Table 40 Lighting Effects in the Employment Precinct

Source	Time of Use	Lamp/Source Type	Issue
Vehicular Traffic: Bolte Bridge ramps	24/7	Vehicle headlights	Intermittent nuisance directed towards employment zone
Vehicular Traffic: **West Gate Fwy**	24/7	Vehicle headlights	Intermittent nuisance directed generally towards precinct
Vehicular Traffic: Westgate Bridge and ramps	24/7	Vehicle headlights	Intermittent nuisance directed towards employment zone
Port: Webb dock and Toll shipping	24/7	High Mast HID	Potential for excessive spill light nuisance.
Shipping	Intermittent 24/7	HID, various	Intermittent nuisance but infrequent.
Cement Handling	24/7	HID, various	Potential for excessive spill light nuisance

Recommended additional analysis/review includes:

- Volume of potential buildings affected by vehicular headlights and the type of shielding that may be required
- Measure of spill light generated from Webb dock and Toll operations
- Measure of light generated by shipping and ferry operations
- Measure of spill light generated from Cement Handling Operations

After additional analysis/review, recommendations can be made requiring actions by owners of offending light sources or the construction of shielding structures or other forms of controls.

10.6 Effects of external lighting from Fishermans Bend onto neighbours

Fishermans Bend development does abut existing residential areas across Williamstown Road, Lorimer Street and on three sides of the Montague Precinct. This latter precinct is close to existing residential towers as is the Lorimer Precinct.

Strict adherence to the limits set out in AS 4282 is recommended to protect the development from the effects of possible future complaints.

Street, building exterior and public space lighting should adhere to a lighting plan that seeks to limit spill, upward directed light pollution and glare.

10.7 Discussion

The nightscape that will eventually be provided by Fishermans Bend development represents an opportunity to deliver both a vibrant and pleasant living environment and an aesthetically coherent and pleasing precinct.

Achievement of this ideal will require management of nuisance lighting from both within Fishermans Bend and the surrounding zones. A lighting plan should be drawn up at the earliest possible stage to integrate the lighting to be installed in public, street and private developments.

11. Planning and land use strategies to manage amenity impacts

11.1 Managing land use conflicts

This report has highlighted a number of locations where existing industries and other uses may have a detrimental impact on the amenity of proposed new sensitive uses as part of a mixed use, residential or other sensitive land use development. The proposed Fishermans Bend envisages mixed use, whereby sensitive uses would be located within prescribed separation (buffer) areas of existing industries. This presents a two-fold problem: (1) a risk to future newly developed sensitive uses of being subjected to unacceptable odour, noise, dust or lighting impacts during either routine or upset events on in certain other circumstances; and (2) the encroachment of sensitive uses on the buffer areas of existing industries may result in unachievable or unreasonable requirements on the industries to mitigate the impacts at the source.

It is important to note, that in a high density city environment, the expectations of residents and other sensitive uses are somewhat different to those of people living in suburban and rural environments. People living in higher density urban environments may not be as sensitive to amenity impacts as their suburban neighbours and this is particularly so in a city context. However, a history of complaints to the EPA from within and around Fishermans Bend indicate that it could be expected that there would be amenity concerns during a transition period. In order to manage the conflicts between land uses, there must be a balance between selecting those measures that sufficiently mitigate amenity impacts, and avoiding over regulation and impacting on the ability to achieve other objectives such as urban growth and environmental sustainability.

11.2 Options for planning and land use controls

There are two different types of planning controls that could be implemented to help transition Fishermans Bend from its current predominately industrial use, to a mix use area with a range of land uses. Firstly, through careful strategic planning of land uses, which dictates where different types of land uses can be located, and secondly through the implementation of design controls, which place specific requirements on developments in particular areas.

It should be noted that as a starting point detailed odour, dust and noise assessments should be undertaken to assess the individual impacts from key industries and to identity locations where the standard buffers can either be reduced or varied depending on the actual impacts of the activity. Following this, the potential development and design controls should be considered:

Strategic Planning

- Staged development approach to the extent possible as the area is predominantly in private ownership – so that sensitive uses are not developed within buffer areas until the industry adequately reduces the off-site impacts or relocates out of Fishermans Bend. Planning policy may be introduced into the Melbourne and Port Philip Planning Scheme to support this approach and put the onus on ensuring appropriate separation rests with the encroaching sensitive land use.
- Buffer overlay – introduce planning buffer overlays in the planning scheme which would remain until industry or other source leave Fishermans Bend (interim protection). The purpose of this buffer may be to alert new residents to the amenity issue, and/or require new sensitive uses to be assessed in terms of the compatibility, siting and design and to mitigate through implement of design controls.

- Zoning of selected industrial sites – the use of zoning mechanisms (i.e. industrial zones or the Special Use Zones (SUZ) to identify noxious industrial activities in the Planning Scheme and alert new residents to potential amenity issues. It is noted that within the Employment Zone land is already predominately zoned IN1Z. It may be appropriate to retaining this zoning over some key industries which are expected to remain within the precinct in the longer term.
- Acquisition of selected industrial sites by government to aid transition, or other business and financial incentives offered to industries that either relocate out of Fishermans Bend or mitigate through best practice design at the source of the impact.
- Locating commercial and business (i.e. less sensitive) uses within proximity to industry developments; this could apply spatially at a horizontal level as well as a vertical level. The commercial and business land uses could act as a physical buffer between industrial activities and sensitive land uses.

Design controls

- Implementation of height controls (i.e. near stacks)
- Directional lighting / baffling etc controls
- Noise protection and acoustic sensitive design

12. Summary

12.1 Key findings and development constraints

This report has highlighted a number of locations where existing industries and other uses may have a detrimental impact on the amenity of sensitive uses. The proposed Fishermans Bend envisages mixed use, whereby sensitive uses would be located within the EPA prescribed separation (buffer) areas of existing industries. This presents a two-fold problem: (1) a risk to future newly developed sensitive uses of being subjected to unacceptable odour, noise, dust or lighting impacts during either routine or upset events on in certain other circumstances; and (2) the encroachment of sensitive uses on the buffer areas of existing industries may result in unachievable or unreasonable requirements on the industries to mitigate the impacts at the source.

In the case of an existing industrial use, the EPAV[1] recommend separation distances should be established in the planning scheme. This can be done by means of an overlay or specific planning framework. Without their implementation by these tools, the default buffers remain recommendations only and cannot be enforced. GHD has assessed all the recommended default buffers for the identified potential odour and dust emitting sources (refer to Figure 5 and Figure 6). This default buffer analysis indicates that there is adequate provision to separate the proposed residential components within Fishermans Bend from all existing industries outside of Fishermans Bend, with the exception of the Kraft Foods facility and potentially the Albright and Wilson (dependent on operations and throughput), both constraining portions of the Wirraway Precinct. Within Fishermans Bend there are a number of industries that will constrain portions of developable land, with the most prominent constrained precincts being Sandridge and Lorimer. The default buffer analysis also showed that the entire employment precinct is currently constrained by buffers either from industries currently within the precinct or industries surrounding Fishermans Bend.

Note that should the reverse situation arise namely, a residential use is proposed, Schedule 4 to the Capital City Zone for Fishermans Bend requires that the threshold distance from any existing industrial and/or warehouse uses referred to in the table to Clause 52.10 must be met otherwise a permit must be sought.

The EPA separation distance guidelines also allow for buffers to be modified on account of local meteorology, this analysis taking into account local meteorological influences is discussed below.

From the buffer assessment and odour complaint history analysis, the potential odour constraints within Fishermans Bend to the future development were identified to be Port Phillip Resource Recovery Centre (waste facility), Colonial (brewery), Kraft Foods (Vegemite production), Herald and Weekly Times (printing). The potential odour constraints from the industries surrounding Fishermans Bend area were identified to be Sugar Australia (sugar refinery) and Albright and Wilson (phosphate production).

From the buffer assessment and dust complaint history analyses, the potential dust constraints within Fishermans Bend development were identified to be the Pronto Concrete Batching Plant, Hanson Concrete Batching Plant, Delta Group Transfer Station, Port Phillip Resource Recovery Centre, Cement Australia, Steel Cement and Independent Cement handling facilities including ship unloading, Boral plasterboard and Piave concrete batching plant. The potential dust constraints from the industries surrounding Fishermans Bend were identified to be Sugar Australia (sugar refinery) and Albright and Wilson (phosphate production).

From the directional buffer assessment the default buffers can be retracted and extended in the directions of good and poor dispersion (refer to Figure 27 for the overall buffers). A large extension of the default buffer occurs to the south, while the default buffer is retracted in the north, west and east. Figure 27 shows the combined overall directional buffers on Fishermans Bend for both the odour and dust sources. DELWP may wish to adopt these buffers when developing land use planning controls or planning a stage development plan whilst the sites continue to operate.

Note that the directional buffers have been generated for all hours of the day as the actual operational hours of the facilities were unknown. If the operational hours are known for a given industry premises, the directional buffer may be re-run for those hours which may produce a marginally different shaped buffer due to the exclusion of the night-time poorest dispersion conditions.

A summary of the constraints is given below. While Figure 28 shows what land uses can operate in which buffer zone and identifies the constrained areas and should be read in conjunction with the suite of mitigation strategies available in Toolbox 1 to develop sensitive uses within the identified buffers.

Montague Precinct

Montague is the only precinct without any identified constraints, allowing this precinct to develop first, if a staged approach is used to develop Fishermans Bend. The mixed use precinct will include residential and office activity along with open space near the corner of Buckhurst and Ferrars Streets connected to a series of public spaces and the Buckhurst Street green spine.

Lorimer Precinct

The two concrete batching plants constrain a significant portion within the centre of the precinct, however development of river crossings for walking, cycling and public transport linking Fishermans Bend to the Docklands, the CBD, and further afield to the renewal areas around North and West Melbourne would be unaffected. A linear open space extending from the river, through the centre of Lorimer and beyond to the Employment Precinct may be partially constrained, while high-density living outside of the buffers would be unconstrained.

Sandridge Precinct

Given the amount of current sequestered land within the Sandridge Precinct, the vision for this precinct to become a premium office and commercial location, balanced with housing and retail will need to concentrate on the non-sensitive uses initially while industries are still operational. Once they begin to transition further opportunities for residential housing and non-residential sensitive uses will be created.

Wirraway Precinct

More than half of the Wirraway Precinct is constrained by directional buffers, in particular the western portion due to Albright and Wilson and northern portion due to Kraft. The eastern portion is unconstrained and would be suitable for development into a mixed use precinct. JL Murphy Reserve is a major green space which is also unconstrained. Further investigation and refinement of the buffer for Albright and Wilson may unencumber land for development into mixed use in the western portion of the precinct.

Employment Precinct

The entire Employment Precinct is currently constrained by buffers. Should significant industrial activities be retained going forward within the Employment Precinct while also hosting compatible productive non-residential uses with low environmental impact, such as district level recreational use or green infrastructure to support biodiversity, these sites should be placed outside of any default buffer to avoid any potential amenity impacts and reverse amenity issues. Placing these uses within the current default industry buffers may lead to complaint and conflict from the uses of the non-residential sensitive uses and the industries themselves (reverse amenity issues).

As explained earlier (refer to section 3.4) the potential for future industries with the potential to pose buffer constraints on Fishermans Bend is unlikely, in part because of the residential areas of Docklands and Capital City zoned land at Fishermans Bend will constrain any industry requiring a significant buffer (reverse amenity constraints). Also for the existing Industrial 1 Zoning to the north (Employment Precinct), it is normally reserved only for small industrial facilities and warehouse type businesses for uses such as retail, trade supplies and offices (buffers < 300 m) in order to provide a buffer between larger IN2 facilities to residential areas. The potential for future industries within the Employment Precinct to cause constraints is also unlikely. The vision as outlined in section 3.4 is for clean, high technology industries with low environmental impact.

Note that the proposed sewer mining plant also has the potential to constrain portions of Fishermans Bend, however exact details of the plant are still to be confirmed.

There are areas within all precincts (except employment) that would be acceptable for sensitive residential or sensitive non-residential uses without any further investigations into individual industrial operations.

The EPA complaint history indicates that there have been some odour and dust complaints attributed to industries within Fishermans Bend (Employment Precinct), while the buffer assessment indicates that a large amount of existing residents would be within the zone of potential upset events from Sugar Australia and Albright and Wilson. The complaints register indicates that there have been more odour complaints than dust registered within this zone, so it may be the case that one of these industries have had a significant upset/malfunction resulting in odour issues under normal or upset operations.

However, the registered complaints may only be attributed to one particular industry, thus it may be case that the buffers prescribed in this assessment for a particular industry may be too large and can be refined once operational details are known.

Emissions from the vehicles travelling on the Westgate Freeway and CityLink would contribute to the background dust levels within and surrounding Fishermans Bend. Based on GHD's previous experience this is unlikely to exceed SEPP –AQM levels nor constrain Fishermans Bend development, as usually there is a sharp decrease in emissions the further away from the road/ line source (within tens of metres). However, further work to assess the magnitude of these impacts could involve the modelling of vehicle emissions on these roads using the AUSROADS model.

A number of Major Hazard Facilities (MHFs) were identified surrounding Fishermans Bend Precinct. There were no MHF sites identified within Fishermans Bend Precinct. The separation distance from the identified MHF facilities to Fishermans Bend is adequate not to result in any constraints to the development.

Buffers are for upset conditions only, industries should have no off site impact under routine operations.
This is the worst case scenario prior to the application of any mitigation strategies / further investigations.
This map should be read in conjunction with TOOLBOX 1 Mitigation Strategies.
Implementation of one or more of these strategies has the potential to reduce or eliminate the buffer.

TOOLBOX 1
Mitigation Strategies
> Planning
> Transition / Relocation
> Further Investigation
> Development Design
> Transmission Controls
> Controls at Source
> Policy
> Local Law

SADNFORD FISHMARKET
TERMINALS
MARSTEL TERMINALS
STOLTHAVEN
SUGAR AUSTRALIA
CSR GPYROCK
ALBRIGHT & WILSON
MOBILE YARRAVILLE
STEEL CEMENT
CEMENT AUSTRALIA
GRAINCO
BORAL
INDEPENDENT CEMENT
PIAVE
KRAFT
PRONTO
HANSON
PPRCC
COLONIAL BREWERY
DELTA
HWT
ACI OPERATIONS
CALTEX
SHELL

Paper Size A3

0 125 250 500 750 1,000
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Industries without recommended default buffers
- Industries with recommended default buffers
- Directional Dust Buffers
- Directional Dust and Odour Buffers Combined
- Directional Odour Buffers

DELWP

Fisherrmans Bend Buffer Report - Update

Job Number	31-34061
Revision	B
Date	19 Oct 2016

Overall Directional Buffers

Figure 27

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Data Source: Imagery, NearMap, extracted 23/04/2016, Image Date 05/02/2015 and VicMap, DELWP (2016).

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This is the worst case scenario prior to the application of any mitigation strategies / further investigations.
This map should be read in conjunction with TOOLBOX 1 Mitigation Strategies.
Implementation of one or more of these strategies has the potential to reduce or eliminate the buffer.

Constrained Land:
Can be developed for non - sensitive uses such as industrial, commercial, business. Application of TOOLBOX 1, may unconstrain portions of this land.

TOOLBOX 1
Mitigation Strategies
> Planning
> Transition / Relocation
> Further Investigation
> Development Design
> Transmission Controls
> Controls at Source
> Policy
> Local Law

Unconstrained Land:
Available for sensitive uses such as residential, education, childcare, health and recreation.

Paper Size A3

0 75 150 300 450 600
Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Precinct Boundaries
- Freeway
- Land Encompassed by 1 Industry Buffer
- Land Encompassed by 2 Industry Buffers
- Land Encompassed by 3 Industry Buffers
- Land Encompassed by 4 Industry Buffers

DELWP

Fisherrmans Bend Buffer Report - Update

Job Number	31-34061
Revision	B
Date	19 Oct 2016

Overall Directional Buffer Constraints

Figure 28

G:\31\34061\GIS\Maps\Working\3134061_Fig28_ConstrainedAirQuality_REVB_A3L.mxd

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Data Source: Imagery, NearMap, extracted 23/04/2016, Image Date 05/02/2015 and VicMap, DELWP (2016).

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Noise

The desktop noise review has involved identification and examination of the likely primary noise and vibration sources within Fishermans Bend and in the surrounding areas for their potential to impact the amenity of Fishermans Bend. These sources include concrete batching plants, DSTO, Port Phillip Resource Recovery, Port Melbourne Metals, Kraft Foods, Webb Dock, Melbourne Shooting Complex, Melbourne International Karting Complex, and other various factories, warehouses, and container services facilities sourced from workshops and logistics related activities, which involve trucks, forklifts, cranes, metal clanging and stockpiling. Proposed uses, such as café/restaurants/clubs open at night, also have the ability to impact on residential amenity. While Figure 17 shows the locations of high risk noise and vibration.

In relation to transportation noise impact, the ambient noise environment is likely to be dominated by traffic noise, mainly associated with West Gate Freeway, CityLink Tollway, as well as local roads such as Plummer Street, Salmon Street, Williamstown Road and Montague Street. Transportation noise impact would also be sourced from the existing light rail corridors within the Montague Precinct, and proposed light rail within Fishermans Bend. Helicopter noise due to the operation of the Helipad at Pier 35 Marina could also potentially cause significant noise impact to Fishermans Bend.

All relevant noise and vibration legislation and guidelines applicable to the proposed Fishermans Bend development has also been discussed in the review. Relevant legislations and guidelines includes EPA environmental noise assessment policy, rail and road noise guidelines, helicopter noise guideline, indoor noise levels and vibration assessment guidelines for human comfort and structural damage.

Overall, the noise generated by various types of industries within and nearby Fishermans Bend could result in cumulative noise impacts to sensitive uses within Fishermans Bend. Hence, it is critical to assess the extent of these impacts when undertaking more detailed noise assessment of Fishermans Bend precinct.

Lighting

GHD have based Fishermans Bend lighting impact review study on Australian Standard 4282. No significant nuisance lighting sources have been identified within Fishermans Bend precincts; however local isolated sources of nuisance light do exist. Fishermans Bend is subject to spill light from a number of potential sources such as the port (wharves and parking zones), shipping, traffic on elevated roadways and bridges, local traffic, local adjacent operations such as Independent Cement and the cityscape.

Future Land Uses

The potential for future industries with the possibility to pose air quality constraints on Fishermans Bend is unlikely, in part because of the residential areas of Docklands and Capital City zoned land at Fishermans Bend will constrain any industry requiring a significant buffer (reverse amenity constraints). Also, for the existing Industrial 1 Zoning to the north (Employment Precinct), it is normally reserved only for small industrial facilities and warehouse type businesses for uses such as retail, trade supplies and offices (buffers < 300 m) in order to provide a buffer between larger IN2 facilities to residential areas. The potential for future industries within the Employment Precinct to cause constraints is also unlikely. The vision as outlined in section 3.4 is for clean, high technology industries with low environmental impact.

Capital City Context

The expectations of residents and other sensitive users living in a high density city environment are somewhat different to those of people living in suburban and rural environments. People

living in higher density urban environments may not be as sensitive to amenity impacts as their suburban neighbours, and this is particularly so in a capital city context.

A key issue in the future Fishermans Bend once built will be to provide a good degree of residential amenity without compromising its commercial viability. Capital city environments offer different opportunities compared to the relative serenity of the outer suburbs including nightlife, experiences, culture and around-the-clock operations.

The most common amenity issue within a built up capital city environment is noise. Noise sources can include people, air conditioners, cooling towers, emergency service vehicles, cars, trucks, church bells, maintenance activities, early morning garbage trucks, loud music, parties, clubs, restaurants and light rail. Construction activities associated with new buildings or renovations can also be an ongoing issue.

Odour issues are not so prevalent in built up city environments with possible concerns being sewer vents and rubbish bins.

Dust issues within a city environment can include car/truck emissions, combustion processes and wood smoke which all contribute to smog in winter and autumn. Construction dust is also an ongoing issue for new or renovated building work.

Light source issues can potentially be from port and shipping operations, traffic, the cityscape and general nightlife activities.

12.2 Mitigation and Implementation Measures

Toolbox 1 outlines the suite of mitigation strategies available to assist in the development of Fishermans Bend from a top down approach. The application of one or more of these may assist in the development of additional sensitive uses within the identified buffers.

Toolbox 1 – Suite of Mitigation Strategies
Planning
Transition / Relocation
Further Investigation
Development design
Transmission Controls
Controls at Source
Policy
Local Law

.

There are a number of strategies and controls that could be implemented to help transition Fishermans Bend from its current predominately industrial use, to a mixed use area with a range of land uses. These include

- Land use separation (both spatially and vertically) though structure planning, policy, zone controls and staging of development

- Development design measures to mitigate impacts at either the source or at the receiver
- Relocation incentives for industry and acquisition by Government of problem sites

Potential odour and dust mitigation strategies to Fishermans Bend were identified to be:

- Land-use planning controls
- Staged development
- The control of odours/dust at source
- Vary separation distances (through further investigation)

Potential odour and dust mitigation constraints to Fishermans Bend may result in compromised land values and land utilisation, while purchasing the constraining industries may not be possible due to contracts and leasing arrangements. Using land-use controls through setback distances and the control at source mitigation strategy without EPA enforcement could be a challenge, as cooperation with industry would be required, particularly as the existing established industries are privately owned.

Noise and vibration mitigation strategies could include:

- Controls at the source
- Transmission controls
- Land-use controls and receiver controls

Controls at the source involve intervention strategies for reducing the noise produced by industry and plant. Transmission controls include noise barriers and involve reducing the noise along its path from source to receiver. Land use strategies can include separation strategies and utilising the natural topography of Fishermans Bend. Receiver controls involve the design and layout of residences and sensitive land areas. Potential noise mitigation measures within a built up capital city environment (i.e. once Fishermans Bend is built) could include managing the hours of operation of the offending activity, fines for emitting excessive noise, withholding liquor licences, slowing traffic and constructing sound barriers near major thoroughfares and construction management plans.

Lighting mitigation strategies could include:

- Strict adherence to the limits set out in AS 4282
- Street, building exterior and public space lighting should adhere to a lighting plan that seeks to limit spill, upward directed light pollution and glare

Potential mitigation measures in a capital city context (local law) would include:

- Managing the hours of operation of the offending activity
- Design buildings without open balconies; separate noisy activities from residential uses through the design of buildings with improved acoustic treatment with rubbish collection points inside i.e. the basement
- Fines for emitting excessive noise
- Withholding liquor licences
- Slowing traffic and constructing sound barriers near major thoroughfares
- Construction management plans, including air and noise management
- Promote cycling and public transport options to reduce car use
- Prompt waste management collections

- Dust management plans
- Install motion sensitive lighting i.e. turn off lighting when not required
- Ensure light bulbs are covered and light faces down
- Install low watt bulbs

Clearer articulation of the capital city issues could be conducted by the developer and/or council to increase resident awareness and acceptance of the realities of living in a high density mixed use environment.

In order to manage the conflicts between uses, there must be a balance between selecting those measures that sufficiently mitigate amenity impacts, and avoiding over regulation and impacting on the ability to achieve other objectives such as urban growth and environmental sustainability.

12.3 Key Recommendations

Findings and identified mitigation measures from this investigation have been used as the basis for recommending next steps for the transition (staging) of development within Fishermans Bend, these are detailed below.

Appendix D shows a proposed process for assessing the development of a sensitive land use.

Planning

Contact key industries to establish their future plans

The key industries to contact to establish what their future plans are going forward are:

- Albright and Wilson
- Sugar Australia
- Colonial Brewery
- Holden
- HWT
- Delta
- PPRRC
- Kraft
- Independent Cement
- Boral
- Pronto
- Hanson
- Piave
- Steel Cement
- Cement Australia
- Port Melbourne Metals
- GrainCo
- Sandford Fishmarket

Understanding the nature of their plans going forward may have the potential for a buffer reduction, refer to Figure 7.

Contact key industries to understand site operations

The key industries that have confirmed they will not be transitioning out of the area, could be contacted to fully understand the nature of their emission sources, onsite operations and past complaint history. They are listed in in order of importance:

- Albright and Wilson
- Sugar Australia
- Colonial Brewery
- Holden
- HWT
- Delta
- PPRRC

An understanding of the site operations may result in buffer reductions for some of the above constraining industries - refer to Figure 7.

A significant amount of land within the Employment Precinct is sequestered by odour/dust constraining directional buffers however, during the transitional phase of Fishermans Bend where significant industrial activities will leave the area replaced by low environmental impact industries, opportunities will be created to expand the amount of non-residential sensitive land uses within the Employment Precinct.

Vary separation distances (transitioning of the industry)

The EPA separation guidelines recommend separation distances can be varied (i.e. reduced) for site specific cases. One of the criterions for varying the separation distances is the case of “transitioning of the industry”. In this case Fishermans Bend is planned to transition from industrial to mixed use and thus buffers may be reduced with agreement of the industries and EPA, as they will be transitioning out of the area over a specified time frame. This may create opportunities to establish non-residential sensitive uses within the Employment Precinct.

Staged Development/ implementation plan

Develop a staged development/implementation plan for the development of Fishermans Bend to the extent possible as the area is predominately in private ownership.

All issues need to be assessed when considering the potential impacts a proposed development might have on its surroundings, and the potential impacts that surrounding land uses might have on the proposed development. Under the Victorian Planning Provisions (VPPs), industrial land uses have rights which enable the industry to operate, provided they comply with relevant regulations. In this case when a strategic land use plan is being developed for a precinct transitioning from industrial to residential land use, the planning authority should consult with potentially affected industries in order to develop a staged implementation plan that allows for the smooth transition of land uses over a period of time.

Agent of change

The ‘agent of change’ principle could be introduced to planning schemes for industry to ensure that the onus on applying appropriate buffers rests with the encroaching sensitive use. Introduction of the ‘agent of change’ principle would be beneficial to responsible authorities for the development of the Employment Precinct. The principle would need to be supported in local

planning policy, ideally incorporated into Clause 52.10 and also reflected in the planning controls covering both the potential industrial land use and surrounding land within its buffers. Over time, some industries will begin to transition out of the area and along with further investigation into 'problem' sites for a possible reduction in the buffer distances, opportunities will be created for non-residential sensitive uses to be developed.

Development controls

Review and assess the strategic plan in the context of the above and to further develop mitigation strategies/planning and design controls to help Fishermans Bend transition from industrial to mixed use. This could include development controls such as a staged development approach, buffer overlays (interim protection while industries still exist) acquisition of problem sites by government to aid transition, incentives to relocate or mitigate emissions, and commercial uses within buffers.

Design

Design requirements

To assist with the transition, design requirements can apply, such as height controls near stacks, lighting/baffling, numerous noise protection measures and other measures identified in each of the desktop reviews.

Further Investigations

Possible future key actions for DELWP Victoria/Victorian Government and/or a competent consultant engaged by DELWP Victoria/Victorian Government are from most critical to least critical:

Odour/dust impact assessments

Conduct odour/dust impact assessments for those constraining industries under routine operations, and/ or a site specific buffer assessment. A buffer that accounts for: (i) meteorology, and (ii) plausible upset scenarios has been developed by GHD[17] to assess the odour exposure of proposed sensitive land uses. This might be appropriate to apply these to those industries likely to remain. This would require cooperation from the industries and EPA.

De-rate buffers

Where appropriate, some buffers identified in this assessment have the possibility of a reduction due to lesser throughputs or emissions compared with larger facilities. This would require cooperation from the industries.

Assessment of South East Sewer mining plant

Once the design parameters of the South East Sewer mining plant have been finalised along with the location, an assessment should be conducted to develop the appropriate buffer required.

Detailed noise and vibration survey

Undertake a detailed noise and vibration survey within and surrounding Fishermans Bend, to characterise the baseline noise and vibration environment, as well as identify potential high risk areas and establish noise and vibration criteria based on applicable standards. Following the baseline study, further assessment of potential high risk operations/industries could be conducted to identify cost-effective mitigation measures and possible recommendations for ensuring compliance and amenity preservation.

[17] Lewis A, Pollock T. "A Method to Determine Site-Specific Buffer Distances for Upsets/Malfunctions in Industrial Premises" Enviro 06, 9 -11 May 2006 Melbourne

Safety separation distance assessments

Further safety separation distance assessments could be sought from WorkSafe for all identified Major Hazard Facility (MHF) sites nearby Fishermans Bend to confirm that Fishermans Bend will be outside of the outer planning advisory areas of the identified MHFs.

Lighting plan

Develop a lighting plan for Fishermans Bend to integrate the lighting to be installed in public, street and private developments.

Policy

Implementation of directional separation distances

In the case of an existing industrial use, the directional separation distances should be established in the planning scheme. This can be done by means of an overlay (Environment Significance Overlay) or specific planning framework. Without their implementation by these tools, the default buffers remain recommendations only and cannot be enforced. This may lead to future land use conflicts (e.g. planning permits granted for residential land uses adjacent to potential constraining industry) should they be ignored.

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