Upgrade of Tooheys Brewery, Lidcombe

Environmental Assessment

Prepared for

ESTD 1869
TOOHEYS

ARUP

Tooheys

Upgrade of Tooheys Brewery, Lidcombe

Environmental Assessment

March 2007

Arup
Ove Arup Pty Ltd ABN 18 000 966 165

Arup
Level 10, 201 Kent Street, Sydney NSW Australia, PO Box 76, Millers Point NSW 2000
Tel +61 2 9320 9320 Fax +61 2 9320 9321
www.arup.com

Job number 85857

PART A

Background and Context

Statement of Certification

Environmental Assessment prepared under Part 3A of the Environmental Planning and Assessment Act 1979

Environmental Assessment prepared by:

Name:	Stuart Hodgson
Company:	Arup
Position:	Associate
Qualifications:	BE (Hons), Engineering Science
	Masters Environmental Law
Address:	Level 10, 201 Kent Street, Sydney

Project to which the Environmental Assessment relates:

Project Description:	Upgrade of Tooheys Brewery in relation to: • a new beer processing building; • a new bright beer cellar; • a new yeast room; and • associated utilities.
Land to be developed:	29 Nyrang Street, Lidcombe, NSW, 2141
	Part Lot 10 DP 1008367 Auburn Local Government Area
Applicant's Name:	Tooheys Pty Ltd
Applicant's Address:	29 Nyrang Street, Lidcombe, NSW, 2141

Certification:

I certify that I have prepared this Environmental Assessment and to the best of my knowledge:

- it has been prepared in accordance with Part 3A of the EP&A Act 1979 and the Regulations;
- it has been prepared in accordance with the Director-General's requirements dated 2 December 2006; and
- it does not contain information that is either false or misleading.

Signature:

Date: 27/03/07

Volume 1

Environmental Assessment Report

- Executive Summary
- Part A – Background and Context
- Part B – Environmental Assessment
- Part C – Commitments and Conclusions

Appendix A

Existing Development Consents

Appendix B

Community Information Brochure

Appendix C

Director-General's Environmental Assessment Requirements

Appendix D

Risk Analysis

Volume 2

Appendix E

Contamination Assessment

Appendix F

Air Quality Assessment

Appendix G

Acoustic Assessment

Appendix H

Traffic Assessment

Appendix I

Indicative Erosion and Sediment Control Plan

Appendix J

Visual

Appendix K

Draft Statement of Commitments

Upgrade of Tooheys Brewery, Lidcombe

Environmental Assessment

Contents

Part B Environmental Assessment

Part C Commitments and Conclusions

Tables

Figures

Appendices

Appendix A

Existing Development Consents

Appendix B

Community Information Brochure

Appendix C

Director-General's Environmental Assessment Requirements

Appendix D

Risk Analysis

Appendix E

Contamination Assessment

Appendix F

Air Quality Assessment

Appendix G

Acoustic Assessment

Appendix H

Traffic Assessment

Appendix I

Indicative Erosion and Sediment Control Plan

Appendix J

Visual

Appendix K

Draft Statement of Commitments

List of Abbreviations and Acronyms

Acronym	Definition
AEGL	Acute Exposure Guideline Level
AMMAP	*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*
ASS	Acid Sulfate Soils
BBT	Bright Beer Tank
CIP	Cleaning in Place
CO_2	Carbon Dioxide
CO_2-e	Carbon Dioxide Equivalents
dBA	"A-weighted" decibel
DA	Development Application
DCP	Development Control Plan
DEC	NSW Department of Environment and Conservation
DGEARs	Department of Planning Director-General's Environmental Assessment Requirements
DoP	NSW Department of Planning
EPA	Environment Protection Authority (part of the DEC)
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC	Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
EPL	Environment Protection Licence issued under the POEO
ESD	Ecologically Sustainable Development
HIPAP	Hazardous Industry Planning Advisory Paper
hl	Hectolitre (100 litres)
HV	High Voltage
kL	Kilolitre
kV	Kilovolts
kVA	Kilovolt-Amps
kWh	Kilowatt hours
L_{A10}	The noise level exceeded for 10% of the sample period (this is commonly referred to as the average maximum noise level)
L_{A90}	The noise level exceeded for 90% of the sample period (this is commonly referred to as the background level)
L_{Aeq}	A-weighted equivalent noise level (this is commonly referred to as the average noise level)
LEP	Local Environmental Plan
LGA	Local Government Area
LOS	Level of Service
LPG	Liquefied Petroleum Gas

μm	Micrometer (10^{-6} meters)
mbgl	Metres below ground level
MJ	Megajoule
MW	Megawatt
NES	National Environmental Significance
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
PASS	Potential Acid Sulfate Soils
PM_{10}	Particulate matter less than 10 μm
POEO	NSW *Protection of the Environment Operations Act 1997*
SEPP	State Environmental Planning Policy
SREP	Sydney Regional Environmental Plan
TPH	Total Petroleum Hydrocarbons
UST	Underground Fuel Storage Tank
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes

Glossary of Terms

Term	Definition
Beer Processing	Removal of solids from Green Beer by centrifugation and filtration.
Bright Beer	Beer that has been filtered to remove residual solids, including yeast, after maturation.
Fermentation	The chemical process by which sugar is converted into ethanol (alcohol) and carbon dioxide by the yeast.
CO_2-e	A unit of greenhouse gas emissions calculated by multiplying the actual mass of emissions by the appropriate Global Warming Potential enabling emissions of different greenhouse gases to be added together and compared with carbon dioxide.
Glycol	Solution of water and propylene glycol 30% by weight.
Green Beer	Beer that has undergone fermentation but prior to filtering.
Grist	Malt that has been crushed (in a mill) to break apart the grain kernels, separating the smaller pieces from the husks.
Hops	The dried fruits of a climbing herb which are aromatic bitter and used to provide aroma and flavour to beer.
Kieselguhr	A light porous soil that consists of siliceous material (i.e. silica) which is used as a filtering material to remove solids from the Green Beer.
Lautering	The process by which the mash is separated into the wort (a liquid) and the residual grain.
Lauter Tun	The vessel used for separation of the extracted wort from the residual grain.
Level of Service	LOS is a performance measure based on the average delay experienced by vehicles through an intersection, ranging from A (good) to F (poor), where D is considered acceptable.
Liquid Adjunct	Sugar syrup.
Malt	A grain (typically barley or wheat) that has been allowed to germinate, and which is sometimes roasted.
Maltose	A sugar.
Mash	Mixture of malted grain grist and water that has been heated.
Mash Tun	The vessel used for mashing.
Mashing	The process of mixing malted grain with water heating to a certain temperatures to convert the starch in the grain into sugars.
Maturation	Storage of green beer to improve conditioning prior to filtration.
Nitrogen Dioxide (NO_2)	An air pollutant and a product of combustion.
Oxides of nitrogen (NO_x)	A mixture of air pollutants, primarily containing nitrogen oxide (NO) and nitrogen dioxide (NO_2), and products of combustion.
PFM	Planning Focus Meeting
PM_{10}	An air pollutant made up of fine dust particles less then 10 micrometers and a product of combustion.
Sucrose	A sugar.

Wort	A solution infused with malt and sugar prior to or during fermentation.

Executive Summary

The Existing Brewery and Site

The Tooheys brewery forms part of an industrial cluster in the suburb of Lidcombe. The industrial premises are enclosed within a large rectangular shaped block bound by Parramatta Road to the north, Boorea Street to the south and Nyrang and Percy Streets to the east and west respectively. The brewery site is at the easterly end of the industrial area, bounded on three sides by industrial sites, and with the residential/retail area across Nyrang Street on the fourth side. The location of the Tooheys brewery is shown in the figure below.

Access to the site is gained via both the Percy Street and Nyrang Street entrances.

The brewery incorporates the following key areas:

- beer making areas, which are process areas, and include raw materials receipt and storage (primarily malt and grain), a grain mill, the brewhouse where wort is made, yeast storage propagation plant, tanks for fermentation of the wort and maturation of the beer, and beer processing areas where filtration takes place;
- packaging areas including the Bright Beer Tanks (BBT) that store the filtered beer, and supply the canning, bottling and kegging lines. Finished products are warehoused on site before loading for delivery;
- utilities area that includes a heating plant consisting of natural gas fired boilers, refrigeration plant consisting of a combination of ammonia and glycol cooling systems, CO_2 recovery plant, compressed air plant and a number of electricity substations. Most of the utilities services are provided through the utilities building; and
- auxiliary functions including laboratory, canteen, general store, offices, workshops, administrative areas and visitor facilities.

The current production capacity of the facility is 4.0 million hl of beer per annum, however shift working arrangements based on a five day week restrict the production output to 3.3 million hl per annum. The seasonality of demand also influences production rates.

The Project

Tooheys proposes to upgrade the beer production facilities and utility services at the Tooheys brewery. The proposed upgrade involves the replacement of outdated equipment and will be limited to the beer production, utility service facilities and canning and bottling equipment. The upgrade will not include extension of the brewhouse or the existing warehouse areas. The key components of the proposed brewery upgrade include:

- extension of the yeast storage area and yeast propagation plant;
- installation of a new Beer Processing Building and relocation and upgrade of the associated beer processing equipment;
- installation of new Bright Beer Tank (BBT) Cellar and BBTs, coupled with decommissioning of the old tanks and cellars; and
- upgrade of utility services including the heating plant, refrigeration plant and compressed air plant.

The layout of the Tooheys brewery as it is proposed to be after the upgrade is shown overpage. It is not intended to increase the total capacity of the brewery or the working arrangements as a result of the proposed upgrade. As such, the production rate after the upgrade would remain at approximately 3.3 million hl per annum.

Project Objectives

The main objective of the project is to improve efficiency, become more responsive to customer and consumer needs, and to reduce production costs through improved energy and water efficiency, reduced product losses, and increased labour efficiency. The replacement of old and inefficient systems with modern technology will improve the economic efficiency of the site, as well as having environmental benefits by reducing resource consumption, waste and pollution.

In recent years, the market has been influenced by the merging of competing breweries and rationalisation of production. These factors mean that efficient and high quality production is imperative to withstand the competition and remain viable within the market. It is therefore timely for Tooheys to inject significant investment in upgrading the Lidcombe brewery to ensure its competitiveness and long term viability in the Australian market.

Proposed Site Layout

Statutory Context

The capital expenditure of the proposed upgrade is approximately $70 million, and as such it constitutes a Major Project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (Major Projects) 2005* (Major Projects SEPP).

The project has therefore been referred to the NSW Department of Planning (DoP), and requires the approval of the Minister for Planning.

In addition to the Major Project SEPP, this Environmental Assessment reviews and assesses the Project against all relevant environmental planning instruments including:

- *State Environmental Planning Policy No. 11 – Traffic Generating Development;*
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development;*
- *State Environmental Planning Policy No. 55 – Remediation of Land;*
- *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005;* and
- *Auburn Local Environmental Plan 2000.*

Consideration of the Sydney Metropolitan Plan has also been provided, as well as consideration of Auburn Council Development Control Plans (DCPs).

The project is consistent with the relevant provisions of each of the environmental planning instruments, as well as the Sydney Metropolitan Plan and Auburn Council's DCPs.

Scope of Assessment

This Environmental Assessment report provides an environmental impact assessment of the proposed upgrades to the brewery, within the context of the existing site and operations. That is, the existing site and operations are described in the report and where necessary, the background conditions established by the existing site and operations are taken into account as part of the assessment. In this way, potential environmental impacts are considered cumulatively, and sufficient assessment is provided to enable a site-wide approval to be granted.

The Environmental Assessment has responded to the issues raised in the Director-General's Environmental Assessment Requirements (dated 2/12/2006) (DGEARs), as well as the issues that have been raised by the Department of Environment and Conservation and Auburn Council through project related consultation.

The Environmental Assessment is based on an unchanged production rate of 3.3 million hl per annum which represents the maximum output based on a five day week.

Outcomes of Environmental Assessment

In accordance with the DGEARs an environmental risk assessment has been carried out. Based on the outcomes of this risk assessment, and the responses from the agencies, the issues listed in the table below have been identified as the issues of most concern in relation to the proposed upgrade of the Tooheys brewery.

With regards to the potential for environmental impacts associated with stormwater, flooding, visual, heritage, noise, traffic, and waste, the Environmental Assessment concludes that such potential impacts are temporary, minimal or negligible. This reflects the fact that the project is an upgrade to an existing development, to improve the efficiency of the brewery.

There are also expected to be significant beneficial environmental outcomes resulting from the proposed upgrade including efficient use of resources, reduced waste generation and improvements in pollution control procedures.

Issue	Summary of Assessment
Hazards and Risk	There are potential off site risks associated with the storage of dangerous goods at the site, in particular ammonia. There will generally be no changes to the storage and handing of dangerous goods at the site. Ammonia will continue to be stored and used at the brewery after the proposed upgrade. As a result of the proposed upgrade, however, there will be a net reduction in the total quantity of ammonia stored / handled at the site, from approximately 15 tonne to 11 tonne. This ammonia will be partially replaced by propylene glycol, which is currently used at the site, and is not a dangerous good. This reduction in the use of ammonia will result in lower risk to sensitive off site receptors. Semi-quantitative risk modelling has been carried out, and demonstrates that the level of risk currently accepted is below the risk criteria in *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning* (DoP, 1992).
Contaminated Land	There are potential off site risks associated with excavation and disposal of contaminated soil and migration of contaminated groundwater. A site assessment was carried targeting locations proposed for excavation for new building footings as well as at locations of underground fuels storage tanks. The assessment identified petroleum hydrocarbon contaminated soil and groundwater consistent with the historical and current industrial use of the site including historical underground fuel storage. No soil contamination was identified at the locations proposed for excavation. Elevated levels of light fraction hydrocarbons were detected in groundwater samples at locations adjacent to the identified underground fuel storage tanks. Contamination was not identified in samples collected from the site boundary indicating that the groundwater contamination is not currently migrating off site. Potentially contaminated site soil and groundwater to be removed during the upgrade will be managed in accordance with the NSW EPA's *Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes* (EPA, 1999). It is unlikely that the upgrade will increase the risk of exposure to contamination to an unacceptable level during construction and the continued industrial operation of the site.
Air Quality Impacts	There are potential air quality impacts associated with replacing the gas fired boilers and installation of a new emission stack which is significantly lower than the current stack, especially regarding nitrogen dioxide and fine particulate matter. Quantitative air quality modelling has been carried out to demonstrate that changes in emissions do not result in ground level concentrations of criteria pollutants that are unacceptable with regards to local and regional air quality goals.
Noise Impacts	There are potential noise impacts associated with the new buildings, and replacement or relocation of plant and equipment. The predicted noise levels resulting from the proposed upgrade are all below the most stringent noise criterion at the closest residences along Nyrang Street. This is as expected due to the relatively large distances between the source and receiver, significant shielding provided by the Tooheys buildings that front Nyrang Street, old plant being replaced by fewer modern and more efficient plant, and the background noise levels existing at the residences along Nyrang Street. On this basis, and with consideration of the nature of the proposed upgrade, the noise impact at the residences along Nyrang Street is expected to be negligible, and may result in an improvement compared with existing condition.

Scope of Project Approval

The NSW DoP has indicated in its Director-General's Environmental Assessment Requirements (DGEARs) that Tooheys should investigate the feasibility of consolidating existing development consents applicable to the site and operations, and making the entire site subject to one planning approval. There are currently seven development consents that apply to various parts of the brewery, all issued by Auburn Council. In addition, a significant portion of the site pre-dates the *Environmental Planning and Assessment Act 1979*, and is not subject to any development consent.

Notwithstanding this, Tooheys understands that there are advantages associated with the consolidation of existing development consents and the regularising of all activities at the site under one planning approval. In particular, obtaining one site wide planning approval would reduce the complexity associated with administration of consents and approvals, and would create clarity regarding environmental management and planning requirements for the site into the future.

The Environmental Assessment includes consideration of the existing development consents, including discussion of the conditions of consent that remain relevant to the continued operation of the brewery.

Environmental Management Commitments

Based on the outcomes of this environmental impact assessment, there are a number of environmental management or mitigation measures that are proposed to be implemented to ensure that there are no environmental impacts that exceed acceptable levels. These proposed management and/or mitigation measures have been consolidated into a draft Statement of Commitments. The draft Statement of Commitments includes commitments by Tooheys relating to:

- management and programming of construction;
- community consultation;
- management of contaminated land; and
- management of on site risks and hazards.

Conclusion

The justification for the project draws on the objectives of the upgrade, the planning and statutory context of the project, and the outcomes of the Environmental Assessment that has been undertaken.

The objectives of the proposal are to improve energy and labour efficiency, lower water consumption and reduce production losses, improving the efficiency and environmental performance of the brewery.

The site is permissible with consent in the zoning, and is generally consistent with the objectives of the zone as set out in the Auburn LEP.

The site is currently used for brewing, and the continued use of the site for this purpose is considered to be consistent with the provisions of relevant environmental planning instruments, as well as the Metropolitan Strategy.

This Environmental Assessment has identified that environmental impacts will be within acceptable limits or can be managed to be so. Measures have been proposed to ensure suitable mitigation and management provisions are employed during construction and operations.

Chapter 1

Introduction

1 Introduction

Tooheys is part of the Lion Nathan group which operates breweries in Brisbane, Adelaide, Perth and New Zealand.

The Tooheys brewery has been in operation since the 1960s and was used as a packaging facility. Brewing commenced in 1978 and the brewery has undergone several small scale upgrades since then.

The improvements that have been made to the site to date involved replacement of old process equipment and addition of equipment and supporting structures as new technologies have emerged. However, until this time, improvements have been restricted to specific parts of the brewery and an upgrade has not been considered with respect to the entire processing operations and overall efficiency of the site.

This Section provides a brief overview regarding the background and the statutory context of the project. The scope, purpose and structure of this Environmental Assessment is also provided.

1.1 Overview of Project

Tooheys proposes to upgrade the beer production facilities and utility services at the Tooheys brewery site, located at 29 Nyrang Street, in Lidcombe NSW. Figure 1 shows the location of the brewery site.

The main objective of the project is to reduce production costs through the following key drivers:

- reduce loss of product;
- increase energy and labour efficiency; and
- reduce water consumption.

The current production capacity of the facility is 4.0 million hectolitres (hl) per annum, however current working arrangements restrict the production output to 3.3 million hl per annum. The upgrade will not increase the total capacity of the brewery or result in any changes to the working arrangements. As such, the maximum production rate after the upgrade would remain at 3.3 million hl per annum.

The proposed upgrade involves the replacement of outdated equipment and will be limited to the beer production, utility service facilities and canning/ bottling equipment. The upgrade will not include extension of the brewhouse or the existing warehouse areas. The major components of the upgrade are:

- extension of the yeast storage area and yeast propagation plant;
- construction of a new Beer Processing Building and relocation and upgrade of the associated beer processing equipment;
- installation of a new Bright Beer Tank (BBT) Cellar and BBTs, coupled with decommissioning of an old bright beer cellar; and
- upgrade of utility services including the heating plant, refrigeration plant and compressed air plant.

Sections 2 and 3 of this report detail the existing activities at the site, and what is proposed as part of this project.

Figure 1 Site Location

1.2 Legislative Context

The site is located within an industrial area within Auburn Council (the Council), and development on the land for the purposes of a brewery is permissible.

Due to the age of the brewery site, the statutory context of previous development has been classified in a number of different ways. These can be summarised as:

- any development prior to 1979, which pre-dates the *Environmental Planning and Assessment Act 1979* (EP&A Act) and therefore has no requirement for Council approval or environmental assessment;
- development after 1979 for minor development (including maintenance and minor building improvements) which was classified as exempt development and for which there is no statutory requirement for Council approval subject to the minor development complying with certain minimum criteria and thresholds; and
- development after 1979 for which environmental impact assessment has been carried out and development consent obtained from Auburn Council under Part 4 of the EP&A Act.

The legislative context for planning approval is therefore complex with potential uncertainty with respect to the scope and extent of existing and future development approvals and the appropriate approval authority (i.e. the Minister for Planning or Auburn Council).

The various upgrades carried out since 1979 have typically been of a minor nature and the environmental impact assessments produced for Council have focussed on the isolated upgrade, with limited consideration of the entire site operations.

The capital expenditure of the proposed upgrade is approximately $70 million, and as such it constitutes a Major Project under Part 3A of the EP&A Act. The project has therefore been referred to the NSW Department of Planning (DoP), and requires the approval of the Minister for Planning.

1.3 Scope and Purpose of the Environmental Assessment

The NSW DoP has expressed an interest in resolving the potential uncertainty and complexity of existing and future planning approval at the brewery site, by making the entire site subject to one planning approval. This would have the effect of:

- repealing Tooheys' existing development consents from Auburn Council;
- making the entire site subject to one planning approval (issued by the Minister for Planning) reducing the potential for numerous consents or approvals to apply to different portions of the site;
- regularising those parts of the site that pre-date the EP&A Act, and for which environmental assessment under that Act has never been undertaken; and
- making any future project at the site subject to approval through the Department of Planning, either as a modification to the single site-wide planning approval, or as an extension to that approval.

As such, Tooheys are applying for a single site-wide planning approval under Part 3A of the EP&A Act, which will over-ride existing development consents issued by Auburn Council. It is therefore necessary to define the scope of the proposed project and the environmental assessment that is presented.

This Environmental Assessment Report provides an environmental impact assessment of the proposed upgrade to the brewery, within the context of the existing site and operations. That is, the existing site and operations are described in the report and where necessary, the background conditions established by the existing site and operations are taken into account as part of the assessment.

While Tooheys are applying for a single site-wide planning approval, the environmental impact of the existing brewery operations has not been subject to an assessment within this report.

1.4 Structure of Environmental Assessment Report

This Environmental Assessment report is structured as follows:

Part A provides the background and project context, comprising Section 1 to Section 6.

Section 1 provides an introduction, including background and context for the proposal.

Section 2 provides a description of the site and activities occurring on site in the context of the location and surrounding land uses.

Section 3 describes the details of the proposal within each area of the site.

Section 4 presents the justification for the proposal.

Section 5 sets out the legislative framework and planning context for the proposal, and summarises the existing development consents operating at the site (which are provided in Appendix A).

Section 6 outlines the consultation process and summarises the issues important to the community and the regulatory authorities. The requirements of regulatory authorities is provided in Appendix C.

Part B provides the environmental assessment, of the proposal, describing the potential environmental effects likely to arise from the proposal, and discussing the environmental management measures proposed to be implemented on site as part of the upgrade and comprises of Section 7 to Section 18.

Section 7 is the environmental risk assessment.

Section 8 summarises the hazards and risk assessment which is provided in Appendix D.

Section 9 summarises the contamination assessment which is provided in Appendix E.

Section 10 summarises the air quality assessment which is provided in Appendix F.

Section 11 is the odour assessment.

Section 12 summarises the noise assessment which is provided in Appendix G.

Section 13 is the flooding assessment.

Section 14 is the stormwater assessment.

Section 15 summarises the traffic assessment which is provided in Appendix H.

Section 16 summarises the visual assessment which is provided in Appendix J.

Section 17 is the heritage assessment.

Section 18 is the cumulative assessment.

Part C concludes the report and provides a summary of the proposed mitigation and management measures.

Section 19 summarises the environmental management measures proposed in the draft Statement of Commitments which is provided in Appendix K.

Section 20 presents a consideration of the principles of Ecologically Sustainable Development.

Section 21 presents the conclusions of the environmental assessment in relation to the proposed upgrades, including a final justification of the project, and the next steps for the project.

Chapter 2

Site Description

2 Site Description

This Section describes the physical environment of the brewery site and surrounding areas including natural and built features as well as the existing brewery process operations.

2.1 Location and Context

The Tooheys brewery site forms part of an industrial cluster in the suburb of Lidcombe. The industrial premises are amassed within a large rectangular shaped block bound by Parramatta Road to the north, Boorea Street to the south and Nyrang and Percy Streets to the east and west respectively.

The brewery site lies at the easterly end of the industrial area with its largest frontage along Nyrang Street. The site is surrounded by industrial, residential and recreational land uses. Figure 2 shows the location.

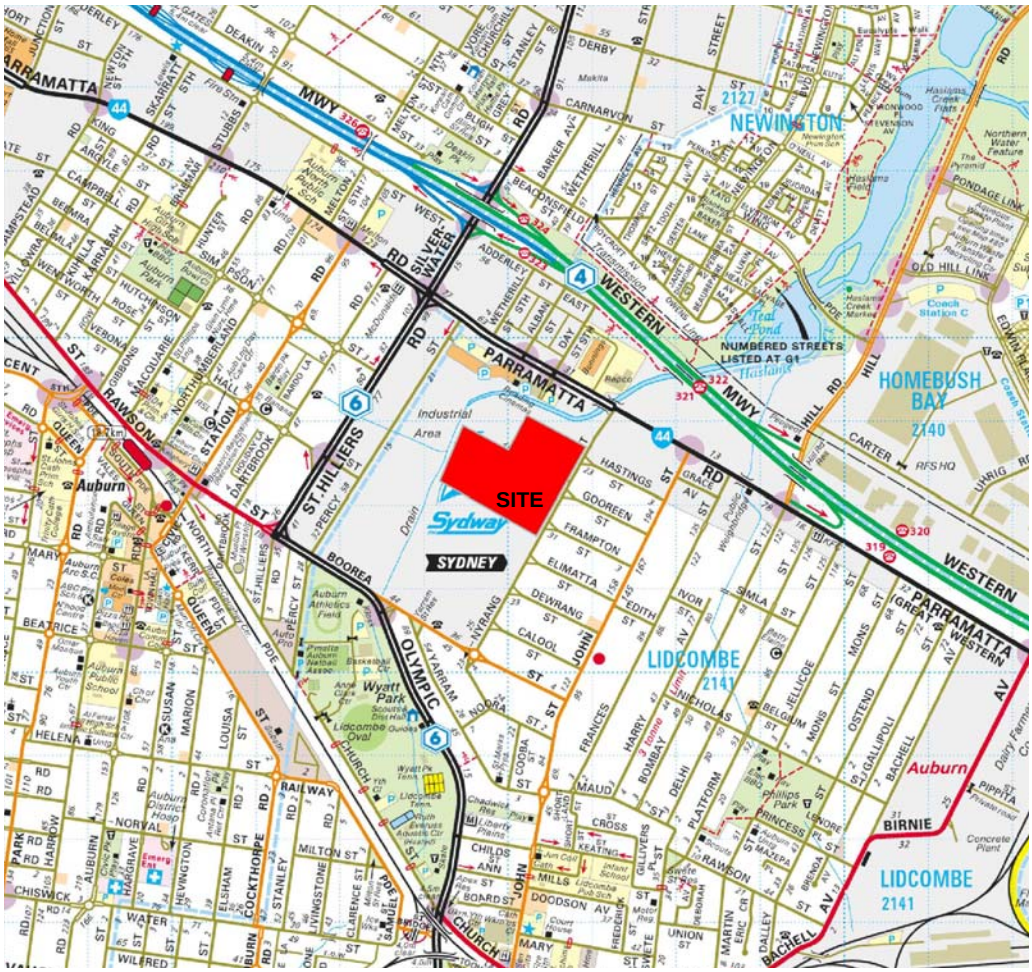


Figure 2 Site Location

The residential area to the east has a distinctive regular grid of streets of blocks containing detached residential dwellings on large allotments from the post-war period. To the south of the industrial area is similar detached housing from the mid 20th century. Redevelopment of some of these allotments has taken place over the last decade with larger double storey dwellings replacing the more austere cottages.

Immediately to the west of the site is a continuance of the industrial area. The majority of these premises contain late 20th century large industrial buildings set back from the street edge which tend to be dominated by hardstand.

Redevelopment in the immediate area has been concentrated along Parramatta Road. The subdivision pattern to the north of the site is largely based on rectangular lots, however the size of each allotment varies. Retail, entertainment and recreation facilities have recently been added to the industrial and commercial streetscape.

Haslams Creek has been canalised where it is adjacent to the brewery site. Northeast of the industrial area, the creek passes through a wetland area, before discharging into Homebush Bay.

2.2 Access

Access to the site is gained via both the Percy Street and Nyrang Street entrances. A manned gatehouse is located at the entrance on Nyrang Street which is the main entrance to site. The secure access on Percy Street is used by most of the heavy vehicles that enter and leave the site.

The Bevchain distribution centre, proposed for the adjacent site will include a realignment of the Percy Street entrance road, which will allow for increased use by heavy vehicles, reducing the need for heavy vehicle access from Nyrang Street. The distribution centre proposal is currently being assessed in a development application to Auburn Council. Additional consideration of the traffic and access implications of the proposed distribution centre upon the brewery upgrade is provided in Section 14.1.

2.3 Physical Features of Land

2.3.1 Topography and Landform

The site is located in a slightly undulating topographic setting that generally falls to the north and north-west. The site is generally flat falling slightly to the north and west at between 2° and 4°.

Immediately beyond the Tooheys fence on the western boundary of the site, the land falls away sharply into Haslams Creek.

2.3.2 Geology and Hydrogeology

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is underlain by Ashfield Shale from the Wianamatta Group, comprising dark-grey to black claystone-siltstone and fine sandstone-siltstone laminite.

Various subsurface investigations have been undertaken on site including geotechnical and environmental assessments. These investigations indicate that the site soil consists of alluvial and residual clay to groundwater level, with underlying shale.

The results of the geotechnical investigation undertaken as part of the upgrade (*Arup, Tooheys Brewery Upgrade: Geotechnical Interpretative Report, November 2006*) indicate that subsurface conditions typically consist of concrete to a depth of 0.15 to 0.18 metres below ground level (mbgl) followed by a layer of fill material (0.3 m to 1.53 m thick) underlain by residual soil consisting of silty clay and then shale.

Groundwater investigations have also been undertaken as part of the geotechnical and contamination investigations for the proposed upgrade and indicate that groundwater is approximately 2.3 to 2.7 mbgl.

Groundwater investigations have revealed that there may be a localised groundwater ridge on site running in an approximately northerly directing groundwater in an arc from the north westerly to north easterly direction. Groundwater is further discussed in Section 9 and Appendix E.

2.4 Existing Operations

The current production capacity of the facility is 4.0 million hl of beer per annum, however shift working arrangements based on a five day week restrict the production output to 3.3 million hl per annum. The seasonality of demand also influences production rates.

Total production capacity at the brewery is limited by a number of factors. These factors include the brewhouse, utilities and services, beer processing facilities, and the volume of fermentation, maturation and storage vessels.

During normal business hours, there are approximately 117 people on site. Outside of normal hours, there are approximately 90 people on site.

The key components of the brewing process and the nature of existing operations at the site are described in the following sections, and illustrated in Figure 3. The existing site layout is shown in Figure 4.

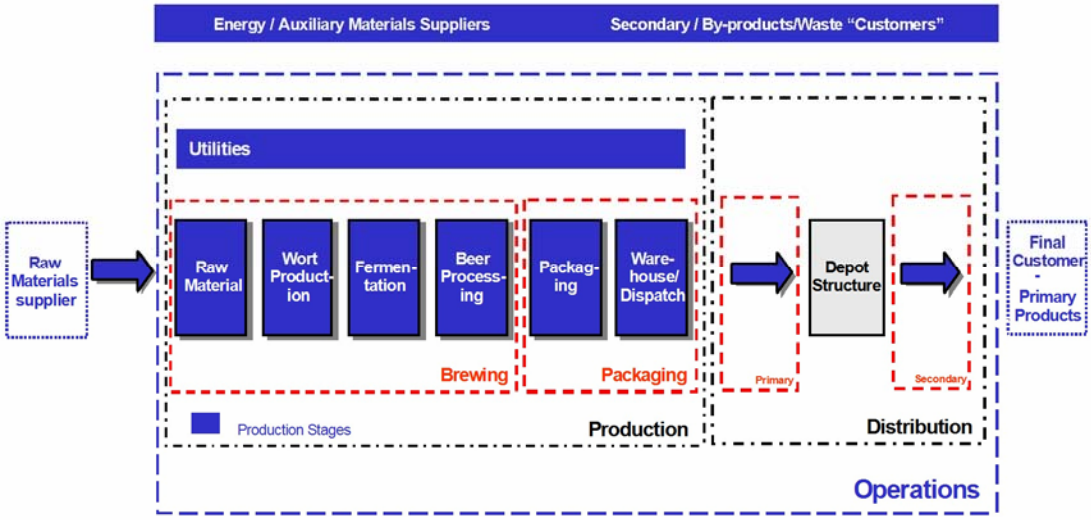


Figure 3 Process Description

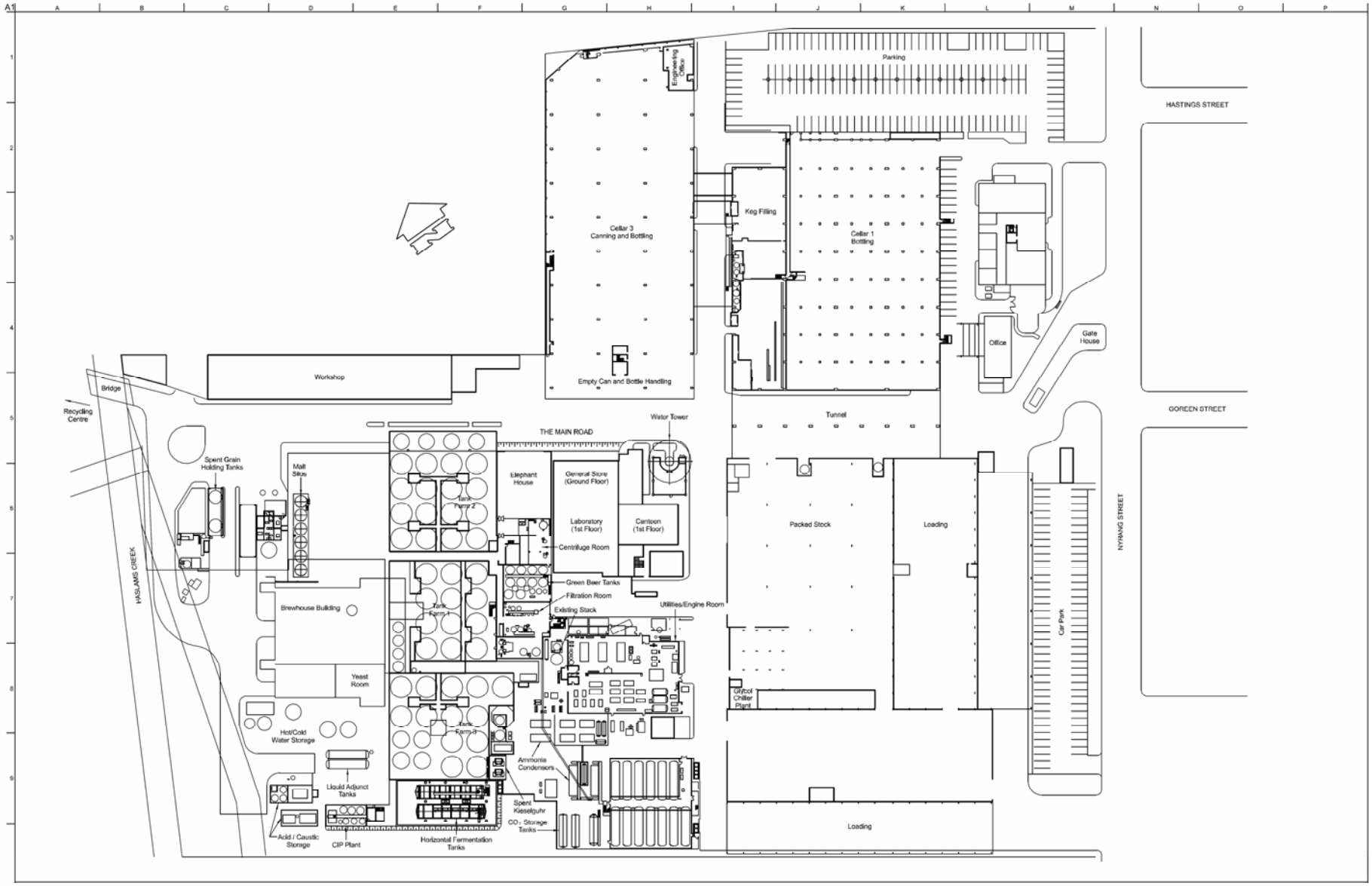


Figure 4 Existing Site Layout

2.4.1 Raw Material

Raw materials used in the brewing process include malted grain, hops, yeast and liquid adjunct (maltose/sucrose). In general, methods of "just-in-time" delivery of raw materials are adopted to minimise on site storage.

Malted grain is delivered by truck to the brewery and is pneumatically transferred to concrete or steel silos. The grain is cleaned and weighed as required and pneumatically transported to the brewhouse malt tower where it is milled to grist (i.e. the outer layer is broken) in preparation for wort production.

Hops and hops extract are stored within silos located within the brewhouse.

There are currently a number of different yeast strains used by Tooheys. Each strain is propagated from small amounts maintained in the laboratory and then stored in the yeast room. In addition to propagated yeast, yeast is recovered from the fermentation process and stored in the yeast room for re-use. The yeast storage room is located to the south of the brewhouse and includes two yeast pitching tanks for measuring out the required volume of yeast and eight storage tanks where the yeast is stored at cold temperatures for a limited period of time.

Liquid adjunct is stored in tanks to the south of the brewhouse building with a capacity equivalent to 4 days storage.

2.4.2 Wort Production

Wort production occurs in the brewhouse building and encompasses the process operations combining the malt grist and liquid adjunct occurring prior to fermentation. In 1993, the brewhouse operations were upgraded and are therefore relatively modern and efficient compared to the remainder of the site operations.

Malt to Mash

The milled malt and water is mixed into mash tuns located within the brewhouse building. The malt and water mixture is then heated to produce a malt grist and water slurry known as mash.

Mash to Wort

The mash is then pumped to the lauter tuns within the brewhouse building where the insoluble grains are allowed to settle on a false bottom which acts as a filter bed to clarify the mash. The liquid, called sweet wort, is separated from the spent grain. The spent grain is collected and sold as animal feed.

Wort Boiling

The final brewhouse operation is the boiling of the wort in brew kettles. The brew kettles are shown in Figure 5. This process stops the conversion of starch to sugar, sterilises and concentrates the wort, extracts bittering and flavour compounds and removes undesirable flavour and other nitrogenous and tannin materials. Hops and hop extracts are added at this time depending on the beer type to be produced. After brewing the hops are strained and the remaining insoluble material allowed to settle and is then transferred to the spent grain holding tanks. The cooled wort is transferred to the fermentation tanks.

Figure 5 Brew Kettles, within the Brewhouse

2.4.3 Fermentation and Maturation

Fermentation occurs when yeast is added to the cooled wort, converting the sugars in the wort to ethanol and carbon dioxide (CO_2) within fermentation tanks.

Yeast is currently propagated and stored in the yeast room. The yeast room is located on level 1 on the south side of the brewhouse, above the brewhouse store room.

Yeast (either propagated or re-used) is added to the wort within stainless steel fermentation tanks located outdoors in Tank Farm 1 and Tank Farm 3, which were installed in the 1970s. Two additional stainless steel horizontal fermentation tanks are located on the southern boundary of the site adjacent to Tank Farm 3.

The first fermentation stage is typically completed within 7 days. This process converts the wort to "green beer". At this stage of the process, the carbohydrate material is converted to alcohol and CO_2 and various other materials which contribute to flavour and character of the beer.

Maturation or aging occurs to remove the last remains of undesirable flavour and aroma components and is controlled at lower temperatures than the first fermentation stage. The secondary fermentation occurs over an approximate 5 day period within maturation tanks.

The maturation tanks include tanks located on Tank Farm 2 and Tank Farm 3 as well as horizontal maturation tanks within the Cellar 2 building. Eight of the tanks on Tank Farm 3, installed in the 1980s, are dual process and able to operate as either fermentation or maturation tanks. These tanks are currently fitted with cone cooling jackets so that they are able to be used for maturation. Four additional maturation tanks have recently been installed to the north of Tank Farm 2.

A summary of the fermentation and maturation tanks on site is presented in Table 1.

Table 1 Existing Fermentation and Maturation Tanks

Tank Type	Quantity	Total Volume	Location
Fermentation Tanks	22	76,000 hl	Tank Farm 1 and 3
Fermentation/Maturation Tanks	8	32,000 hl	Tank Farm 3
Maturation Tanks	54	114,000 hl	Tank Farm 1 and 2 and Cellar 2

2.4.4 Beer Processing

Beer processing operations are the physical processes that remove solids from the beer at various stages of the overall process.

Most of the solids (mainly yeast) are removed from the green beer by centrifugation after the primary fermentation stage. There are three centrifuges operating in parallel within the centrifuge room. The viable yeast waste solids are stored in the sale yeast tanks and sold as a revenue generating stream. The green beer is also chilled during the centrifugation process.

Following maturation, the beer is dosed with a filter medium (kieselguhr) and filtered to remove residual yeast and other solids. The spent kieselguhr is dried and removed from site to be used for soil conditioning by the same company that buys the spent grains.

The existing beer processing plant is located within a conglomerate of four buildings including the "elephant house" and filtration buildings, located in the centre of the site to the east of the tank farms. These four buildings currently contain the filter lines, auxiliary filtration equipment and Cleaning in Place (CIP) plant. The layout of the process equipment within these buildings is complex and indicates that a number of upgrades have occurred over the history of the brewery in an unsystematic fashion. There are obvious inefficiencies resulting from the existing layout.

2.4.5 Packaging

Following filtration the finished product, known as bright beer, is stored prior to packaging within three cellaring areas. Cellars 1 and 3 are located within the packaging area and Cellar 2 within the brewing area. The cellars supply three bottling lines, one canning line, and one keg line, and have a combined total storage capacity of almost 30,000 hl.

The cellars feed the packaging lines through partly manual and partly automated processes.

Finished products are warehoused on site before loading for delivery. Unloading of new cans and bottles and loading of finished goods is done automatically.

2.4.6 Utilities Services

The brewing process is supported by a number of key utility services as below.

Heating Plant

The existing heating plant consists of two 15MW gas fired steam boilers and one 2MW gas fired steam boiler with flue gas vented through a 50m stack. The stack is shown in Figure 6.

All boilers are more than 30 years old with an estimated efficiency of 72%.

Figure 6 Existing Stack

Refrigeration Plant

The cooling requirements for the site are supplied by an ammonia refrigeration plant including 9 screw compressors and 8 evaporative condensers. An example of an existing ammonia evaporative condenser is shown in Figure 7.

Figure 7 Existing Ammonia Refrigeration Plant (Evaporative Condenser)

A newly installed glycol chiller plant, including 3 screw compressors, is also used for cooling. The glycol cooling plant is based on a propylene glycol solution, which is cooled by the ammonia refrigeration plant, and the cold glycol solution reticulated around the site. The glycol system is preferred as it significantly reduces the amount of ammonia that is required to be stored and used at the site, and amount of ammonia that is required to be reticulated throughout the site.

Table 2 identifies the refrigeration plant that serve the various brewery operations.

Table 2 Existing Cooling Loads

Ammonia Plant	Glycol Plant
Fermentation tanks	4 new maturation tanks
Maturation tanks	Yeast storage and propagation
Green beer coolers	Yeast cooler
Ice water chiller (for wort cooling)	Two pre-filter beer coolers
Deaerated water chiller	Beer coolers in the packaging area
	Beer flash pasteurisers
	Room cooling in packaging area
	Horizontal fermenters
	Cellar room drying
	Air dryers
	CO_2 dehumidifier

CO_2 Recovery and Supply

CO_2 is recovered from the fermentation tanks and treated and compressed through the recovery plant before being reintroduced into the beer for carbonation. A new CO_2 recovery plant within the engine room has been recently commissioned replacing the existing CO_2 liquefaction plant which is over 30 years old. The installation of the CO_2 recovery plant makes the brewery self-sufficient with CO_2.

Compressed Air Plant

The compressed air plant supplies dried compressed air to instrumentation, valves and to convey spent grains. The compressed air plant, within the engine room, consists of 5 oil-free screw compressors. The compressed air is dried in glycol cooled air dryers reported to be highly inefficient. The inefficient air plant can result in water getting into the air pipes causing fouling and corrosion.

Electrical Power Supply

Electrical power is currently supplied to the site by three 11 kV incoming lines to an Energy Australia substation. The substation is connected to the brewery high voltage (HV) main distribution board in Substation 1.

The HV is supplied to 7 transformers in the utility centre and to 8 other transformers across the site as presented in Table 3.

Table 3 Existing Substations

Transformer	Capacity	Area Supplied
Substation 1 – Utility Centre		
Transformer 1	1000kVA	Warehouse, Cellar 2, Engine Room, Filtration
Transformer 2	1000kVA	Warehouse, CO_2 Recovery Plant, Engine Room
Transformer 3	1000kVA	Warehouse, Cellar 2, Engine Room, Filtration
Transformer 4	1000kVA	Warehouse, CO_2 Recovery Plant, Engine Room
Substation 2 – Packaging		
Transformer 1	1000kVA	Racking and Bottling
Transformer 2	1000kVA	Racking and Bottling
Substation 3 – Utility Centre		
Transformer 1	1500kVA	Chiller units and warehouse
Substation 4 – Office		
Transformer 1	750kVA	Main office, Link building
Substation 5 – Packaging		
Transformer 1	1000kVA	Warehouse, Cellar 2, Engine Room, Filtration
Transformer 2	1000kVA	Warehouse, CO_2 Recovery Plant, Engine Room
Substation 6 – Future		
None		
Substation 7 – Tank farm		
Transformer 1	1000kVA	Tank Farms and Brewhouse
Transformer 2	1000kVA	Tank Farms and Brewhouse
Substation 8 – Brewhouse		
Transformer 1	1000kVA	Brewhouse and Trade Waste
Substation 9 – Ammonia Compressor		
Transformer 1	3.3kV/1000KVA	Ammonia Compressor
Substation 10 – Ammonia Compressor		
Transformer 1	3.3kV/1000KVA	Ammonia Compressor

2.4.7 Auxiliary Buildings

Other buildings on site include the laboratory, canteen, general store, offices, workshops, recycling centre, administrative area and visitor facilities.

The existing central laboratory is used for quality control and other laboratory testing and is located above the general store in the centre of the site.

Workshop areas are located across the site with the general workshop located on the main road on the northern boundary of the site.

The existing offices for team leaders, brewers, process improvement team and management are spread throughout the site, with the administration and technical offices located at the Nyrang Street entrance.

The canteen serving the on site staff is located in the centre of the site on the first floor to the east of the laboratory.

There is an existing waste recycling centre on the western side of the brewery, on the western side of Haslams Creek. The area is used to store old plant and equipment for repair or sale.

Chapter 3

Scope of Proposal

3 Scope of Proposal

Section 3 describes the proposed upgrade. The proposed upgrade involves the replacement of outdated equipment and is limited to the beer production and utility service facilities.

The upgrade will improve the overall efficiency of the brewery, reduce by-products and result in environmental benefits. The proposal will not include extension of the brewhouse or existing warehouses.

Approval is sought for the upgraded facility, which includes the existing site and operations as described in Section 2 with the changes as described below in Section 3.

The proposed final layout of the upgraded brewery is presented in Figure 8.

3.1 Scope of Proposed Upgrade

The Environmental Assessment, as presented in Part B, is based on an unchanged production rate of 3.3 million hl per annum which represents the maximum output based on a five day week.

3.1.1 Raw Materials

There will be no changes to the process for malt receipt, storage and milling.

3.1.2 Wort Production

The brewhouse will largely be retained intact. The control room on level 1 of the brewhouse is to be decommissioned and relocated. The new control room will be on the ground floor level and will be located between the brewhouse and the new beer processing room. It will establish a central control room for the supervision of the brewhouse, cellars, beer processing, and utility services. The area where the current control room is located will be refurbished for use as offices and meeting rooms. The wall along the lower level of the northern façade of the brewhouse will be modified to allow integration of the brewhouse with the new Beer Processing Building.

Operations within the brewhouse are to be slightly modified to include four small hops silos and five dosing lines for automatic dosing of the wort.

3.1.3 Fermentation and Maturation

The yeast room on the first floor of the brewhouse will be extended. The existing yeast storage tanks are to remain and an additional 4 new yeast storage tanks installed. The existing yeast propagation plants are to be removed and replaced with 2 two-stage propagation plants. The new yeast storage room will accommodate the new yeast storage tanks and propagation plants. Figure 9 shows the proposed floor plan of the new yeast room.

Existing corridors within the tank farm will be removed and new bunds will be installed beneath the fermentation and maturation tanks to accommodate new pumps and valve matrices. The new valve matrices will reduce the likelihood and severity of spills, while bunding of these areas will improve the segregation of contaminated and clean stormwater within the tank farm. Water from within the bunded areas will be directed to the process waste water system prior to disposal to trade waste, via the new pumps.

Figure 8 Proposed Site Layout

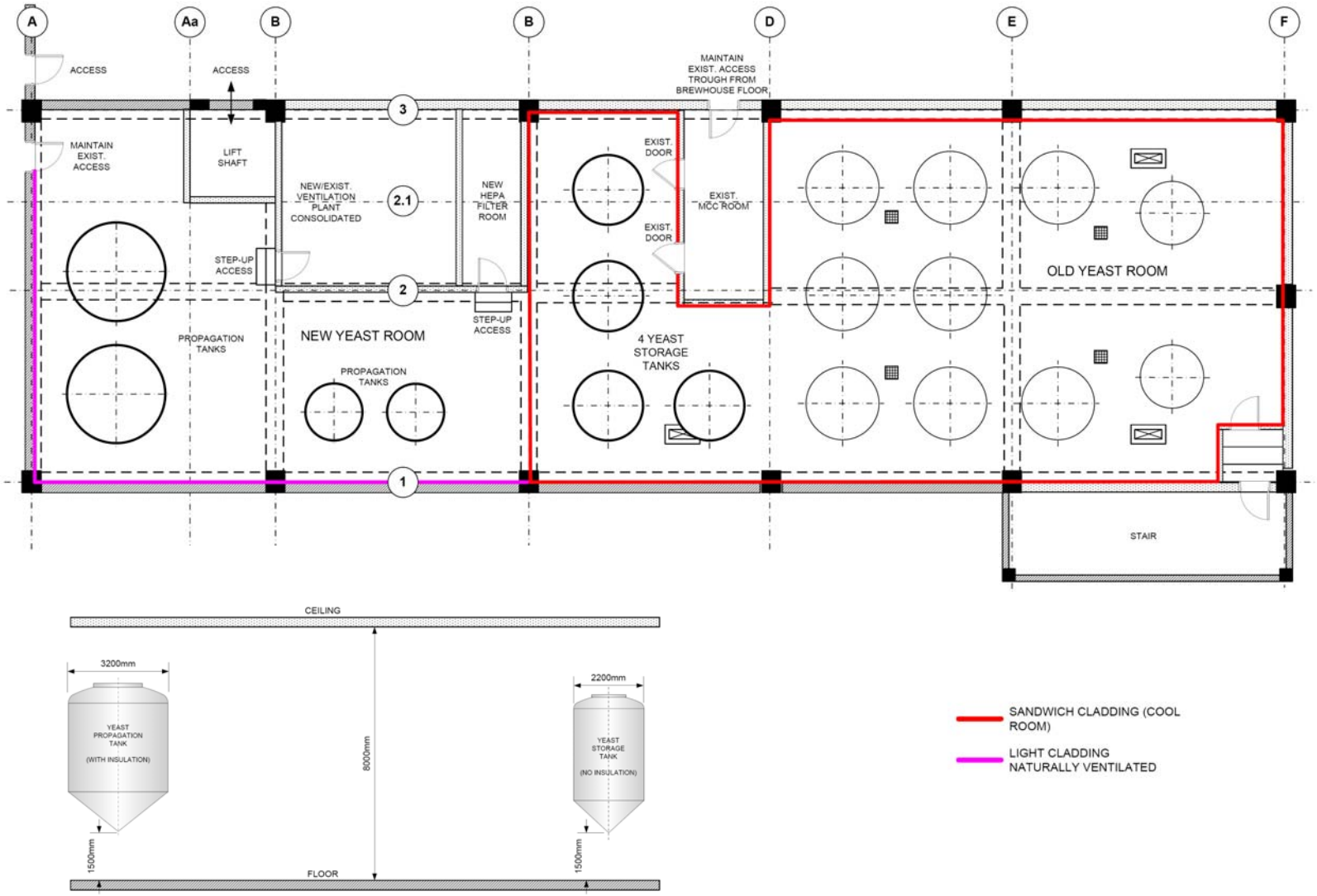


Figure 9 Proposed Yeast Room Layout

3.1.4 Beer Processing

Green beer from the fermentation process will be transferred to the new Beer Processing Building.

The new beer processing building will include relocation of the filtration plant (including centrifuges), installation of two new filter lines, and the relocation of the transfer line.

The existing kieselguhr filters will be removed and new filters installed. Pending investigation the new filters are likely to be membrane filters. If membrane filters are installed then the waste kieselguhr storage areas will become redundant and will be decommissioned and removed.

However, membrane filter technology has not yet proven itself for this function, and it may be necessary to install new kieselguhr filters. The installation of new kieselguhr filters will be accompanied by an improvement in the use, storage and handling kieselguhr and spent kieselguhr.

The new Beer Processing Building will include a mezzanine along the eastern side of the building, and a central control room and small laboratory in the area adjoining the brewhouse.

A photograph of the cleared area where the proposed Beer Processing Building will be located is shown in Figure 10. Figure 11 illustrates the proposed floor plan of the new Beer Processing Building, and Figure 12 provides an indicative cross section of the proposed Beer Processing Building, including the height of the building.

Figure 10 Location of New Beer Processing Building

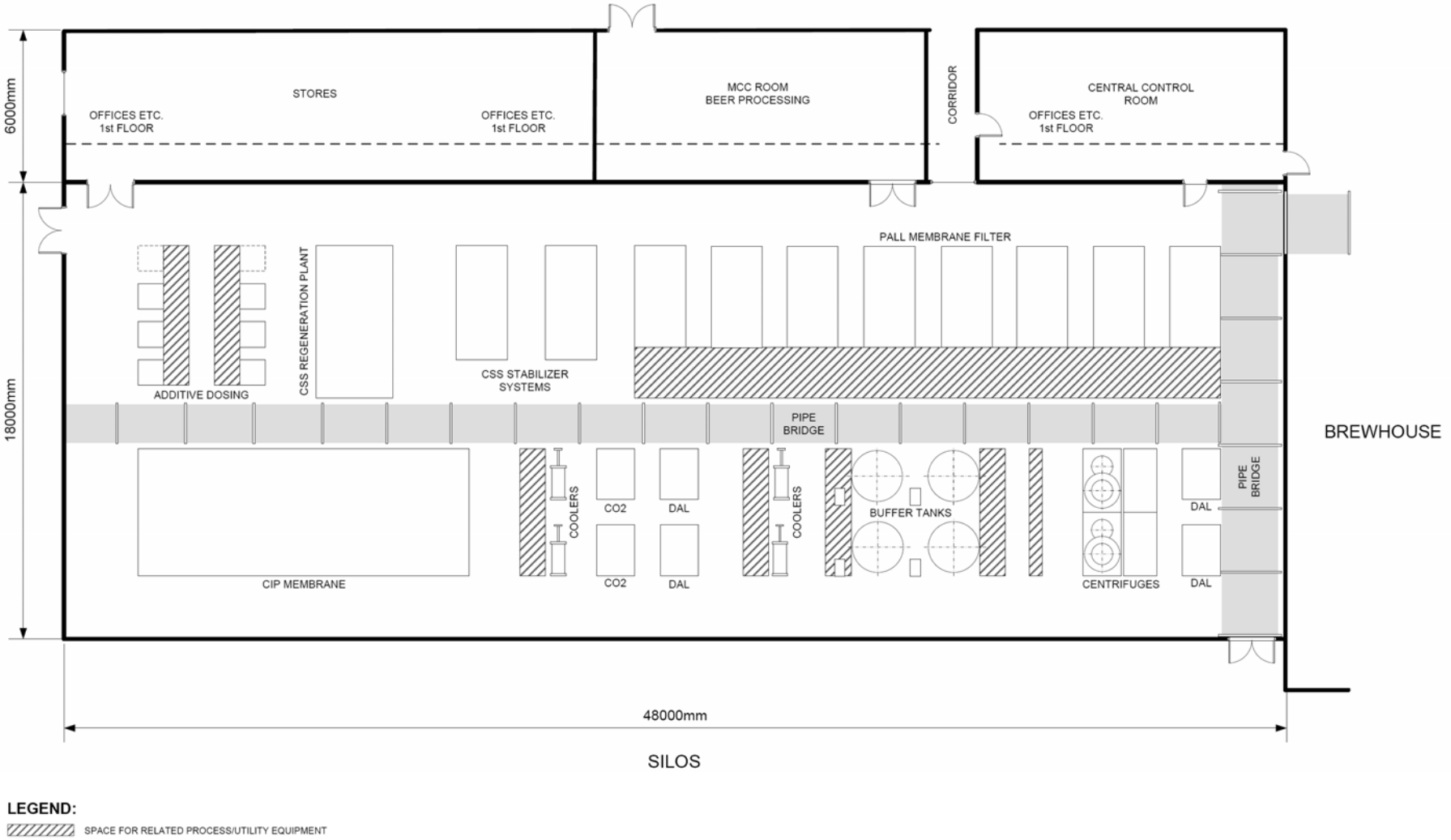


Figure 11 Proposed Beer Processing Building – Floor Layout

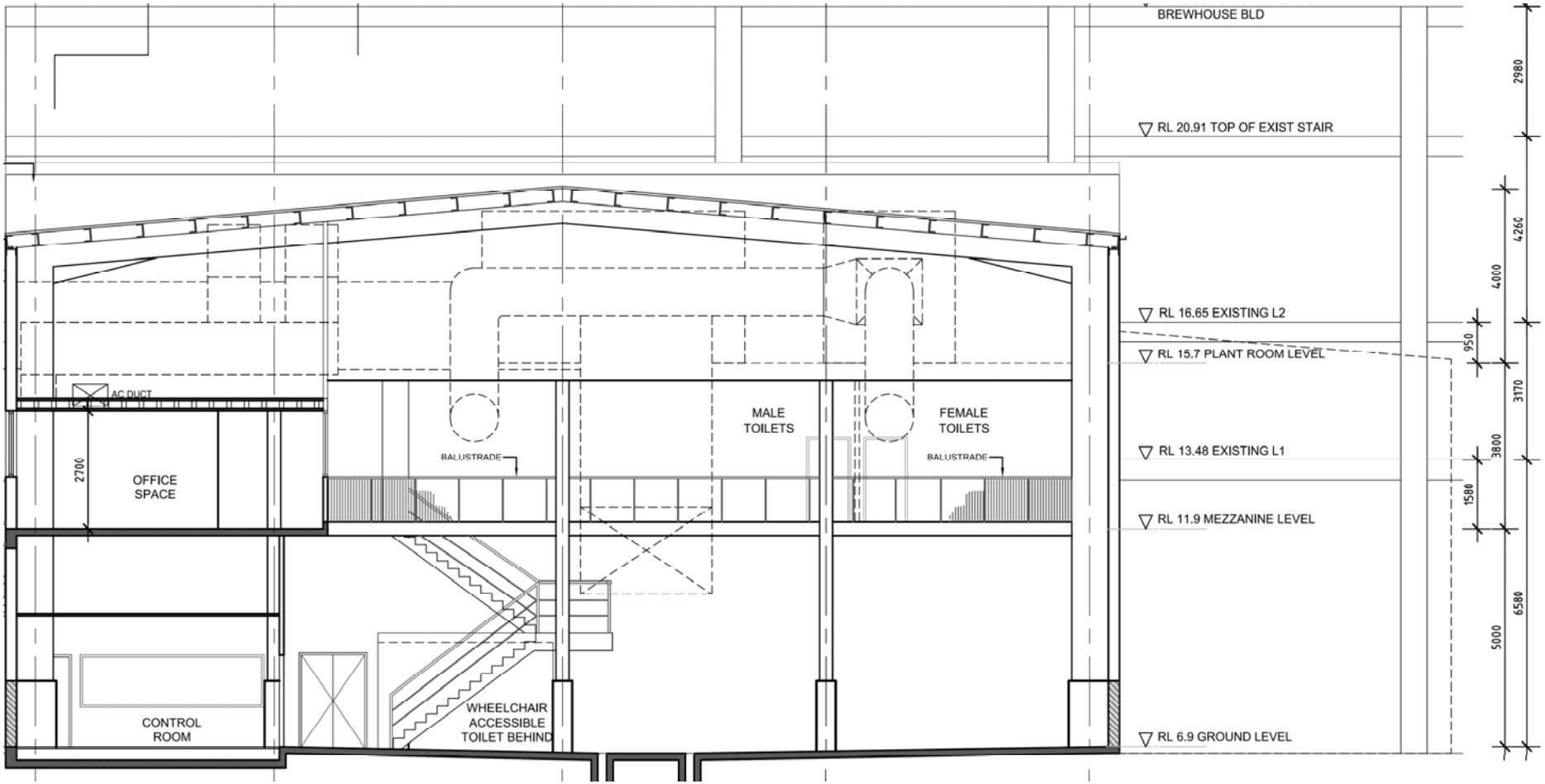


Figure 12 Proposed Beer Processing Building – Cross Section

3.1.5 Packaging

A new BBT Cellar is to be installed on the northern boundary of the site. The cellar will be configured as a single storey building with the BBTs supported at roof level. The conical portion of the tanks will protrude through the roof slab. The new BBT Cellar includes new CIP plants for tanks and pipes. Figure 13 shows the floor plan and the elevation of the new BBT Cellar.

The existing three BBT cellars will be decommissioned in a phased approach. Cellar 1 will be decommissioned first, as part of the project, and the building prepared for installation of new packaging equipment. After Cellar 1 is decommissioned tanks in the new BBT Cellar will be able to supply any of the packaging lines with beer. The total storage volume will be reduced by approximately 16%, based on the flexibility of the tanks and the expectation that the entire process will be more efficient requiring a smaller buffer volume of filtered beer.

Cellar 2 and Cellar 3 will be retained in the immediate term, and decommissioned later as they become unviable.

The upgrade within the canning and bottling facility will be limited to the replacement of outdated plant and reconfiguration of existing conveying systems within the existing buildings. Other than the modification to BBT Cellar 1, there are no permanent building modifications to the packaging hall buildings as part of the proposed upgrades.

3.1.6 Utility Services

Figure 14 shows the modified floor plan of the utilities building and utilities area.

Heating Plant

The existing natural gas boilers will be decommissioned and replaced with a completely new boiler system. The new on site heating plant will consist of two new high efficiency natural gas boilers each 12 MW.

The existing 50 m stack will no longer be utilised but will not be demolished and will remain in its current location. A new 25 m stack will be installed to discharge air emissions from the new boilers. The new stack will be located within the utilities building, protruding from the roof of the building.

Refrigeration Plant

The ammonia refrigeration plant will continue to be downscaled and some of the cooling load shifted to the glycol plant.

The fermentation and maturation tanks will generally remain on ammonia refrigeration system, as will the water chillers. However, the water chilling system will be relocated to the utility room, reducing the amount of ammonia that is required to be reticulated around the site.

The green beer coolers will be taken off the ammonia refrigeration system and will be placed onto the glycol cooling system. One additional glycol chilling unit is required to accommodate this. The new CO_2 plant and air dryers will also relieve some of the glycol cooling load.

The reduction in demand on the ammonia refrigeration system will allow a significant amount of the existing ammonia storage reticulation system to be decommissioned and removed. This includes removal of all of the existing ammonia condensers, and replacement of these with three new condensers.

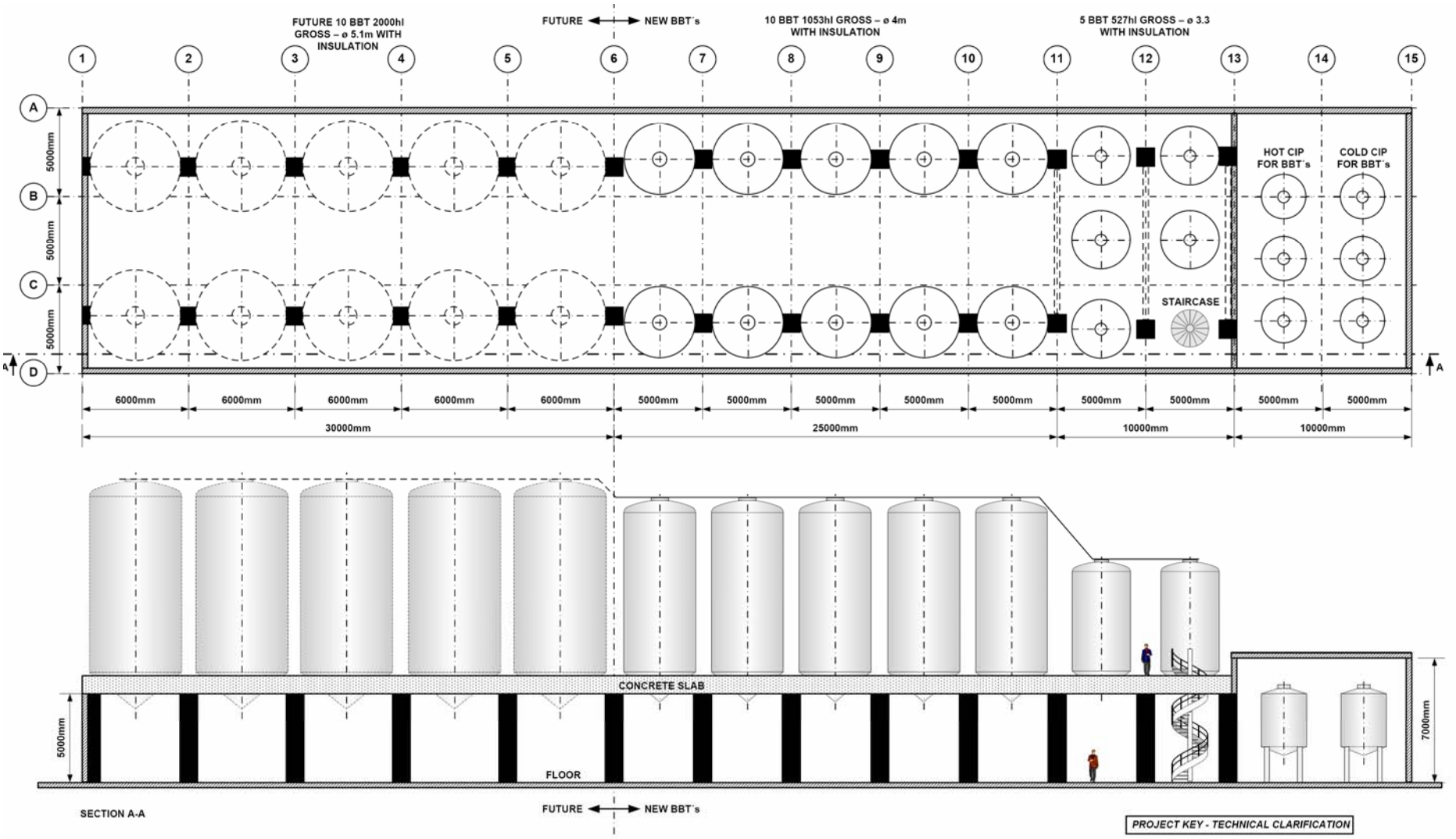


Figure 13 Proposed BBT Cellar

Figure 14 Utilities Room

CO_2 Recovery and Supply

The new CO_2 recovery plant, recently installed, will make the brewery self-sufficient with CO_2 for both the existing and proposed scenarios and no further upgrades are likely to be required.

Water Plant

A new water treatment plant will be installed in the utility room, and will include a new deaerator. The new plant will be based on reverse osmosis technology, and will include a new water cooling tower, six filters, sand and activated carbon (wet). The existing water storage tower will remain as is.

Compressed Air Plant

It is anticipated that there will only be a minor increase in the compressed air peak load following the upgrade. However, a new air compressor is proposed to be installed in addition to the existing screw compressors so as to provide the capacity to discharge spent grains during peak load.

A new air adsorption drying plant is to be installed to dry the compressed air. The proposed plant utilises the compressor heat for drying and requires energy for operation of a small motor.

Electrical Power Supply

No changes in the electrical power supply are proposed. The required electrical load following the upgrade has been calculated to be 7.5MW. This can be met by the existing system, which has a capacity of up to 8.5 MW. The total installed transformer capacity is 15,250 kVA which will remain to be sufficient to meet the requirements of the brewery.

3.1.7 Auxiliary Buildings

The existing laboratory is to be maintained and a satellite laboratory included in the new Beer Processing Building on the ground floor.

Existing offices for brewing personnel are to be centralised in the new Beer Processing Building.

The workshop will be relocated to the north-west within the same building complex. Part of the existing workshop building will accommodate the new BBT Cellar.

Other auxiliary buildings including the canteen and general store are to be retained as existing.

3.2 Construction

3.2.1 Description of Construction Activities

Construction activities required as part of the proposed upgrade include:

- Demolition of existing structures, portions of the wall between the existing brewhouse and the proposed Beer Processing Building, and part of the general workshop (to make way for the new BBT Cellar);
- Construction of piled foundations for new structures and buildings, including the new Beer Processing Building and the new BBT Cellar;
- Construction of foundations for the new plant and equipment including the new stack, new boilers, new refrigeration plant, new air compressor, and new water treatment plant;

- Removal of the former refuelling underground fuel storage tank at the site of the proposed BBT Cellar;
- Removal and replacement of roof structure of the utilities room, to accommodate extraction of the existing boilers, and installation of the new boilers;
- Internal road realignment, to allow integration with the Bevchain distribution centre being developed on the western side of Haslams Creek;
- Construction of new Beer Processing Building; and
- Installation of process equipment and utilities.

Construction works for the proposed upgrade will take place while the brewery remains fully operational.

3.2.2 Services

There are a number of buried services within the proposed upgrade areas. These include stormwater, sewer, trade waste, potable water, electrical cables and conduits. All services will be identified prior to construction activities commencing, and suitable measures will be employed to ensure services are not compromised by the construction activities.

3.2.3 Asbestos and Lead

Asbestos has previously been identified throughout the site, particularly in “Super 6” profile cement sheeting, electrical backing boards, vinyl floor tiles, flue, and cement products. Although much of the asbestos has already been removed from site, asbestos may be encountered during demolition. In such an event, details will be placed on the asbestos register. Asbestos is a hazardous material and will be disposed of through an accredited contractor.

The external wall cladding in the utilities room contains asbestos may be impacted by the proposed construction works. Construction methods will be utilised that minimise impact to asbestos structures. In particular, it is proposed that the removal of the old boilers and the installation of the new boilers will be via removal and replacement of the roof structure, so as to avoid damage to asbestos cladding on the walls of the utilities building. Any penetrations through the asbestos cladding will be carried out by a specialist subcontractor should they be necessary.

Other areas where asbestos has been identified, but which are unlikely to be impacted by the proposed works are:

- Office 37 (between Yeast Loading and Engine Room) – Roof material and external walls.
- Filtration Building – Top floor, ceiling panels painted white.
- Warehouse – Roof material, sections of external walls, cappings, gutters and downpipes, and infill panel above doorway.
- Warehouse Centre Building (Old Brewhouse) – external wall, roof material, sections of external walls, internal ceiling, eaves lining, stairwell, and service cavity.
- Warehouse Packed Stock – Roof material, cappings, gutters, downpipes, cement sheeting and cubicle partitions.
- Fabrication Building (Elephant House) – Roof material, wall cladding and cappings.

There are no known lead wastes that will be produced during construction. If lead is identified then a suitably qualified subcontractor would be utilised.

3.2.4 Timing and Programme

The proposed timeframe for the project is presented in Table 4.

Table 4 Proposed Timeframe

Activity	Proposed Timing
Civil and Building Construction	June 2007 – March 2008
Process and Utility Installation	December 2007 – May 2008
Close-up and Disestablishment	May 2008 – July 2008
Testing and Commissioning	June 2008 – September 2008

While the construction period is estimated to take nearly a year, noisy works identified in Table 4 are expected to take place for up to 4 weeks. Following this there would be a period of up to 22 weeks for external building works. The rest of the construction period would consist primarily of internal works and building fit-out.

Chapter 4

Project Justification

4 Project Justification

Section 4 describes the justification for the proposed upgrade within the context of the Australian beer market including a discussion of the project drivers, the project benefits and consideration of alternatives.

4.1 Strategic Context

The Tooheys brewery is the largest brewery in NSW in terms of beer volume produced. The brewery supplies approximately 43% of the share of the NSW market and also has a share of markets within the other states. The brewery is significant in the context of the NSW economy providing direct employment to over 200 staff, and employment and income to the supply chain companies and grain farmers.

The Australian beer market has fluctuated considerably over the period of operation of Tooheys brewery. Beer consumption levels in Australia declined steadily during the early 1990s but stabilized and grew modestly in the late 1990s. Consumption levels declined slightly following the introduction of GST and other taxes in 2000 and are now again stabilising with such stability forecasted to continue into the future.

In recent years, the market has been influenced by the merging of competing breweries and rationalisation of production as well as the rise in the market for international and premium beers. These factors mean that efficient and high quality production is imperative to withstand the competition and remain viable within the market.

It is therefore timely for Tooheys to inject significant investment in upgrading the Lidcombe brewery to ensure its competitiveness and long term viability in the Australian market.

4.2 Project Drivers

In general, the proposal will upgrade the brewery by replacing old and inefficient systems with modern technology. While the main project driver is to improve the economic efficiency of the site, such efficiencies will also have environmental benefits by reducing resource consumption and reducing pollution in the form of production losses which escape to the environment.

Furthermore, Tooheys have a commitment to long term environmental improvement and sustainability under the Environmental Policy endorsed by Lion Nathan Directors. Under this policy, Tooheys are committed to protection of the environment and meeting the expectations of their employees, customers, consumers and stakeholders.

The policy states that sound environmental management practices are to be adopted to ensure high standards of environmental performance across all business activities and support internal and external programs to continually improve their systems and performance by:

- *working to the principles of sustainability in the use of resources and environmental practices;*
- *maintaining compliance with all relevant legislation, regulations and codes of practice;*
- *establishing and maintaining environmental management systems in line with international best practice (ISO 14001);*
- *implementing environmental management programs to address environmental impacts, prevent pollution, reduce risk of harm to the environment and continually improve performance;*

- *reducing the consumption of natural resources through minimising the procurement of resources and materials where feasible, considering the environmental aspects of materials and packaging purchased and implementing waste management practices to reduce, re-use and recycle materials where applicable;*
- *reducing greenhouse gas emissions through efficient consumption of raw materials and energy resources;*
- *managing vineyards to ensure minimal impact on the environment by responsible agricultural practices and efficient use of resources;*
- *maintaining and communicating emergency plans to minimise the risk and impacts of environmental incidents;*
- *training and involving all of our people and contractors to incorporate this policy in their work and decision-making;*
- *communicating with suppliers and contractors to implement environmental systems in line with ISO 14001 and supporting greenhouse and product stewardship programs;*
- *contributing to the development of public environmental policy by supporting and being involved in regulatory body activities; and*
- *communicating with the public by making the policy available to the public, industry and government.*

Tooheys have recognised the project as an opportunity to implement this policy and reduce the environmental impact of the site as a project driver in itself. This will be achieved by consolidation of environmental approvals across the entire site and improvement of current site practices.

4.2.1 Energy and Electricity

Energy requirements for the brewery are supplied by grid electricity, natural gas fired boilers for heating and small amounts of LPG for on site vehicles. The present specific electricity consumption for the brewery is 10.5 kWh/hl of beer and natural gas consumption is 82.7 MJ/hl of beer.

Improved energy efficiency is one of the primary objectives of the upgrade. It is estimated that the electricity consumption will be reduced to 9 kWh/hl and natural gas consumption to 70 MJ/hl. Key improvements to the plant and equipment at the brewery to help achieve this project objective are:

- introduction of an energy management system;
- more efficient flow route of product through the brewery;
- installation of new natural gas fired boilers which are more efficient;
- repair of steam and air leaks;
- repair and increase in insulation;
- improved condensate return rate;
- improved hot water balance;
- increased use of variable speed drives for pumps, motors and fans;
- installation of a local air compressor for spent grains discharge;
- high efficiency motors for new equipment;

- installation of new and more efficient evaporative condenser plant for the main ammonia refrigeration plant and removal of old condensers; and
- utility systems designed to stand-by capacity to ensure the utility plant performs only when required.

4.2.2 Water Consumption

Water is supplied to the site by a Sydney Water mains connection from Nyrang Street. Water consumption within the brewing process represents 73% of the total water consumption, packaging (25%) and amenities and other water fixtures (2%) making up the remainder. Water usage is continually monitored and compared with production quantities. Water consumption has been declining at the site with a reduction of 23% since 2002 resulting from a series of water saving initiatives. The current ratio of water consumption to beer production is 3.84 kL/kL.

Tooheys is currently participating in Sydney Water's 'Every Drop Counts Business Program' to improve water efficiency on site and as such is subject to water efficiency audits by the NSW Department of Commerce.

Reduced water consumption is a primary objective of the upgrade. The proposed process upgrades are anticipated to result in a water consumption of 3.5kL/kL. This will be achieved by:

- reduced beer production losses;
- introduction of an energy management system;
- improved hot water balance;
- installation of new evaporative condensers, improving condensate return; and
- adjustment of flows to minimum required.

Since there is to be no net increase in production capacity, net water consumption at capacity is expected to decrease as a result of the project.

4.2.3 Production Losses

Inefficiencies in production contribute to economic inefficiency and the generation of waste and pollution. Through modern technologies these inefficiencies can be reduced and waste minimised.

Currently, average production losses of beer are in excess of 10%. Through the efficiencies to be implemented as part of the proposed upgrades, it is expected that production losses will be reduced to less than half the current losses.

4.2.4 Reduced Operating Costs

Operating costs will be reduced in the order of $5-10 million per year. Savings arise from the three main areas of labour costs, raw material and beer losses, and process services consumption.

There will be a net reduction in employment at the brewery, primarily in casual labour, which is provided for Tooheys by third parties, but in addition some permanent Tooheys employees will be affected.

Precise arrangements are yet to be determined, but a reduction in the order of 15-20% of a permanent workforce of some one hundred brewery technicians is expected.

A voluntary redundancy package will be made available, and it is anticipated that sufficient interest will be shown in the agreed terms. Nearer the time, financial advice and various

other forms of support will be made available to those who wish to consider leaving the business.

As stated above, there will also be savings arising from the reduction in losses and the reduction in the consumption of gas, electricity, and water.

4.3 Consideration of Alternatives

Tooheys has realised the necessity to invest in replacement of aging production equipment and to address the ever increasing challenge of reducing production costs.

The alternative of continuing to minimise capital spent on plant replacement in order to purely maintain current production efficiencies was considered. However, strong competition in Australia has put high pressure on the business to make a step change in improving the current performance and obtaining sustainable cost reductions.

The priorities selected in terms of plant items have been those that deliver the best returns in terms of cost, quality, or reliability, and those that provide a more flexible operation, that is able to deliver customer and consumer needs as these continue to change and develop.

In the short to medium term the current capacity of the brewery is considered to be adequate considering the Australian beer sales market is static or declining. Should additional capacity be required at some point in the future, this could be achieved at Lidcombe, as the site itself is not yet fully utilised and would be subject to further application to DoP.

Due to prohibitive costs, relocation of the brewery is not feasible. A greenfield brewery of similar size would require an investment in plant of approximately $400 million. The Lidcombe site is well located in the geographic centre of greater Sydney adjacent to major transport corridors.

Closure of the brewery for consolidation with other Lion Nathan breweries is not feasible as Tooheys is the largest brewery in the group, and produces the biggest variety of products, adjacent to the major Australian market. Although Tooheys is a national brand, its NSW heritage is an important component of the brand identity, particularly for NSW consumers.

Similar arguments can be made against consolidating regional production from Perth, Adelaide, or Brisbane, to Tooheys, in particular when costs of distribution are considered.

To summarise, Tooheys firmly believes that a significant investment in the Lidcombe site will provide the best conditions for a more efficient operation, with a reduced environmental impact, according to the needs of customers and consumers, providing for a sustainable future for the brewery. A do-nothing scenario would not realise these benefits.

Chapter 5

Planning Framework

5 Planning Framework

Section 5 provides a description of the statutory context for the project and provides a consideration of the consistency of the proposal within that statutory context. In particular, this Section:

- describes the Commonwealth and State legislation and related statutory instruments that are relevant for the proposed brewery upgrade, including relevant environmental planning instruments;
- provides a consideration of the proposal against the relevant provisions and requirements of those instruments;
- identifies relevant Development Control Plans that have been established by Auburn Council, and provides a consideration of the consistency of the proposal with those Plans;
- identifies and lists existing development approvals that have been determined by Auburn Council; and
- describes the details of the adjacent distribution centre project that influences the Tooheys brewery, for which a development application has been lodged with Auburn Council.

5.1 Commonwealth Government

5.1.1 Environmental Protection and Biodiversity Conservation Act, 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides protection to matters of National Environmental Significance (NES) which include:

- World heritage properties.
- Ramsar wetlands of international importance.
- Nationally listed threatened species and communities.
- Migratory species protected under international agreements.
- Nuclear actions.
- National heritage places.
- Commonwealth marine environment.
- Any additional matters specified by regulation.

The proposed development will not affect any matters of NES, and therefore referral to Department of Environment and Heritage is not required. Part B provides an assessment of environmental impacts associated with the project.

5.2 State Government

5.2.1 Environmental Planning and Assessment Act, 1979

The upgrade constitutes 'development' and, therefore, is to be considered under the *Environmental Planning & Assessment Act 1979* (the EP&A Act) and the *Environmental Planning & Assessment Regulation 2000* (the EP&A Regulation). The EP&A Act and Regulation sets out the assessment framework under which development must be assessed. The original brewery development predates the EP&A Act and therefore the majority of the operations at the brewery have not been subject to environmental assessment and approvals process. Development occurring since 1979 has either been

assessed under Part 4 as permissible development requiring development consent from Auburn Local Council or exempt development not requiring consent.

The nature and scale of this proposed upgrade, however, represents a major project under Part 3A of the EP&A Act.

Part 3A of the EP&A Act

Recent amendments to the Act have established a new framework under Part 3A for environmental assessment for major projects in NSW. These changes integrate a number of approvals required under other pieces of state legislation, reducing the complexity of the approvals process in NSW as well as establishing a degree of flexibility in the environmental assessment of major infrastructure projects.

Projects to which Part 3A applies require development approval from the NSW Minister for Planning. Prior to approval being granted by the Minister, Part 3A requires an environmental assessment to be undertaken by the proponent, and to be reviewed and assessed by the NSW DoP.

Part 3A applies if a project meets any of the types set out *in State Environmental Planning Policy (Major Projects) 2005* (Major Projects SEPP). Consideration of the Major Projects SEPP is provided below, and the Minister has formed the opinion that Part 3A of the EP&A Act applies to the proposed upgrade.

Under Part 3A of the EP&A Act a range of State legislation no longer applies to the proposed upgrade. Legislation that may be affected in this manner for the proposal, include:

- *Heritage Act 1977*, in relation to an approval or an excavation permit relating to non-Indigenous heritage items;
- *National Parks and Wildlife Act 1974*, in relation to a permit of a consent relating to Indigenous heritage items; and
- *Rivers and Foreshores Improvement Act 1948*, in relation to a permit for works within 40 metres of protected waters. The proposed upgrade will include activities within 40 metres of Haslams Creek.

5.2.2 Protection of the Environment and Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) regulates emissions to air, water and land. It regulates specific types of activities and installations that have the potential to cause environmental harm as a result of their operations. The POEO Act covers the preparation and implementation of environmental protection policies, pollution prevention and control, and the licensing of certain development activities and installations. The NSW Department of Environment and Conservation (DEC) administers the requirements of the POEO Act.

Breweries or distilleries that produce alcohol or alcoholic products and that have an intended production capacity of more than 30 tonnes per day or 10,000 tonnes per year are listed under Part 1, Schedule 1 as an activity for which the occupier of a premise at which the activity is carried on, requires an Environmental Protection Licence (EPL) from the DEC authorising the activity to be carried on at that premise.

Tooheys holds an Environmental Protection Licence (EPL) No. 1167 administered by the DEC, covering emissions to air, generation of noise and discharges to water from the brewery operations.

An annual return is prepared for Tooheys each year detailing areas of non-compliance with State environmental legislation including requirements of the EPL as well as mitigating actions.

Under Part 3A of the EP&A Act, if planning approval is granted by the Minister for Planning then the EPL cannot be refused to be amended (if amendment is necessary) and the EPL must be amended so that it is consistent with the Minister for Planning's approval.

5.2.3 State Environmental Planning Policies

State Environmental Planning Policy (Major Projects) 2005

The Major Projects SEPP outlines four types of Part 3A projects to which the major projects SEPP applies.

Breweries are listed under clause 3(b), Group 1, Schedule 1 of the Major Projects SEPP. Under the SEPP, a brewery development that employs 100 or more people or has a capital investment value of more than $30 million constitutes a "Major Project".

The total capital expenditure of the proposed development at the Tooheys brewery is approximately $70 million and as such it constitutes a Major Project under the SEPP, and Part 3A of the EP&A Act applies.

State Environmental Planning Policy No 11 - Traffic Generating Developments

State Environmental Planning Policy No 11 (SEPP 11) aims to ensure that the Roads and Traffic Authority (RTA) is made aware of, and given an opportunity to make representations in respect of, development referred to in Schedule 1 or 2 of the SEPP.

- Schedule 1 includes:

  the erection of a building for the purposes of industry where the gross floor area of the building is or exceeds 20 000 square metres or the enlargement or extension of a building used for the purposes of industry where the gross floor area of that enlargement or extension is or exceeds 20 000 square metres.

- Schedule 2 includes:

  the erection of a building for the purposes of industry where the gross floor area of the building is or exceeds 5,000 square metres, or the enlargement or extension of a building used for the purposes of industry where the gross floor area of that enlargement or extension is or exceeds 5,000 square metres; and

  premises licensed under the Liquor Act 1982, or the Registered Clubs Act 1976, in each case having accommodation for 50 or more motor vehicles or the enlargement or extension of any such premises where the enlargement or extension includes accommodation for 50 or more vehicles.

The floor area of the proposed new buildings and building extensions is less than the Schedule 1 threshold.

The brewery may be considered as a Schedule 2 development, as a licensed premise with accommodation for more than 50 vehicles. Under Schedule 2 development need only be referred to the Roads and Traffic Authority where it is development on or of land that has direct vehicular or pedestrian access to:

- an arterial road, or
- a road connecting with an arterial road, if the access is within 90 metres (measured along the road alignment of the connecting road) of the alignment of the arterial road.

The nearest arterial roads are Parramatta Road and St Hilliers Road. In both cases the distance from the site access to the arterial road is greater than 90m and therefore referral to the Roads and Traffic Authority is not required under SEPP 11.

State Environmental Planning Policy No. 33 – Hazardous and Offensive Developments

State Environmental Planning Policy No. 33 (SEPP No. 33) relates to potentially hazardous and offensive developments. The brewery is considered a potentially hazardous industry under SEPP 33, given the nature and quantities of dangerous goods stored at the site. However, it is identified that the nature and quantities of dangerous goods stored at the site will generally not change significantly at the site as a result of the proposed upgrade. In relation to ammonia, a key dangerous good currently stored at the site, the quantity will be reduced significantly as a result of the proposed upgrade.

A risk analysis has been undertaken in accordance with SEPP 33. The risk analysis considers the level of current risk associated with hazardous events, and how this will change as a result of the proposed upgrade. It concludes that there is no increase in off site risk to people or the environment associated with the proposed upgrade at the brewery. The risk analysis is provided in Appendix D, and the key outcomes summarised in Section 8.

The brewery is also likely to be considered a potentially offensive development given the potential for noise, air and water emissions. An EPL is held by Tooheys under the POEO Act for the entire brewery, and will need to be amended to incorporate the proposed upgrade. An assessment regarding potential impacts associated with air, noise and water emissions is provided in Section 8, Section 12 and Section 14 respectively. The assessments identify that there are no unacceptable impacts associated with emissions to air, noise or water associated with the proposed upgrade.

State Environmental Planning Policy No.55 – Remediation of Land

State Environmental Planning Policy No. 55 (SEPP 55) requires that the issue of contamination be considered whenever a planning authority considers a development in NSW. Clause 7(1) of SEPP 55 is as follows:

> *7 Contamination and remediation to be considered in determining development application*
>
> *(1) A consent authority must not consent to the carrying out of any development on land unless:*
>
> *(a) it has considered whether the land is contaminated, and*
>
> *(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and*
>
> *(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.*

SEPP 55 requires that the consent authority considers whether the site is suitable for continued industrial use. A preliminary site investigation has been undertaken, and is presented in Appendix E and summarised in Section 9.

The assessment identified petroleum hydrocarbon contaminated soil and groundwater consistent with the historical and current industrial use of the site including historical underground fuel storage. However, the risk of exposure to such contamination is low as the majority of the site is occupied by buildings or hardstand areas which will not be disturbed by the upgrade.

Elevated levels of light fraction hydrocarbons were detected in groundwater samples at locations adjacent the identified underground fuel storage tanks. Contamination was not

identified in samples collected from the site boundary indicating that the groundwater contamination is not currently migrating off site.

Potentially contaminated site soil and groundwater to be removed during the upgrade will be managed in accordance with the NSW EPA's *Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes* (EPA, 1999).

It is therefore considered that the upgrade is not likely to increase the risk of exposure to contamination to an unacceptable level with respect to human health or the environment during construction and the continued industrial operation of the site.

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The Tooheys brewery site is within the Sydney Harbour Catchment, but is not highlighted as a Foreshores and Waterways Area, a Strategic Foreshore Site, or a designated Heritage Item or Wetland Protection Area.

Sydney Harbour Catchment Regional Environmental Plan sets out some general principles regarding the development of land within the catchment which would apply to the proposed upgrade. These principles relate to the protection of the hydrological, ecological and geomorphological processes within the catchment, as well as the visual qualities of the Harbour.

The site is adjacent to Haslams Creek, which is a tributary to Sydney Harbour. However, the creek has been significantly modified from its natural condition, and the proposed upgrade will not impact on the creek.

During construction works, appropriate sediment and erosion control measures will be implemented.

5.2.4 Metropolitan Strategy

The Metropolitan Strategy is the NSW Government's twenty-five year plan for the Sydney metropolitan area. It aims to enhance liveability; strengthen economic competitiveness; ensure fairness; protect the environment; and improve governance. There are seven strategies contained within the plan which aim to manage the growth of greater Sydney.

Of these seven strategies two are relevant to the proposal, namely Economy and Employment and Centres and Corridors. The following objectives are applicable:

- A1: Provide suitable commercial sites and employment lands in strategic areas.
- B6: Focus development in renewal corridors to maximise infrastructure use where demand and opportunities exist.

As the development site is within the Auburn Local Government Area, it is included in the west central sub-region. Within this sub-region, 95,500 new dwellings and 35,000 new jobs are expected to be created by 2031.

The brewery site is within the Parramatta to City renewal corridor and is identified as part of a cluster of employment lands concentrated along Parramatta Road, a major transport route. The Parramatta Road renewal corridor is shown in Figure 15. The corridor has been identified as a 'renewal corridor' as many of larger and heavy industries have relocated. Renewal corridors are usually a focus for commercial development and contain concentrations of employment, surrounded by, or with the potential for complementary, higher density residential development.

The continued use of the Tooheys brewery is consistent with the relevant objectives of the Metropolitan Strategy, as it ensures that a significant industrial facility is retained within the renewal corridor and within the existing industrial area that is serviced by infrastructure and currently operates as an employment hub.

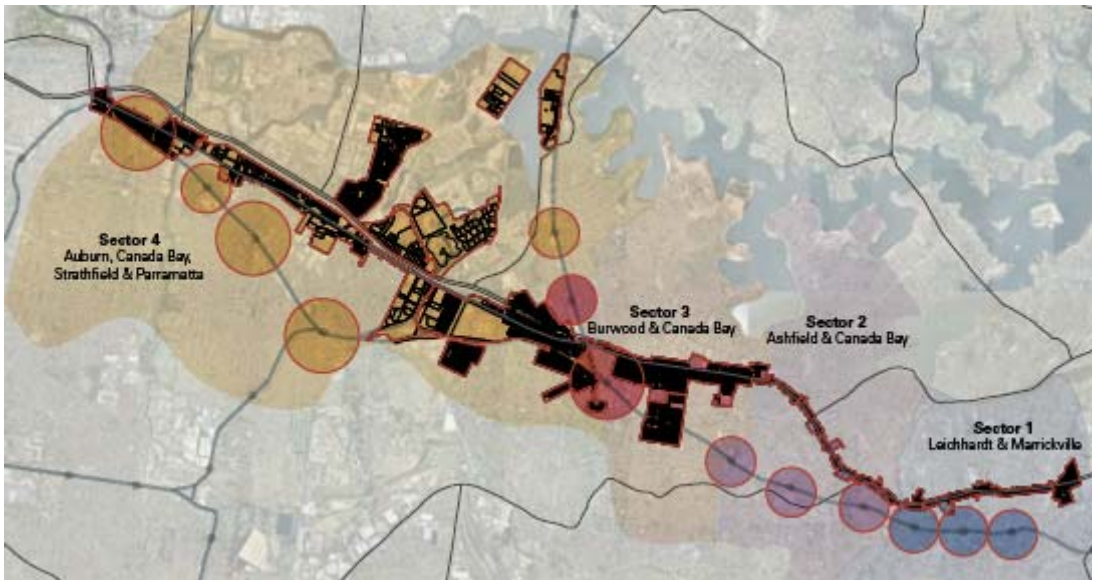


Figure 15 Parramatta to City Corridor (Source: Metro Strategy)

5.3 Local Government

5.3.1 Auburn Council Local Environmental Plan, 2000

Specific Objectives

Auburn Local Environmental Plan 2000 (Auburn LEP) includes specific objectives under the categories of environment, economic development, social development, and character and amenity.

The specific objectives in relation to environment are:

a) to conserve, protect and enhance the environmental heritage of the LGA,

b) to ensure that the natural environment is duly considered in the decision-making process,

c) to consider Auburn's location within the Parramatta River Catchment Area and Cooks River Catchment Area and ensure that development does not adversely impact on these river systems and their tributaries,

d) to encourage an efficient means of disposing of stormwater that reduces the potential for flooding without reducing the ability to rehabilitate Auburn's waterways,

e) to ensure that development does not adversely impact on air and soil quality,

f) to ensure that development does not breach regulatory noise controls,

g) to promote the conservation of natural resources and non-renewable energy resources through energy efficient design, construction techniques, choice of building materials and the utilisation of ecologically sustainable development techniques,

h) to minimise waste by promoting the recycling and reusing of materials.

The proposed development is contained entirely within the existing Tooheys brewery site, and will form a minor addition to the existing developments. One of the primary objectives of the proposal is to improve the efficiency of the brewery, so as to reduce the use of raw material inputs (including energy and water) and the waste produced per unit of beer produced. This promotes the conservation of natural resources and minimisation of waste.

An environmental assessment has been carried out, and is presented in Section 7 to Section 18. Sections 0 and 14 respectively relate to flooding issues and stormwater impacts. It is considered that the proposal will have no significant effect in relation to flooding in the locality, and it will not increase the potential for contaminated stormwater to enter Haslams Creek. The upgraded sections of the brewery will be incorporated into the existing stormwater management regime as part of the proposal.

Air quality, noise and soil quality have all been assessed in the environmental assessment.

Economic, social, and character and amenity objectives of the Auburn LEP that are relevant to the proposed upgrade are listed below:

- to facilitate economic activity and employment growth within the LGA;
- to increase the availability of employment opportunities;
- to ensure that development improves the environmental character and quality of streetscapes within the LGA;
- to ensure that redevelopment improves streetscapes and is in keeping with the character of the LGA; and
- to identify and conserve those items and localities which contribute to the local environment and cultural heritage of the LGA.

The proposed upgrade is necessary to ensure the ongoing sustainability of the brewery at the current site. The improvements in efficiency will ultimately lead to a reduction in the number of staff employed at the brewery. Section 4.2 identifies the nature of employment reduction and the systems to be put in place by Tooheys to minimise the associated disruption.

The proposed upgrade will not affect the existing brewery frontage on Nyrang Street, and due to its scale, will not affect the environmental character of the locality, which will remain as an industrial area.

Zone Objectives

The Tooheys bewery site is located within land zoned 4(a) (General Industrial) under the *Auburn Local Environmental Plan 2000*.

The objectives of this zone are:

a) to provide sufficient land to be used primarily for a broad range of industrial uses,

b) to permit a range of uses that are compatible with industrial areas,

c) to encourage industrial uses that will contribute to economic and employment growth of the locality,

d) to prohibit shops in this zone, but permit minor retail development only where it is providing for the daily convenience needs of the local workforce or is ancillary or incidental to the main purpose of development.

Under the plan the brewery would constitute an “industry” and any development at the site for the purposes of brewing would be permissible with consent. Development for the purposes of upgrading the brewery encourages ongoing operation of the brewery at its present location, maintaining employment opportunities and continuing the economic benefits to the locality, therefore meeting the objectives of the zone.

The proposed brewery upgrade is permissible with consent, and is considered to be consistent with the objectives of the zone.

Other Relevant Clauses in Auburn LEP - Heritage

In the vicinity of the site is a heritage item identified in Schedule 2 of Auburn LEP being the canalisation of Haslams Creek south of Parramatta Road.

Clause 43 of the Auburn LEP relates to development in the vicinity of heritage items and requires the consent authority to consider the likely effect of the proposed development on the heritage significance of the heritage item. None of the works proposed will physically impact upon the canalisation of Haslams Creek. The proposed upgrade will not alter the industrial setting adjacent to the heritage item, and it is considered that the significance of the creek and its setting will not be affected.

Clause 46 of the LEP is also relevant as it concerns development of archaeological sites or potential archaeological sites. Potential archaeological features associated with the Sydney Meat Processing Company may exist on the brewery site, however, it is not known to what extent it covered the brewery site or what level of change has occurred since. The site has not been formally identified in Auburn Council's register of archaeological sites and potential archaeological sites.

If a relic is uncovered during works, notice will be given to the appropriate Authority (DEC, DoP, or the Heritage Office) and the relevant permits obtained. Contractors will be made suitably aware of the potential for heritage items to be discovered during construction works, and of their obligations. These measures have been included in the draft Statement of Commitments in Appendix K.

Other Relevant Clauses in Auburn LEP - Flooding

Clause 54 of the Auburn LEP refers to flood liable land. The clause restricts development within a floodway, and development that is likely to:

- adversely impede the flow of floodwaters;
- imperil the safety of persons in the event of the land being inundated with flood waters;
- aggravate the consequences of floodwaters with regard to erosion or siltation; or
- adversely affect the water table in its immediate vicinity.

Consistent with requests by Auburn Council, the brewery upgrade will not include storage of equipment or materials within 10 m of the bank of Haslams Creek, which is the main floodway channel. Tooheys may seek to erect temporary buildings in this zone. If this is the case then the configuration of these temporary buildings will be such that they do not affect the flood regime of Haslams Creek and will be immune to flooding in the 1 in 100 year flood event.

The new works are also generally outside the 1 in 100 year extent with the exception of the north western corner of the new Beer Processing Building. Section 13 describes issues relating to flooding in further detail.

5.3.2 Auburn Council Development Control Plans

Industrial Areas Development Control Plan 2000

Auburn Council's *Industrial Areas Development Control Plan 2000* applies to land zoned 4(a). It establishes a number of objectives, performance criteria and development standards for the following:

- Streetscape and urban character: The proposed upgrade will not affect the streetscape or urban character surrounding the brewery. Existing views to the brewery will not be altered to any great extent. The most significant change to the viewscape is the addition of the new 25 m high stack. The visual impact of the new stack is assessed in Section 16. The proposal is not inconsistent with any of the relevant performance criteria or development standards relating to streetscape and urban character.

- Building form: The form of the new buildings will be consistent with the character of the existing brewery site and industrial setting in the locality. The new Beer Processing Building will be lower than the existing brewhouse building. The new BBT Cellar will be less than 6 m high. The BBTs will, however, protrude from the top of the BBT Cellar building, by approximately 11 m. These tanks are consistent with the existing structures at the brewery, which include fermentation and maturation tanks, and silos. Architectural façade treatments will be incorporated into the detailed design of the new buildings, however, the final architectural and façade treatments have not yet been finalised.
- Access and car parking: See Car Parking and Loading Development Control Plan.
- Landscaping: Landscaping is currently provided for the existing frontages and visible areas of the brewery. It is not proposed to alter this landscaping. The proposed new buildings are within the operational part of the brewery and will not be visible at ground level to anyone off site. It is not proposed to provide any specific landscaping.
- Operational restrictions: The objective of the proposed upgrade is to improve the efficiency of the brewery. This will reduce the amount of raw materials (such as energy, gas, water and grain) used at the brewery per unit of beer produced and will reduce the amount of waste generated. Sections 7 to 18 provide an environmental assessment of the proposed upgrade and conclude that there are negligible off site environmental impacts.
- Subdivision: The proposal does not include subdivision.

Car Parking and Loading Development Control Plan 2000

There are 385 existing off-street car parking spaces at the brewery to cater for approximately 200 existing site employees and contractors. In addition, there are 37 car parking spaces for visitors. It is not proposed to change the number or type of off-street car parking, or loading facilities at the brewery site.

Stormwater Drainage Development Control Plan 2000

The new works are generally outside the 1 in 100 year flood extent with the exception of the north western corner of the new Beer Processing Building. However, comparison of the flood levels to the existing ground levels shows that the loss of flood storage would be negligible.

As discussed in Section 14, any modifications to the stormwater system to accommodate the new buildings and structures will be designed and installed, where possible, in accordance with Council's Stormwater Drainage DCP.

5.4 Tooheys Existing Development Consents

There are seven existing development consents that have been issued by Auburn Council that currently have effect over parts of the brewery.

These previously approved developments relate to upgrades of specific pieces of process equipment and associated building modifications at specific locations across the brewery site. They generally contain limited or no consideration of the entire site operations.

Existing development consents issued by Auburn Council are listed in Table 5, and are provided in Appendix A. As part of the site wide approval being sought, these existing development consents would be rescinded.

Table 5 Existing Development Consents

Reference	Determination Date	Description of Development
DA 270/2006	31/08/06	Construction of CO_2 tank.
DA 92/2006	30/05/06	Construction of 4 maturation tanks. Extension of existing cooling tower platform to accommodate cooling tower and CO_2 condenser. Construction of new platform and enclosure for new CO_2 balloon on roof of existing engine room.
DA 20/2006	12/04/2006	Construction of new link bridges between two existing buildings (the can hall and the bottling hall) for equipment and materials transfer systems.
DA 402/04	20/09/04	Two new mini fermenters and water filter vessel located beside the brewhouse with associated concrete slab works.
DA 215/04	02/09/04	Construction of 6 malt silos and 3 fermenters.
DA 544/03	22/12/03	Erection of platform on the warehouse roof and installation of cooling towers.
DA 284/96	21/5/1997	Car parking, canopy extension and dispatch office.

5.4.1 Conditions of Council's Development Consents

A summary of the conditions imposed by Auburn Council in the various development consents issued for the brewery is provided in Appendix A. The Appendix splits the conditions into two categories. The first category includes conditions that relate to:

- certification (e.g. the requirement to obtain a Construction Certificate or an Occupation Certificate);
- construction (e.g. construction hours, construction management plans, or erosion and sediment control during construction); and
- other pre-operational requirements.

It is considered that these conditions are generally not relevant to the current operations of the brewery.

The second category includes those conditions that relate to the on-going operational activities at the brewery. Some of these conditions remain relevant and some not. A discussion of these conditions is provided in Table 6 below.

In addition, a number of conditions are considered to be impractical or unacceptable to Tooheys. These conditions are also identified in the Table 76. Removal or modification of these conditions as part of the Minister's approval would better reflect the upgraded brewery operations.

Table 6 Relevant Conditions of Existing Development Consents

Condition No.	Summary of Condition	Discussion and relevance
DA 270/2006		
20	Sufficient supplies of absorbent materials must be stored on site to recover liquid spillage. Spilled liquids to be cleaned up using dry methods and the used materials to be disposed of to an appropriately licensed waste facility.	This condition is unnecessary. Tooheys have in place a first flush system to catch liquid spills and direct to trade waste. Tooheys are currently implementing a Spill Containment Action Plan to reduce risk of spilled liquids entering the stormwater system.
21, 22, 23	Must comply with the POEO Act in relation to air emissions, odour and water pollution.	These conditions are unnecessary. Compliance with the POEO Act is a statutory requirement.
DA 92/2006		
14	Stormwater to be discharged to the existing system.	This condition remains relevant.
16	Cooling Tower System maintenance and operations manual to be available on site. The manual must comply with requirements contained in AS/NZS 3666.2:1995.	This condition remains relevant.
DA 544/03		
15	Mechanical ventilation systems (MVS)/cooling towers a. MVS must comply with Australian Standard AS1668.2 – 1991; b. design, install and maintain cooling tower in accordance with requirements set out in the Public Health (Microbial Control) Regulation 2000 and AS/NZS 3666.2: 1995; c. all waste water from the cooling tower/humidifier/evaporative cooler/warm water system to be discharged to sewer under a Trade Waste Agreement.	Condition 15a and the part of condition 15b that relates to design and installation is not relevant as it does not relate to ongoing operations matters. Condition 15b as it relates to maintenance remains relevant. Condition 15c remains relevant.

Condition No.	Summary of Condition	Discussion and relevance
17	Cooling Tower System maintenance and operations manual to be available on site. The manual must comply with requirements contained in AS/NZS 3666.2:1995.	This condition remains relevant.
DA 284/96		
4	Construct and use the loading area in a manner that meets noise reduction of 5 dBA (activity within/near the entrance of loading docks) and 10dBA (activity within the loading dock area).	This condition is impractical. The condition requires a reduction of noise, however it does not set a background noise or a final noise reduction goal. Tooheys are bound by the noise limits in the Environment Protection Licence (EPL) and it is considered that the development approval and the EPL should be consistent.
5	All trucks must use the Percy Street access to enter and leave the premises between 8:00pm and 6:00am on any day.	This condition is inappropriate. During construction all operational brewery vehicles will be required to use Nyrang Street. Once construction is finished some heavy vehicles will still be required to use Nyrang Street at night time. It is considered that new conditions relating to traffic regulation should be applied as part of the Minister's development approval, to reflect the existing and upgraded brewery.
9	All vehicles to enter and leave the site in a forward direction.	This condition remains relevant.
10	All deliveries to and from the site shall be from vehicles standing within designated loading areas.	This condition remains relevant.
11	All company and/or commercial vehicles shall be parked within the site.	This condition remains relevant.
12	All ingress/egress shall be in accordance with the submitted site plan.	This condition remains generally relevant, however, it is considered that new conditions relating to traffic regulation should be applied as part of the Minister's development approval to reflect the existing and upgraded brewery.
13	Maintain existing landscaped areas to satisfaction of Council.	This condition is unnecessary as the Council is no longer the consent authority.

Condition No.	Summary of Condition	Discussion and relevance
16	All goods, material and the like are to be stored within the building.	This condition is unnecessary and irrelevant. Throughout the site there are goods and materials that are stored outside of buildings but in appropriately designated areas.
18	No direct sale or display of goods to the general public is permitted.	This condition remains relevant.

5.5 Current Development Application for Distribution Centre

Bevchain has lodged a development application with Auburn Council for a distribution centre on an adjacent site.

The site for the proposed distribution centre is located to the west of the brewery, on the western side of Haslams Creek, and is land owned by Lion Nathan. This distribution centre site is bounded by Percy Street on the north-western side, St Hilliers Road Branch Channel to the south and Haslams Creek Channel to the east and would have street access solely via Percy Street.

The Bevchain distribution centre proposal includes the following:

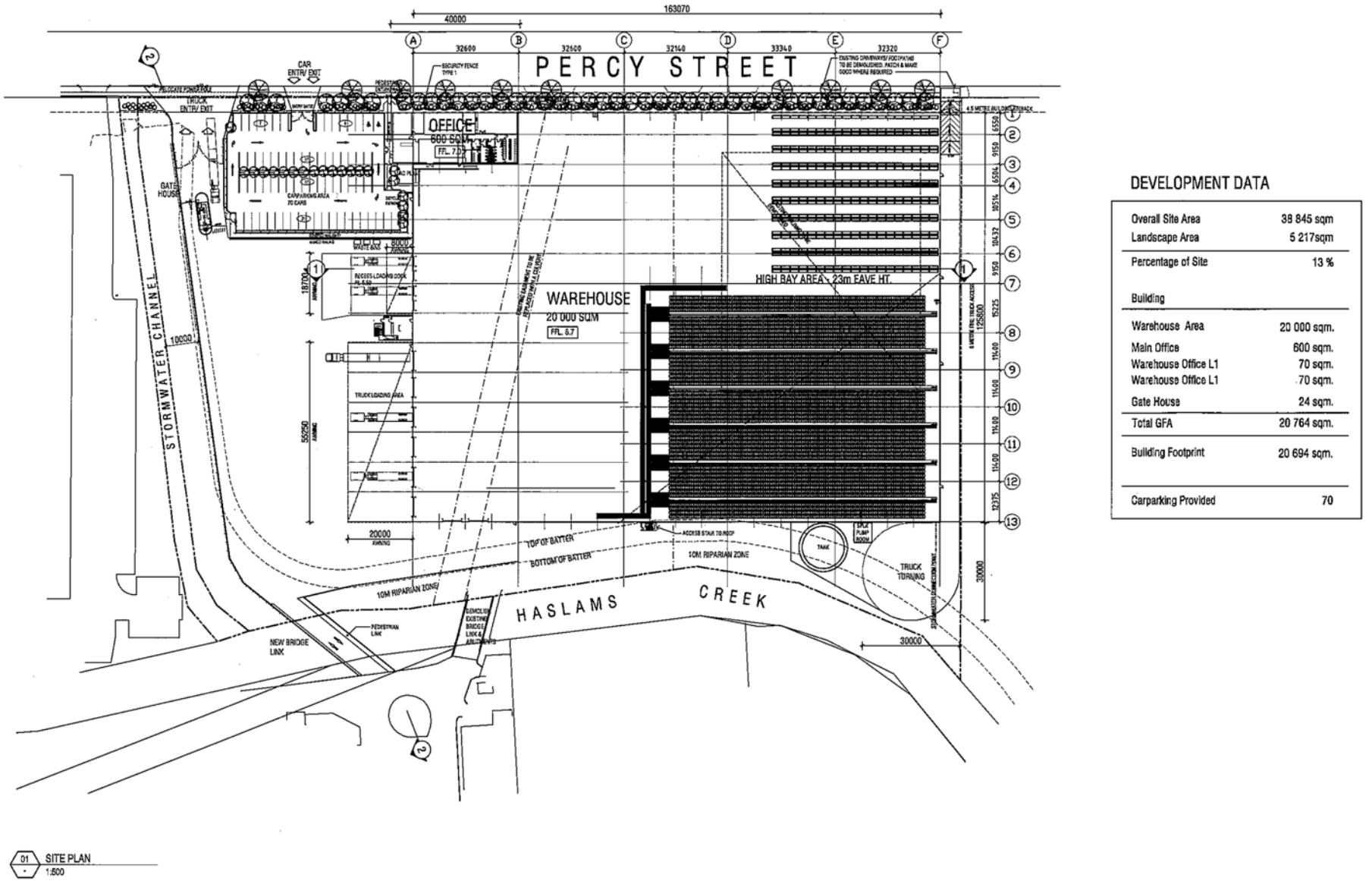
- The demolition of all existing buildings and ancillary structures on the site.
- The construction and use of a warehouse distribution facility with ancillary office, including internal warehouse racking and office fit-out, the installation of infrastructure, internal driveways, landscaping, external lighting, carparking, gate house and fencing. The warehouse facility will have a total gross floor area of 20,764 m^2 predominantly comprising the warehouse with approximately 20,000 m^2.
- The relocation and realignment of a bridge over Haslams Creek providing access over the channel and connection of the site with the Tooheys brewery site.

Figure 16 illustrates the site layout of the distribution centre site and shows its orientation in relation to the brewery site. The figure is reproduced from the Statement of Environmental Effects that was lodged with Auburn Council for the project.

The Bevchain warehouse is to operate independently of the brewery for a range of Lion Nathan products, including wine and Ready To Drink products, manufactured at a range of Lion Nathan facilities throughout Australia. The proposed distribution centre is not part of the proposed brewery upgrade and will distribute products from other manufacturers.

Construction of the Bevchain distribution centre is programmed to commence in early 2007, and there will likely be programming and staging issues associated with potential access implications via Percy Street during this time. It is expected that the distribution centre will be completed prior to the completion of the brewery upgrade works.

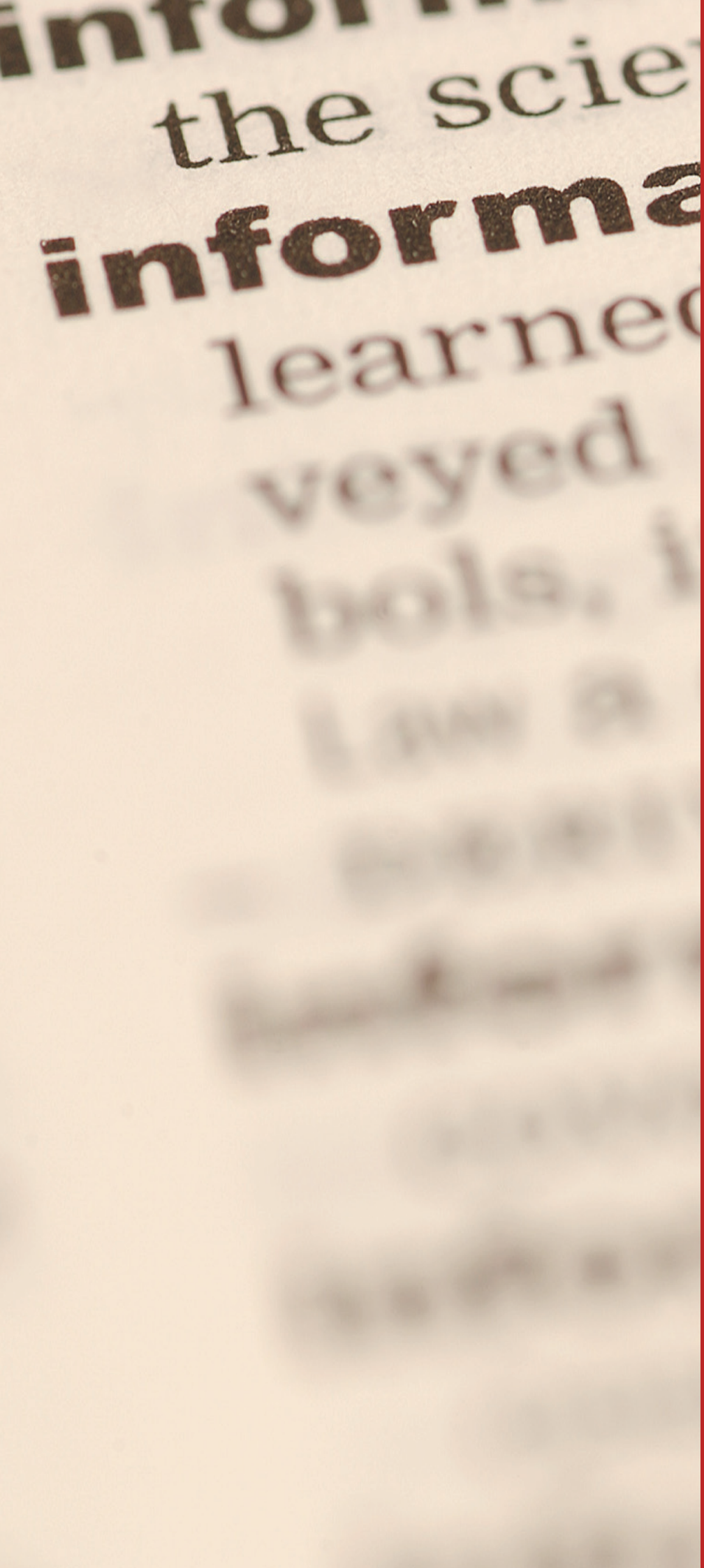
Once it is completed, some products from the Tooheys brewery will also be warehoused within this distribution centre, transferred by an internal road and new bridge across Haslams Creek. The co-location of the distribution centre adjacent to the brewery will significantly reduce the number of heavy vehicles that currently leave the brewery via Nyrang Street, since these products will be dispatched via the new gatehouse on Percy Street as part of the distribution centre operations.



DEVELOPMENT DATA

Overall Site Area	38 845 sqm
Landscape Area	5 217sqm
Percentage of Site	13 %
Building	
Warehouse Area	20 000 sqm.
Main Office	600 sqm.
Warehouse Office L1	70 sqm.
Warehouse Office L1	70 sqm.
Gate House	24 sqm.
Total GFA	20 764 sqm.
Building Footprint	20 694 sqm.
Carparking Provided	70

Figure 16 Bevchain Distribution Centre



Chapter 6

Consultation

6 Consultation

6.1 Consultation with Government Agencies

A planning focus meeting (PFM) was held on 18 October 2006. Representatives from the Department of Planning, the Department of Environment and Conservation and Auburn Council were represented at the PFM, and had been provided a copy of the Preliminary Environmental Assessment to review prior to the PFM.

The purpose of the PFM was to introduce the relevant Government agencies and Council to the proposal, and to formally commence the environmental planning and assessment process. The PFM provided an opportunity for the project to be presented to the agencies and for the agencies to inspect the brewery site and ask questions about the proposal.

Based on the outcomes of the PFM, a number of issues were raised by the agencies and by Council. The agencies and Council were provided with additional time to consider the project, and to submit written comments to the Department of Planning for consideration while preparing the Director-General's Environmental Assessment Requirements DGEARs.

The DGEARs were received on 4 December 2006 and are attached in Appendix C along with a copy of the correspondence provided from the DEC and Auburn Council. The appendix also provides a table which details the general and specific requirements within the DGEARs as well as the issues by the DEC and Auburn Council, and identifies where the issues have been addressed in the Environmental Assessment.

Subsequent to the receipt of the DGEARs, discussions were held with DoP, DEC and Auburn Council to clarify the nature of the assessment that would be necessary.

6.2 Community Consultation

A public information brochure was delivered to nearby residences, which included a brief description of the proposed upgrade, an invitation to view the Preliminary Environmental Assessment and details on how to make comments on the proposed upgrade. A freecall telephone number and email address were established to allow people to contact the project team for further information or raise concerns regarding the project. Additionally, copies of the Preliminary Environmental Assessment report were made available for the public to view at the brewery's main office. A copy of the information brochure is provided in Appendix B.

No responses were received from the local community in relation to the project.

6.3 Identification of Important Issues

6.3.1 Local Community

Tooheys have an established communication and environmental complaints procedure to handle issues raised by the community and agency stakeholders. This present system has been in place since 1997 and provides a mechanism for registering complaints and recording resolution and consultation outcomes.

A review of the register shows that issues raised by community members tend to be concentrated within a 500 metre radius of the site and complainants are located to the east of the brewery. Issues in the past have tended to focus on noise and odour. Tooheys maintains an open dialogue with concerned residents and investigates all complaints.

A review of Tooheys complaints register has also been undertaken to ensure the key issues of concern for the local community have been considered as part of the Environmental Assessment.

Since 1997 there have been 16 complaints made from 11 individual local residents, mostly from residents in Goreen Street, Frampton Street and John Street. Complaints generally related to noise and odour, with one complaint regarding pests. A summary of the key issues raised in noise and odour complaints is provided below.

Noise

- 9 complaints.
- Night time operational and traffic noise.
- Alarm noise.
- Noise from keghall.

Odour

- 6 complaints.
- Particularly strong malt/ mashing/ brewery smell occurs regularly.
- Odour on corner Boronia Street and Nyrang Street.

6.3.2 Agencies and Council

The agencies' key issues associated with the proposed brewery upgrade have been identified based on the outcomes of the PFM, the DGEARs and correspondence from the DEC and Auburn Council. A summary of the key issues that have been identified by the agencies is provided in Table 7.

Table 7 Environmental Assessment Requirements

Issue	Stakeholder	How / Where Addressed in EA
Consolidation of Planning Approvals		
Investigate the feasibility of consolidating the existing planning approvals for the operation into a single planning approval.	DoP	Tooheys is seeking to consolidate its existing development consents. Section 5.5 summarises existing conditions of development consent.
Air Quality		
Air, Odour and Greenhouse Gas Emissions	DoP	Air Quality, Section 10 and Appendix F Odour, Section 11
Conduct an air quality impact assessment in accordance with the requirements of the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, August 2005.	DEC	
Assessment of potential odour impacts and detail how potentially offensive odour will be eliminated at any sensitive receptor locations.	DEC	
Noise		
Construction noise, Operational Noise and traffic Noise	DoP	Section 12 and Appendix G
Include a noise assessment in accordance with the INP inclusive of industrial noise from the premises.	DEC	
Contamination		
Assessment of the potential soil and ground water impacts of the project.	DoP	Section 9 and Appendix E

Issue	Stakeholder	How / Where Addressed in EA
Description of the measures that would be implemented to remediate any contamination on site		
Include assessment of existing and potential soil and water groundwater contamination arising from the removal of UST on the NE site boundary in accordance with the EPA *Guidelines for Assessing Service Station Site* (1994). Outline a strategy for managing contaminated soil from the UST removal.	DEC	
Contamination investigation and assessment.	Council	
Hazards and Risk		
A preliminary hazards analysis as required by SEPP 33.	DoP	Section 8 and Appendix D
Soil and Water		
Detailed water balance. Assessment of the potential surface water impacts A detailed erosion and sediment control plan (ESCP) for the proposed construction works.	DoP	Surface Water Section 14. An indicative ESCP is provided in Appendix I.
Address how surface and stormwater will be managed on site during and after the upgrade works.	DEC	Tooheys has been working with Sydney Water on several water saving initiatives through the every drop counts programme. Process water will reduce from 3.8 to 3.5 kL/kL of beer. See also Sections 2.4.6, 3.1.6 and 4.2.
Details of water quality and quantity (on site detention) and water re-use.	Council	
Describe and assess measures to minimise water use on site (i.e. water recycling/ conservation measures).	DoP, DEC	
Council requests that rainwater tanks be considered for use in relation to irrigating landscaped areas an washing down areas etc.	Council	
Flooding		
Assessment of the potential flooding impacts.	DoP	Section 13 Equipment or materials will not be located within 10 m of Haslams Creek.
No equipment, materials of temporary buildings should be located within 10 m from Haslams Creek.	Council	
Traffic		
Including construction and operational traffic.	DoP	Section 15 Construction traffic for the upgrade will not use Percy Street and is not expected to require closure of any Council roads.
An intended work time frame for Tooheys upgrade and distribution centre and how the sites relate to each other, particularly regarding construction traffic.	Council	
Construction management schedule which details proposed vehicular routes in surrounding streets, proposed work hours and delivery times and any likely obstruction to Council roads.	Council	

Issue	Stakeholder	How / Where Addressed in EA
Other issues		
Heritage impacts on Haslams Creek.	DoP, Council	Section 17
A detailed management plan for removal of any lead and asbestos which complies with Australian Standards, WorkCover and other relevant requirements. Outline a strategy for managing asbestos and/or lead wastes if discovered in building material to be demolished or upgraded.	DEC, Council	Section 3.2.3 Asbestos waste will be avoided.
Confirm that the proposed upgrade will eliminate the future generation of potentially odorous kieselguhr waste.	DEC	The feasibility of membrane technology is being investigated however kieselguhr technology may need to be retained if the membrane technology is unproven.

PART B

Environmental Assessment

Chapter 7

Environmental Risk Analysis

7 Environmental Risk Analysis

The environmental assessment as presented below provides an assessment of the changes to the brewery site, as they are described in Section 3 within the context of the existing site and operations as described in Section 2. The assessment is based on an unchanged production rate of 3.3 million hl per annum which represents the maximum output based on a five day week.

Table 8 presents a summary of the potential environmental impact associated with all relevant issues associated with the brewery upgrade. The table also assigns a level of significance to each issue based on the extent and likelihood of:

- potential impact with consideration of mitigation or management measures; and
- potential community or regulatory concern.

The three levels of significance are:

High environmental significance:	A high likelihood of adverse environmental impact or the potential environmental impact is of a severe nature. These issues are key decision making factors, and require detailed and specific investigations to adequately characterise the nature of the impact and to determine appropriate mitigation or management measures which may still result in significant residual impact.
Moderate environmental significance:	Some likelihood of adverse environmental impact however the potential environmental impact is predicted to be of a manageable nature. These issues are likely to be important decision making factors, and may require investigations to characterise the nature of the impact. Non-standard mitigation and management measures, or special tailoring of standard measures, are likely to be required to ensure impacts are minimised to acceptable levels.
Low environmental significance:	Low likelihood of adverse environmental impact and the potential environmental impact is negligible or of a manageable nature. These issues are not likely to be key decision making factors, and are unlikely to require investigations. Standard mitigation and management measures may be applied.

No issues of high environmental significance have been identified. This reflects the fact that the project is an upgrade to an existing development to improve the efficiency of the brewery. There are expected to be beneficial environmental outcomes resulting from the proposed upgrade including decreased resource consumption (energy and water), reduced waste generation and improvements in pollution control equipment and procedures.

Issues that were considered to have moderate environmental significance were taken forward for more detailed assessment. Table 8 briefly describes the nature of the additional assessment, and where the details of that assessment are located within the report.

Where there was considered to be a low environmental significance in relation to an issue, no further assessment has been provided and a brief summary of the proposed management measures is provided.

Table 8 Environmental Risk Analysis

Issue	Potential Environmental Impact	Further Assessment
Hazards and Risk	For sodium hydroxide, carbon dioxide, phosphoric acid, hydrogen peroxide, peryoxyacetic acid, hydrogen peroxide, LPG and liquid oxygen there will be no change in quantity for the proposed site after the upgrade. Ammonia will continue to be stored and used at the brewery after the proposed upgrade. As a result of the proposed upgrade, however, there will be a net reduction in the total quantity of ammonia stored and handled at the site, from approximately 15 tonne to 11 tonne. Ammonia will be replaced by glycol (30wt% propylene glycol), which is currently used at the site and is not a dangerous good. **Moderate environmental significance.**	**More Detail Provided in Section 8 and Appendix D.** A semi-quantitative analysis of the current risk associated with site is provided. The risk analysis details the types and locations of dangerous goods stored and the potential off site risks associated with those materials.
Contamination	Petroleum hydrocarbon contaminated soil and groundwater has been identified on site. This is consistent with the historical and current industrial use of the site including historical underground fuel storage. The soil contamination identified was limited to hard stand locations which will not be disturbed during the upgrade. The groundwater contamination was not identified to be migrating off site. **Moderate environmental significance**	**More Detail Provided in Section 9 and Appendix E.** Assessment includes a review of site history, and sampling and analysis of soil and groundwater in locations that are to be affected by the upgrade.
Air Quality	Total emissions to air will reduce as a result of new boilers with improved efficiency and lower generating capacity, and lower natural gas consumption. Emissions at heat peak load will slightly increase. Reduction of stack height from 50 m to a minimum of 25 m and relocation of stack will affect plume dispersion. Reduced production losses and improved operating efficiencies anticipated as a result of the upgrade will contribute to a reduction in fugitive emissions. **Moderate environmental significance.**	**Further Assessment Provided in Section 10 and Appendix F.** Assessment includes consideration of *Protection of the Environment Operations (Clean Air) Regulation 2002.* Dispersion modelling has been carried out for CO, NO_2 and PM_{10} in accordance with *DEC Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*.

Issue	Potential Environmental Impact	Further Assessment
Odour	The largest potential source of odour from the brewery is the evaporation of volatile organic compounds derived from mashing grain and hops during wort boiling within the brewhouse. Odour was previously an issue for the brewery, being the subject of six community complaints. A number of management measures have been employed to minimise odour from the brewery, including use of a vapour condenser for brewhouse emissions. Odour from the brewhouse will not change as a result of the proposed upgrade. **Moderate environmental significance.**	**More Detail Provided in Section 11.** Assessment details historical odour issues at the brewery, as well as management measures that have been implemented to minimise odour emissions.
Noise	Residences along Nyrang Street represent sensitive noise receivers. There have previously been nine community complaints associated with noise impacts from nearby residences. The buildings at the site that provide the dominant noise source from the Tooheys plant are the warehousing and truck loading buildings at the front of the site. These buildings also provide significant shielding from mechanical plant noise sources from the operational areas of the brewery, so that mechanical plant does not significantly influence existing noise levels at the residences. Changes to noise impacts from the proposed upgrade are expected to be negligible as the upgrade only relates to changes in mechanical plant which are generally limited to indoor operations. Any changes are expected to be beneficial. **Moderate environmental significance.**	**More Detail Provided in Section 12 and Appendix G.** A noise assessment of the proposed upgrade has been undertaken for each proposed change. This includes construction noise and vibration.

Issue	Potential Environmental Impact	Further Assessment
Flooding	Haslams Creek, which runs parallel to the north-western boundary of the site, is the main flood channel for the catchment area. There is an existing concrete bridge crossing Haslams Creek which has the potential to obstruct Haslams Creek flood waters. The development of the distribution centre on an adjacent site includes replacement of the bridge over Haslams Creek and will modify the flood regime in the area. There have been several flood studies commissioned in relation to Haslams Creek, including two dimensional flood modelling. The proposed new Beer Processing Building is more than 75 m away from the Haslams Creek channel centreline. There will be a negligible increase in terms of the volume of runoff and peak flow generated as a result of the proposed upgrade. The upgrade will not change or impact on the current overland flow paths regime. **Moderate environmental significance.**	**More Detail Provided is in Section 13.** Assessment includes: • review of two dimensional modelling previously undertaken for the adjacent distribution centre site by Buckton Lysenko Consulting Engineers; • identification of flooding impacts to the new buildings and structures that are part of the proposed upgrade; and • potential for proposed upgrade to alter flooding regime.
Stormwater	Contaminated stormwater runoff from the brewery represents a risk that is continually being addressed by Tooheys. Increased automation and improved systems are part of a plan to lower risk of stormwater contamination. Tooheys have a first flush system that diverts potentially contaminated stormwater to trade waste. The proposed upgrade does not include structures or buildings that would be expected to significantly alter overland flows or the amount of or quality of stormwater runoff. **Moderate environmental significance.**	**More Detail Provided is in Section 14.** The assessment details the existing first flush system, and the other measures that are being implemented to reduce the risk of stormwater contamination, especially from the tank farm. The assessment includes estimation of changes to stormwater flows.

Issue	Potential Environmental Impact	Further Assessment
Traffic	Approximately 345 vehicles access the site daily. These include B-Doubles, semi-trailers and rigid trucks, with heavy vehicles making up approximately 95 per cent of vehicles accessing the site. Heavy vehicles currently access the site via the main gate on Nyrang Street, or the secure entrance on Percy Street. Nyrang Street is bounded on one side by residential dwellings whereas Percy Street is entirely within the industrial estate. As it is not intended to increase the total capacity of the brewery, no increase in traffic generation is anticipated. Furthermore, the new distribution centre will reduce the number of heavy vehicles accessing the Tooheys brewery site via Nyrang Street. The brewery site currently has 385 parking spaces for employees and contractors, to cater for approximately 200 employees, as well as 37 parking spaces for visitors. No increase in staffing levels is anticipated. **Moderate environmental significance.**	**More Detail Provided in Section 1 and Appendix H.** Assessment includes identification of traffic levels accessing the site, and the performance of key intersections in the vicinity of the site. Assessment considers construction issues associated with staging and potential conflict between construction and operational vehicles.
Visual	The Tooheys brewery has a number of landmarks of significance within the local townscape, including the concrete water tower, the boiler stack and the malt tower with the Tooheys logo. From Nyrang Street the site is dominated by the warehousing, packaging and administration buildings, as well as the car parking areas. The upgrade does not affect these buildings that create the Nyrang Street frontage. While they are in keeping with the existing structures and buildings at the brewery site the new stack and buildings will be visible from certain locations in the vicinity of the site. In particular, the new stack is potentially sensitive from a visual impact perspective. **Moderate environmental significance**	**More Detail Provided in Section 16 and Appendix J.** The visual impact assessment identifies the visual impact for a range of views based on whether any of the new structures or buildings can be seen and the sensitivity of the view location.

Issue	Potential Environmental Impact	Further Assessment
Heritage	The Wangal clan of the Eora Aboriginal tribe were the original inhabitants of the Auburn area. The site has, however, been significantly modified and it is unlikely for Indigenous artefacts to remain. The brewery site forms part of a site occupied by the Sydney Meat Preserving Company between 1869 and 1955. The *Auburn Heritage Study* (Schwager, 1996) identified the meat preserving works site as being of archaeological significance, however, the buildings and structures have been removed and the ground surface disturbed. The site is not formally identified in Auburn Council's register of archaeological sites and potential archaeological sites. The canalisation of Haslams Creek, running along the western boundary of the site, is a non-Indigenous heritage item of local significance, listed in Schedule 2 of the Auburn LEP. None of the works will physically impact upon the canalisation of Haslams Creek. Council, DEC and the DoP have specifically requested detailed consideration of potential heritage impacts. **Low environmental significance.**	**More Detail Provided in Section 17.** Assessment includes consideration of the Statutory consideration of Haslams Creek under Auburn LEP is provided in Section 5.3.1. Management measures included in the draft Statement of Commitments include: • Ensuring that contractors are suitably aware of the potential for heritage items to be discovered during construction works. • If a relic is uncovered during works, notice will be give to the appropriate Authority and the relevant permits obtained.
Flora and Fauna	A search of the NSW Government's BioNet database was carried out in September 2006. There are no previous recordings of any threatened species on the site. Threatened fauna species have been recorded mainly to the north of the site in the vegetated areas between Olympic Park and Homebush Bay (especially the waterbird refuge adjacent to the bay). Other locations where threatened species have been recorded are south of the site, adjacent to the railways lines, and nearby to or within the Rookwood Cemetery. Some trees that have previously been planted for landscaping would be removed or relocated for the new Beer Processing Building. The upgrade is within the operational part of the brewery and would not impact the vegetated areas on the south western side of the site and along Haslams Creek. **Low environmental significance.**	**No Further Assessment – Flora and Fauna issues were also described in the Preliminary Environmental Assessment.** No management measures proposed.

Issue	Potential Environmental Impact	Further Assessment
Waste Management	The project will require demolition of existing buildings and disposal of demolition waste and old process equipment. Although much of the asbestos has been removed from site, asbestos may be encountered during demolition. Operational waste is currently stored at locations across the site as well as within a waste compound located adjacent to the Percy Street entrance on the western side of Haslams Creek. Tooheys currently recycle plastic, glass and cardboard and sell aluminium, waste beer and kieselguhr waste to third parties. The upgraded brewery will not produce an increase in waste volumes or generate any new waste types. Increases in production efficiency and reduction in product loss will likely result in a decrease in total waste. If membrane filtration is selected, approximately 280,000 kg/annum dry weight kieselguhr waste will be eliminated. Waste generated from the membrane filtration technology would be less than for the kieselguhr filtration. **Low environmental significance.**	**No Further Assessment – Waste was also described in the Preliminary Environmental Assessment.** Management measures included in the draft Statement of Commitments include: • A construction waste management plan. • An operational waste management plan to ensure waste is managed, handled, transported and disposed of in accordance with the guidelines. • Asbestos removal and disposal to be undertaken by an accredited contractor.
Energy Consumption	Energy requirements for the brewery are supplied by grid electricity, natural gas fired boilers for heating and small amounts of LPG for on site vehicles. The specific electricity consumption for is currently 10.5 kWh/hl of beer and it is proposed to reduce this to 9.0 kWh/hl as a result of the efficiency improvements at the brewery. The specific natural gas consumption is currently 82.7 MJ/hl of beer and it is proposed to reduce this to 70 MJ/hl as a result of the efficiency improvements at the brewery. **Low environmental significance.**	**No Further Assessment – Improving energy efficiency is an objective of the proposal, and is discussed in additional detail in Section 4.2.** No management measures proposed.
Water Consumption	Water is supplied to the site by a Sydney Water mains connection from Nyrang Street. The brewing process is responsible for 73% of water consumption on site. The current ratio of water consumption to beer production is 3.84 kL/kL. The proposed process upgrades are anticipated to result in water consumption of 3.5kL/kL. **Low environmental significance.**	**No Further Assessment – Improving water efficiency is an objective of the proposal, and is discussed in additional detail in Section 4.2.** No management measures proposed.

Issue	Potential Environmental Impact	Further Assessment
Socio-Economic	The site forms part of a larger industrial cluster surrounded by the residential suburbs of Lidcombe and Auburn. To remain viable in the competitive market, the brewery requires the proposed upgrade. At present, much of the process equipment, particularly the utility services at the brewery are inefficient adding significant costs to brewery operations. The upgrade would increase the efficiency of the brewery, but would include a net reduction in employment. The proposed upgrade works will employ a number of on site construction management, workers and contractors. **Low environmental significance.**	**No Further Assessment – Improving the overall viability of the brewery is an objective of the proposal, and is discussed in additional detail in Section 4.2.** **Socio-economic issues were also described in the Preliminary Environmental Assessment.** Tooheys intends to minimise impacts to affected permanent staff by providing measures such as voluntary redundancy arrangements, provision of independent financial advice and redeployment assistance for those who wish to consider leaving the business.

Chapter 8

Hazards and Risks

Summary

Current Operation and Performance:

Dangerous goods are currently stored at the site. These include ammonia, sodium hydroxide, carbon dioxide, phosphoric acid, hydrogen peroxide, peryoxyacetic acid, hydrogen peroxide, LPG and liquid oxygen.

The release of ammonia is identified as a key hazardous event which would have potential offsite impacts.

Proposed Upgrade/Changes:

There will be no new dangerous goods stored or handled at the site.

Ammonia will continue to be stored and used at the brewery after the proposed upgrade.

The proposed upgrade will reduce the total quantity of ammonia stored and handled at the site, from approximately 15 tonnes to 11 tonnes.

Ammonia will be replaced by glycol (30wt% propylene glycol), which is currently used at the site and is not a dangerous good.

Potential Impacts:

It is unlikely that the proposed upgrade will increase risks or impacts associated with dangerous goods and/or hazardous events, and will more likely reduce such risks.

Statement of Commitments:

Commitments to minimise or manage potential impacts associated with dangerous goods and/or hazardous events include:

- the area around the LPG tank will be kept free from dry vegetation and wooden pallets;
- deadman valves will be installed on all ammonia oil pot drain valves;
- a risk assessment will be performed on all parts of the storage and pumping systems for the CIP chemicals that are inconsistent with Australian Standard AS 3780;
- a HAZOP study will be performed on all modified process equipment, storage and handling systems; and
- the site emergency response plan and safety management systems will be updated.

8 Hazards and Risks

Section 8 summarises the risk assessment provided in Appendix D. The risk assessment calculates the level of risk that is currently presented to surrounding residences and businesses by the storage and use of ammonia at the brewery, and how this will change as a result of the proposed upgrade.

8.1 Baseline Conditions

8.1.1 Dangerous Goods

The brewery currently stores a range of dangerous goods, as listed below:

- sodium hydroxide;
- carbon dioxide (collected from fermentation and reused);
- anhydrous ammonia (used for refrigeration);
- phosphoric acid;
- hydrogen peroxide and peroxyacetic acid mixture;
- hydrogen peroxide;
- LPG (used for forklifts); and
- liquefied oxygen.

A detailed description of the nature, storage quantity and concentration of the dangerous goods is provided in Appendix D.

8.1.2 Transport of Dangerous Goods

On average, about once every three days there is a vehicle carrying potentially hazardous materials to the site, totalling approximately 135 vehicles per annum. The transport of dangerous goods is described below:

- bulk liquid road tankers – 10 per annum;
- ammonia deliveries – 14 per annum;
- trucks carrying intermediate bulk containers (e.g. CIP Chemicals) – 6 vehicles per annum; and
- LPG deliveries – 105 vehicles per annum.

8.1.3 Hazardous Events

In accordance with the requirements of the DoP's *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (HIPAP 6) hazardous events at the brewery have been identified. Appendix D provides a summary of all the hazardous events that were considered as part of the study, including:

- release of ammonia;
- release of LPG;
- building fires;
- dust explosion;
- explosion in boilers; and
- loss of containment of chemicals and other risks to watercourses.

The release of ammonia was identified as the key event with potential for off site impact. There are a number of possible causes for the release of ammonia, including failure of pipes, hoses, vessels instruments or compressor seals, as well as human error.

Releases of ammonia have the potential to cause irritation, injury or even death depending on the concentration of the dose and the time exposed. If the concentration is within the flammable range and if it is confined then ammonia can explode. There is also potential for aqueous ammonia (high pH) formation if water is used for absorption in the event of a release.

A risk analysis has been performed to ascertain the level of off site risk that is currently accepted from the brewery, considering both the risk of off site fatality and the risk of off site injury or irritation. This analysis relates only to the existing configuration of the brewery and is summarised below.

Fatality

Fatality risk has been modelled based on two representative events and the results compared against the risk criteria in the DoP's *Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning* (HIPAP 4). The two cases modelled were failure of the largest tank (3,760 kg) and release from a 50 mm hole.

The modelling demonstrated that the fatality risk within the nearby residential and industrial areas was below the respective criterion, even without taking into consideration the probability of the necessary weather and wind conditions.

Injury and Irritation

To assess the cases that can lead to off site injury or irritation in residential areas, the Acute Exposure Guideline Levels (AEGLs) are used. There are three AEGLs, which are defined in detail in Appendix D, and summarised below:

- AEGL 1 relates to discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. AEGL 1 is taken to be the irritation impact.
- AEGL 2 relates to irreversible or other serious, long-lasting adverse health effects. AEGL 2 is taken for injury impact.
- AEGL 3 relates to life-threatening health effects or death.

The AEGLs for ammonia for various exposure times are shown in Table 9.

Table 9 Ammonia AEGLs

AEGL Level	AEGL Concentration, ppm		
Exposure	10 mins	30 mins	60 mins
AEGL 1	30	30	30
AEGL 2	220	220	160
AEGL 3	2,700	1,600	1,100

The modelling undertaken indicates that the large releases have the potential to cause off site irritation or injury.

Modelling of smaller releases also shows that off site ammonia concentrations exceed the low AEGL levels for 10 minutes exposure for most typical weather conditions. Given the complexity of the ammonia systems, it is unlikely that the frequency of releases will be as

low as the relevant criteria in HIPAP 4. However, these events can be easily mitigated by either site based response or from the NSW Fire Brigade.

8.2 Impact Assessment

8.2.1 Dangerous Goods

There will be no new dangerous goods stored or handled at the site as a result of the proposed site changes.

For sodium hydroxide, carbon dioxide, phosphoric acid, hydrogen peroxide, peryoxyacetic acid, hydrogen peroxide, LPG and liquid oxygen there will be no change in quantity for the proposed site after the upgrade.

After the proposed upgrade there will be a net reduction in the total quantity of ammonia stored and handled at the site from approximately 15 tonne to 11 tonne. Ammonia will be replaced by glycol, which is currently used at the site, and is not a dangerous good. Ammonia will continue to be stored and used at the brewery after the proposed upgrade because it will still be required to cool the glycol refrigeration system.

There will also be a reduction of ammonia deliveries by approximately 2 per annum. For delivery of other dangerous goods, there are no other changes associated with the proposed upgrade. Therefore, as off site transport risk is not increased because of this project and the current delivery frequency is relatively low, further analysis of transport risk has not been carried out.

8.2.2 Hazardous Events

With regard to potential release of ammonia from the ammonia refrigeration systems on site, the proposed upgrade will result in a net reduction in the quantity of ammonia used. Glycol will be used instead which is an inherently safer material and is not a dangerous good.

The use of glycol also reduces the scale and complexity of the ammonia refrigeration system since glycol will be reticulated through the plant instead of ammonia.. In particular, it is highlighted that all eight of the existing ammonia condensers will be replaced with only three new condensers as part of the upgrade.

Based on the reduction in the use and storage of ammonia at the brewery after the proposed upgrade, there is predicted to be a corresponding reduction in off site risk.

Since the level of off site risk associated with the upgraded brewery will be lower than the level of risk that is currently accepted, no additional analysis has been undertaken.

8.3 Management Measures

The following recommendations have been included in the draft Statement of Commitments:

- a construction safety plan;
- the area around the LPG tank will be kept free from dry vegetation and wooden pallets;
- deadman valves will be installed on all ammonia oil pot drain valves;
- a risk assessment will be performed on all parts of the storage and pumping systems for the CIP chemicals that are inconsistent with Australian Standard AS 3780;
- a HAZOP study will be performed on all modified process equipment, storage and handling systems; and
- the site emergency response plan and safety management systems will be updated to include the issues associated with the proposed site changes.

Chapter 9

Contamination

Summary

Current Operation and Performance:

Petroleum hydrocarbon contaminated soil and groundwater has been identified on site. This is consistent with the historical and current industrial use of the site including historical underground fuel storage.

The soil contamination identified was limited to hard stand locations which will not be disturbed during the upgrade.

The groundwater contamination was not identified in the network of boundary monitoring wells with the exception of the well located adjacent the former refuelling UST.

The silty clay in borehole 9 located adjacent to Haslams Creek is classified as Acid Sulphate Soil from a depth of approximately 8.0m below ground level.

Proposed Upgrade/Changes:

The proposed works would not result in increasing concentrations of contaminants in soils and groundwater. However, there is the potential for contamination to soil or groundwater caused by incidents including spills or leaks from fuel and chemical storage during the subsurface works.

Potential Impacts:

The proposed upgrade is unlikely to increase the risk of exposure to contamination with respect to human health or the environment.

Statement of Commitments:

Commitments to minimise or manage potential impacts associated with soil and groundwater contamination include:

- spoils management including stockpiling and disposal to a licensed landfill in accordance with NSW EPA Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes.
- procedures for minimising, managing and disposing (in accordance with the requirements of Sydney Water and/or NSW EPA Environmental Guidelines) of any groundwater accumulating in excavation pits will be developed;
- procedures for identification and management of unanticipated contaminated soil will be developed;
- the refuelling UST and associated pipe works and contaminated soil will be removed and validation soil sampling undertaken as part of BBT cellar construction;
- attenuation of hydrocarbon contamination will be monitored in the groundwater well adjacent the refuelling UST following its removal;
- the former boiler USTs will be decommissioned in situ including removal of residual water and fuel and refilling with inert material;
- an ongoing groundwater monitoring programme will be implemented for the network of boundary monitoring wells with contingency plans for processes/actions which may be adopted by Tooheys if contaminated groundwater is found to be migrating off site; and
- an ASS Management plan will be prepared prior to construction.

9 Contamination

Section 9 summarises the contamination assessment provided in Appendix E. The assessment includes analysis of soil investigations which were targeted at:

- locations where ground conditions are likely to be impacted by the proposed upgrade, namely in the location of the new Beer Processing Building, the BBTs and the new boiler stack; and
- locations associated with known underground fuel storage tanks.

Groundwater sampling and analysis targeted potentially contaminated areas as well as boundary conditions to assess the potential for off site impacts.

9.1 Baseline Conditions

9.1.1 Geology and Hydrogeology

Subsurface conditions typically consist of fill material to varying depths up to 1.5m over residual soil to approximately 6 metres below ground level.

Various subsurface investigations have been undertaken on site including geotechnical and environmental assessments. These investigations indicate that the site soil consists of alluvial and residual clay to groundwater level, with underlying shale.

The results of the geotechnical investigation undertaken as part of the upgrade (*Arup, Tooheys Brewery Upgrade: Geotechnical Interpretative Report, November 2006*) indicate that subsurface conditions typically consist of concrete to a depth of 0.15 to 0.18 metres below ground level (mbgl) followed by a layer of fill material (0.3 m to 1.53 m thick) underlain by residual soil consisting of silty clay and then shale.

Groundwater investigations have also been undertaken as part of the geotechnical and contamination investigations for the proposed upgrade and indicate that groundwater is approximately 2.3 to 2.7 mbgl.

Groundwater investigations have revealed that there may be a localised groundwater ridge on site running in an approximately northerly direction, directing groundwater in an arc from the north west to the north east.

Acid Sulphate Soil (ASS) risk maps indicate that there is potential for ASS to be present on site, which may represent a risk to the environment where subsurface work is undertaken, especially within the vicinity of Haslams Creek.

9.1.2 Site History

A review of the history of the Tooheys brewery site was undertaken to identify potentially contaminating activities.

The present day Tooheys brewery site formed part of a larger land holding. Over the history of the area there have been a number of potentially contaminating activities corresponding to the changing development. The larger land holding has had three distinct phases of development with the reclamation of Haslams Creek before the 1950's, buildings and yards for meat processing (abattoirs) up to the 1960's and new buildings and hardstand from the 1970's (food processing and bottling).

Formerly the larger land holding was operated by the Sydney Meat Preserving Company which opened in 1869 and occupied a 146 acre site between Parramatta Road in the north and Haslams Creek Railway Station in the south. The company specialised in 'Apert's' method of preserving meat which refers to meat being boned, tinned and cooked in vacuum. Written descriptions and photographs of the site, including the area forming the larger land

holding, illustrate the majority of buildings were concentrated on the western side of Haslams Creek toward Parramatta Road.

When the Sydney Meat Preserving Company closed in 1955, the site was progressively reduced in size to 32 acres and the original modest collection of buildings grew to contain a number of industrial structures and stock yards. The construction of these structures is likely to have included importing of fill material.

From the 1960s the brewery site was used as a packaging and bottling facility until the commencement of actual brewing processes in 1978. The original brewhouse was formerly located on the grassed area to the north of the existing brewhouse.

9.1.3 Underground Fuel Storage

Seven decommissioned underground fuel storage tanks (USTs) have been identified as remaining in situ on the site.

Six of the USTs were installed over 30 years ago at the heating plant to supply heavy oil to the boilers including 5 x 45.3kL and 1 x 149.8kL USTs located to the immediate north of the engine room building (refer Figure 4). The USTs are reported to have been emptied 16 years ago, when the boilers were converted to natural gas. Site inspections revealed that the tanks are contain small amounts of residual fuel and water and remain in situ.

The seventh remaining UST located on the north eastern boundary of the site at the location of the proposed BBT Cellar was formerly used for storage of petrol for on site vehicle refuelling. This UST is reported to have been sand filled and capped approximately 20 years ago and remains in situ. This tank is to be removed as part of the scope of works for the upgrade.

9.1.4 Substations

The site is connected to mains electricity by three 11 kV incoming lines to an Energy Australia substation. The substation is connected to the brewery high voltage (HV) main distribution board in Substation 1.

The HV is supplied to 7 transformers in the utility centre and to 8 other transformers across the site.

Substations may be associated with polychlorinated biphenyl (PCB) contamination due to PCB based transformer oil which was historically used as a dielectric fluid in Australia particularly during the late 1970s.

9.1.5 Underground Services

The site is serviced by a network of underground services including tradewaste, sewer, electricity lines, cold water and natural gas. Underground service lines may be associated with contamination due to possible leaks from pipelines and the fill material with service trenches.

9.1.6 Dangerous Goods Storage

Tooheys currently store and use a number of dangerous goods with the potential to cause contamination in the event of leaks or spills, described in Section 8.1.1.

9.1.7 Previous Investigations

Contaminated land investigations have been undertaken as part of previous development applications submitted to Auburn Council for the brewery and adjacent site. These investigations included:

- a Phase 2 soil contamination assessment as part of the development application for the proposed distribution centre adjacent the brewery site to the west of Haslams Creek; and
- a soil contamination investigation as part of the development approvals process for the installation of an additional carbon dioxide tank at the CO_2 recovery plant on the brewery site located to the south of the engine room on the site boundary.

The results of the distribution centre investigation (off site) revealed elevated lead and total petroleum hydrocarbon (TPH) concentrations likely to be associated with a petrol UST and polynuclear aromatic hydrocarbon (PAH) contamination associated with fill material. No potential for ASS was identified.

The results of the CO_2 recovery plant investigation (on site) were all below the assessment criteria. Field observations reported fill material including igneous gravel, ironstone gravel, traces of ash, rootlets and PVC.

No groundwater investigations were carried out in either investigation.

9.1.8 Summary of Potential Contamination

Possible sources of contamination and associated contaminants identified during the desktop assessment are listed in Table 10.

Table 10 Potential Contamination Sources

Source	Potential Contaminants
Boiler USTs	Heavy metals, TPH, Benzene, Toluene, Ethylbenzene, Xylenes
Refuelling USTs	Heavy metals, TPH, Benzene, Toluene, Ethylbenzene, Xylenes
Unknown fill	Pesticides, PAHs, Heavy metals, TPH, Benzene, Toluene, Ethylbenzene, Xylenes, ASS
Former meat works	Volatile organic compounds, Heavy metals, TPH, Benzene, Toluene, Ethylbenzene, Xylenes
Brewery operations	Volatile organic compounds, Ethanol/methanol, Ammonia, Chlorinated alkalis, Heavy metals, TPH, Benzene, Toluene, Ethylbenzene, Xylenes
Substations	PCBs
Buildings and former building footprints	Asbestos, Heavy metals
Haslams Creek	ASS

9.1.9 Site Assessment

Soil and groundwater testing was undertaken by Douglas Partners during a 2-stage investigation in November and December 2006. These investigations are detailed in the reports attached to Appendix E.

The first stage of the investigation involved soil sampling at six targeted locations and groundwater sampling and analysis at three targeted locations. The second stage of the investigation included installation of a boundary groundwater monitoring well network at four locations in the inferred down gradient groundwater flow direction of the site and ASS testing. The locations of the sampling locations are shown in Figure 17.

Soil

The results of the soil sampling revealed the contamination concentrations below the adopted assessment criteria at all locations with the exception of boreholes 6b and 6c located adjacent to the former boiler USTs. TPH contamination was identified in these boreholes above the adopted assessment criteria as presented in Table 11.

Table 11 Soil Contamination Concentrations

Contaminant	Borehole ID	Location	Depth (mbgl)	Conc (mg/kg)	Assessment Criteria (mg/kg)
TPH (C_{10}-C_{36})	6b	Adjacent boiler USTs	0.85-0.95	1,220	1,000[1]
TPH (C_{10}-C_{36})	6c	Adjacent boiler USTs	1.1-1.3	10,600	1,000[1]
TPH (C_{10}-C_{36})	6c	Adjacent boiler USTs	2.8 – 3.0	<250	1,000[1]

[1] NSW EPA Contaminated Sites: Guidelines for Assessing Service Station Sites (1994)

The deeper sample retrieved from borehole 6c (2.8 – 3.0 m) did not show evidence of TPH contamination indicating that the soil contamination may be limited in its vertical extent. The heavy chain TPH identified is consistent with the heavy fuel oil reported to have previously been stored within the boiler USTs. However the limited vertical extent indicates the contamination may be attributable to contamination within the imported fill material or spills or disposal practices associated with the historical industrial use of the site.

Groundwater

The assessment indicated that the inferred groundwater flow direction is either to the west or towards the north east.

The results of the groundwater sampling and analysis were above the adopted assessment criteria in two of the seven wells sampled as presented in Table 12. These wells were located on site adjacent to the USTs as presented in Figure 17.

Table 12 Groundwater Contamination Concentrations

Contaminant	Borehole ID	Location	Conc (µg/L)	Assessment Criteria (µg/L)
TPH (C_6-C_9)	1	Adjacent refuelling UST	290	150[1]
TPH (C_6-C_9)	6c	Adjacent boiler USTs	850	150[1]
Toluene	6c	Adjacent boiler USTs	470	300[2]

[1] Airport (Environment Protection) Regulations (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination (adopted due to the absence of high reliability NSW EPA or ANZECC guidelines for TPH)

[2] NSW EPA Contaminated Sites Guidelines for Assessing Service Station Sites (1994) Threshold concentrations for sensitive land use, Protection of Aquatic Ecosystem.

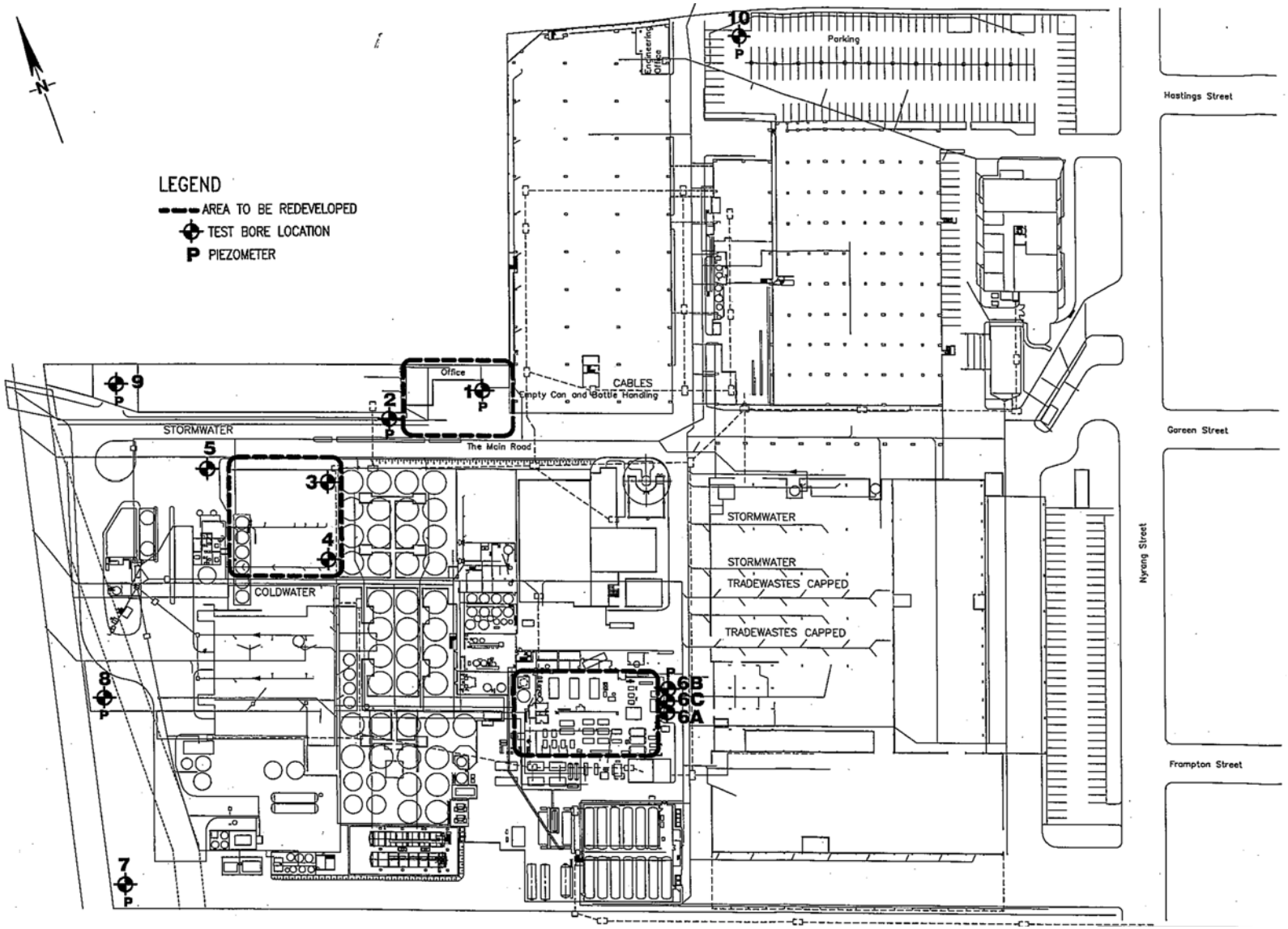


Figure 17 Soil and Groundwater Investigation

The source of the light fraction hydrocarbons (toluene and C6-C9 hydrocarbons) in groundwater adjacent to the boiler USTs is not typically associated with heavy fuel oil. It is therefore unlikely that the boiler USTs represent the source of this contamination. Furthermore, concentrations in the boundary monitoring wells located to the west and north east of the former boiler USTs (inferred down hydraulic gradient) were below laboratory detection limits. This indicates that the identified groundwater contamination and potential contamination associated with the former boiler USTs is not likely to be migrating off site.

The source of the light fraction hydrocarbons (C6-C9 hydrocarbons) in groundwater adjacent to the refuelling UST is unknown but is typically associated with vehicle fuel petroleum which may have been formerly stored in the refuelling UST.

Acid Sulphate Soil

A preliminary ASS assessment was undertaken as part of stage 2 of the site assessment. Samples were collected at 0.5m intervals from two boreholes (borehole 9 and 10) adjacent to Haslams Creek. Field pH screening was conducted on all samples and suggesting that potential ASS exists. Based on field screening procedures, four samples were submitted for laboratory analysis for Suspension Peroxide Oxidation Combined Acidity and Sulphate (SPOCAS). The results showed that the silty clay in borehole 9 (adjacent Haslams Creek) is classifiable as ASS from a depth of approximately 8.0m below ground level.

9.2 Impact Assessment

9.2.1 Operational Impacts

The results of the site history investigation, previous investigations and site assessment indicate that there are potentially several areas of existing contamination associated with former and current industrial use of the site.

Elevated concentrations of TPH were identified in surface soil samples retrieved from adjacent to the former boiler USTs. These concentrations may be attributable to contamination within the imported fill material or spills, leaks or poor disposal practices associated with the historical industrial use of the site.

Soil sampling and analysis in the remainder of the areas where excavation works are proposed did not reveal any other elevated contaminant concentrations.

In addition to the identified soil contamination, it is possible that there are several isolated hot spots of sub surface soil contamination present across the site, consistent with the ongoing industrial use of the site. However, the risk of exposure to such contamination during operation is low as the majority of the site is occupied by buildings or hardstand areas. The upgrade will increase the impervious area across the site and is therefore likely to reduce the risk of exposure to existing contamination.

A further issue is the potential for additional groundwater or soil contamination to occur in the future as a result of materials handling and storage losses during operation. However, a key objective of the upgrade is to reduce production losses including those losses associated with spills and leaks by updating equipment and containment. It is therefore considered that the equipment upgrade will reduce the occurrence of potentially contaminating spills and leaks. Furthermore, the increase in impervious area as a result of the upgrade will further limit the potential for spills and leaks that do occur to impact the subsurface environment.

9.2.2 USTs

The upgrade will include the excavation of the former refuelling UST prior to the construction of the BBTs. Any fuel contaminated soil (although not identified in the preliminary sampling) will also be removed at this time. Soil samples will be obtained from the excavation pit walls

and base and submitted for laboratory analysis prior to refilling to ensure that any contaminated soil has been removed.

The former boiler USTs are not proposed for removal due to their location adjacent to the utility building and the likely impact of their removal upon the ongoing operations of the brewery. It is proposed that these USTs are decommissioned in situ, involving removal of any residual product or water and filled with an inert material.

9.2.3 Groundwater

The groundwater investigation revealed light fraction hydrocarbon concentrations in two on site monitoring wells. Results from the boundary groundwater monitoring well network established indicated that this contamination is not likely to be migrating off site. It is proposed that regular sampling and analysis of the boundary monitoring well network is undertaken during operation of the upgraded brewery to ensure that the contamination identified is not migrating off site.

It is further proposed that on-going sampling and analysis of the groundwater well adjacent the refuelling UST is undertaken to monitor the attenuation of hydrocarbon contamination following the removal of the refuelling UST.

9.2.4 Construction Impacts

The upgrade will include subsurface works where excavations are required for the foundation of new buildings and equipment namely; the new Beer Processing Building, the BBT Cellar and the new boiler stack. Contaminant concentrations in soil samples retrieved from these areas were all below the adopted assessment.

The Site Management Plan to be adopted during the construction phase, as part of the Construction Environmental Management Plan, will ensure that all site soil to be removed is properly classified and disposed of in accordance with the NSW EPA *Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes* (EPA 1999). It is therefore considered that the works are not likely to increase the risk of exposure with respect to human health or the environment.

During the subsurface works there is also the potential for contamination to groundwater or soil to be caused by incidents such as spills or leaks from fuel and chemical storage. Environmental management measures prescribed by the Construction Environmental Management Plan will reduce the likelihood of such incidents occurring. Incident response procedures will also decrease the extent of impact in the unlikely event that such an incident occurs.

9.3 Management Measures

9.3.1 Construction

Environmental management of contamination during construction will be undertaken by implementation of a Site Management Plan, an ASS Management Plan as sections within the Construction Environmental Management Plan.

The Site Management Plan will prescribe:

- procedures for excavation and disposal of soil to a licensed landfill in accordance with NSW EPA *Environmental Guidelines: Assessment, classification and management of liquid and non-liquid wastes* (EPA 1999);
- procedures for minimising potential for groundwater accumulating in excavation pits;
- on site treatment and/or disposal of groundwater accumulating in excavation pits in accordance with the requirements of Sydney Water and/or NSW EPA *Environmental*

Guidelines: Assessment, classification and management of liquid and non-liquid wastes (EPA 1999); and

- procedures for identification and management of unanticipated contaminated soil.

The ASS Management Plan (to be ed in accordance with *Acid Sulfate Soils Manual* (Acid Sulfate Soils Advisory Committee, 1998) will prescribe:

- requirements for sampling and analysis at the locations where excavations are proposed; and
- management and disposal requirements for excavated ASS materials.

The Construction Environmental Management Plan will further prescribe measures to prevent further contamination during construction including:

- apropriate storage and labelling requirements for dangerous goods, fuels and other potential contaminants to be used during construction; and
- Incident response procedures including training and provision of equipment such as spill kits.

9.3.2 Operation

A groundwater monitoring programme will be developed and implemented including:

- regular sampling and analysis of boundary well monitoring network to detect off site migration of groundwater contamination;
- contingency plans for processes/actions which may be adopted by Tooheys if contaminated groundwater is found to be migrating off site in the future; and
- regular sampling and analysis of the groundwater well adjacent the former refuelling UST, following its removal, to monitor attenuation of hydrocarbon contamination.

Chapter 10

Air Quality

Summary

Current Operation and Performance:

The existing emissions to air from the brewery operations are associated with:

- point source emissions from the boiler stack;
- emissions from the brewhouse vents;
- vehicle emissions;
- fugitive emissions from the ammonia cooling plant; and
- other fugitive process emissions from process losses and spills.

Proposed Upgrade/Changes:

The types of process emissions will not vary from the existing facility as the proposed upgrade will adopt the existing processes and use the same vehicles on site and the same boiler fuel.

Since the production rate will remain the same, the fugitive process emissions and brewhouse vent emissions are expected to decrease due to the subsequent upgraded process equipment and increased level of automation and control.

Change in boilers from a system with a capacity of 27 MW to two 12 MW high efficiency water tube boilers.

Installation of a new stack located within the utilities room with a minimum height of 25 m. The existing stack will become redundant but will not be demolished.

Potential Impacts:

The upgrade is likely to reduce the total emissions to air within the local air shed due to the decrease in the annual average natural gas consumption.

The upgrade of the brewery will likely result in a slightly increased rate of natural gas combustion at heat peak load.

It is unlikely that the new boiler stack emissions at peak heat load will result in any new exceedances of the ground level criteria at sensitive receptors.

The impact of boiler emissions on air quality in the vicinity of the site will not adversely affect sensitive receptors.

During construction, emissions to air are likely to include dust generation as result of soil exposure during earthworks and vehicle emissions as a result of the slightly increased traffic volumes.

Statement of Commitments:

Commitments to minimise or manage potential air quality impacts during construction include minimising dust from the work site, minimising the stockpiling of soil and open excavations, and minimising dust from vehicles accessing the work site. Exposed soil will be watered.

Construction vehicles, plant and equipment will be adequately maintained so as to minimise air quality impacts from exhaust;

Regarding operation, the boiler stack will be designed to improve dispersion of air, including minimum discharge temperature of 250°C, minimum stack height of 25 m and maximum internal stack diameter of 1.95 m.

10 Air Quality

This section summarises the Air Quality assessment as presented in Appendix F. The objective of this Air Quality Assessment is to:

- assess the changes to regional air quality as a result of the upgrade;
- assess the impact to air quality at sensitive receptors adjacent the site as a result of the proposed upgrade; and
- assess the greenhouse gas emissions.

10.1 Baseline Conditions

10.1.1 Existing Site Description

The site is within an industrial area of approximately 1km² with industrial developments to the immediate north and south of the Tooheys site, and to the west of Haslams Creek. East of the brewery site (on the eastern side of Nyrang Street) is a residential area, which mainly comprises stand alone houses. Parramatta Road forms the northern boundary of the industrial area that the brewery site is located within. The convergent intersection of the Western Motorway (M4) with Parramatta Road is to the east of the industrial area. The M4 runs to the north of the Parramatta Road in the vicinity of the industrial area.

10.1.2 Sensitive Receptors

The nearest neighbours to the site include industrial premises to the north and east, but are not considered to represent sensitive receptors for the purpose of the air quality nearest residences are to the south and south east boundaries of the site adjacent Nyrang Street. Further residential areas exist on all sides of the boundaries of the industrial zone.

10.1.3 Site Structures

The incremental nature of the development on site has resulted in a range of industrial-type buildings of varying heights and lengths purpose built to accommodate various process equipment. The structures most likely to impact the dispersion of air pollutants at the existing site are presented in Table 13 below.

Table 13 Existing Site Structures

Structure	Height (above ground level)
Fermentation and maturation tanks (stored externally on Tank Farm 1,2 and 3)	Up to 16m
Brewhouse	17m
Beer processing plant rooms (including the elephant room, centrifuge room, filtration room, general store and laboratory)	Up to 18m
Engine room	3.8m
Water tower	32m
Malt tower (with the Tooheys logo)	38m
Bottling and canning halls	Up to 21m

10.1.4 Existing Emissions to Air

The emissions to air from the brewery operations are associated with:

- point source emissions from the boiler stack;
- emissions from the brewhouse vents;
- vehicle emissions;
- fugitive emissions from the ammonia cooling plant; and
- other fugitive process emissions from process losses and spills.

The 50 m high stack is reported to be oversized, with an exhaust temperature of approximately 200°C. The existing boilers are reported to have a total capacity of 27 MW to supply a peak heat load of 17 MW and run at an efficiency of approximately 72%. These emissions represent the annual average emissions to air.

The emissions from the brewhouse vents are associated with the mashing and wort boiling prior to fermentation. The emissions do not contain ethanol and mostly consist of water vapour.

10.1.5 Greenhouse Gas Emissions

Lion Nathan has participated in the Australian Government's Greenhouse Challenge Program since 1996. As a participant in the programme, Lion Nathan reports upon the greenhouse gas emissions from all its facilities including the Tooheys brewery in accordance with the methodology prescribed by the Australian Greenhouse Office (AGO) Factors and Methods Workbook (December 2005) for use in Australian greenhouse emissions reporting.

These emissions include those attributable to grid electricity consumption, natural gas and LPG usage, process emissions and waste to landfill. Over the ten year period of reporting, Tooheys has produced an average of 179 kg CO_2-e per kL beer, which is attributable to sources as presented in Table 14.

Table 14 Greenhouse Gas Emissions

Emission Source	% Total GHG Emissions
Process Emissions	5.6
Electricity	60.7
Natural Gas Usage (boilers)	32.1
LPG Usage (forklifts)	1.0
Waste	0.6

It should be noted that under the Australian Greenhouse Challenge programme, Tooheys include process CO_2 emissions within their GHG inventory in terms of the volume of CO_2 which must be purchased to supplement the recovered CO_2. The direct CO_2 emissions from fermentation are not included in the inventory as they are derived from malt and sugar crops which act as carbon sinks sequestering equivalent amounts of CO_2. The AGO has approved this methodology.

10.1.6 Existing Air Shed

Meteorological data relevant to the site has been recorded at the Sydney Olympic Park Monitoring station approximately 2km to the north of the site at an elevation of 28m. The data is considered to be representative of the brewery site due to its proximity. Hourly data

sets including wind speed, wind direction, temperature and sigma theta values for 2001-2006 have been obtained from the Bureau of Meteorology.

The 9am data indicates that in the cooler months from March to September light to moderate westerly winds dominate in the morning. During the warmer months, these winds are still present, but with an increase in winds from the south to south east and north.

The 3pm data indicates that from spring to autumn winds are predominantly from the east and southeast. By autumn, the easterly and south-easterly winds are still dominant, with an increase in winds from the south-south-east and west. During winter, moderate winds from the southwest to northwest are the most dominant.

It is therefore likely that the most significant impacts will be experienced by residents to the west and north west in the moderate east to south easterly winds occurring during the warmer months. These residents may also be impacted during late autumn and early spring where pollutants dispersed by light morning westerly winds are recirculated to the north east by afternoon south easterly winds. The light to moderate westerly winds in winter may also result in impact to the residents to the immediate east of the site.

10.1.7 Background Air Quality

Background air quality information was obtained from data recorded by the NSW EPA at its Chullora monitoring site. CO, PM_{10} and NO_2 data have been reviewed as the pollutants of concern for assessment purposes.

A summary of the background concentrations is presented in Table 15.

Table 15 Summary of Background Air Quality

Pollutant	Averaging Period	Background Conc. (µg/m^3)
PM_{10}	24 hour	49.72[1]
NO_2	1 hour	135
CO	1 hour	6,300
CO	8 hour	3,000

1 Highest background concentration below the accepted value has been adopted as the background concentration to show that there are no *new* exceedances of the accepted value

10.2 Impact Assessment

10.2.1 Fugitive and Brewhouse Emissions

The types of process emissions will not vary from the existing facility as the upgraded site will essentially adopt the existing processes and use the same vehicles on site and the same boiler fuel. Since there is no proposed upscaling in production, the fugitive process emissions and brewhouse vent emissions are anticipated to decrease as a result of the process equipment upgrade and increased level of automation and control. No further assessment of fugitive or brewhouse emissions has been undertaken.

10.2.2 Natural Gas Combustion

As a result of the upgrade, the peak heat load for the boilers is anticipated to increase from 17MW to 19.3 MW, although the average heat load is likely to decrease from 82.7 MJ/hl beer to 70MJ/hl as a result of the process efficiencies and energy management system to be adopted.

The emissions to air from the boiler are likely to change as a result of the upgraded process. These emissions are associated with the rate of natural gas combustion and therefore it is useful to predict the likely change in fuel requirements as a result of the upgrade.

The peak heat load of the boilers is likely to increase, but as a result of the improved boiler efficiencies, the rate of natural gas combustion at peak heat load will only slightly increase as presented in Table 16.

Table 16 Fuel Requirements at Peak Heat Load

	$E_{required}$[1]	Efficiency	E_{Actual}[2]	Natural Gas Combustion
	MW	%	MW	m^3 gas/hr
New Boiler	19.3	78	24.8	2380
Existing Boiler	17	72	23.6	2185

[1] Energy required to be delivered to plant at peak heat load

[2] Energy required from fuel given the efficiency of the boiler

While peak heat load is anticipated to increase, the process efficiencies to be employed as part of the upgrade will decrease specific heat consumption of the brewery with respect to beer production rates. The annual average natural gas consumption at the brewery based on beer production rates is anticipated to decrease as presented in Table 17.

Table 17 Annual Average Fuel Requirements

	$E_{required}$[1]		Efficiency	E_{Actual}[2]	Natural Gas Combustion
	MJ/hl beer	MW	%	MW	m^3 gas/hr
New Boiler	70.0	9.6[3]	78	12.3	1175
Existing Boiler	82.7	11.3[3]	72	15.7	1500

[1] Annual average energy required by brewery

[2] Annual average energy required from fuel given the efficiency of the boiler

[3] Based on capacity production of 3.3 million hl beer per year

Therefore the upgrade is likely to produce a net decrease in the concentration of air pollutants within the local air shed.

10.2.3 Top of Stack Concentrations

The pollutant concentrations calculated at the top of the stack following the upgrade are all less than the standards prescribed by the *Protection of the Environmental and Operations (Clean Air) Regulation* indicating that the upgraded brewery will comply with the legal requirements under the POEO Act.

10.2.4 Regional Air Quality

The boiler stack emissions are proportional to the rate of natural gas combustion. Since the rate of natural gas combustion is anticipated to decrease for the annual average scenario and only slightly increase for the peak heat load scenario, the net emissions to air will decrease as a result of the upgrade.

10.2.5 Air Quality at Sensitive Receptors

Although the total emissions are likely to decrease as a result of the upgrade, the change in stack height and diameter and increase in peak heat load will affect the dispersion characteristics. The ground level concentrations at nearby sensitive receptors are therefore likely to change as a result of the upgrade. These impacts have been investigated by the use of dispersion modelling techniques and compared against the ground level concentration criteria specified by the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (AMMAAP).

Air dispersion modelling of emissions from the boiler stack was undertaken to ensure that the new location and reduced height from 50m to 25m will not adversely affect sensitive receptors in the vicinity of the site. Air dispersion modelling using the Ausplume programme was undertaken for PM_{10}, NO_2 and CO as the pollutants of concern, in accordance with a Level 1 assessment described by the AMMAAP. The model was run to determine the increment ground level concentrations attributable to the boiler which were then added to background levels for comparison with the relevant criteria. The increment ground level concentrations are summarised in Table 18.

Table 18 Summary of Ground Level Concentrations

Pollutant	Background Conc. (µg/m^3)	Maximum Ground Level Concentration at Sensitive Receptor (µg/m^3)			Complies
		Increment	Cumulative	Criteria	
PM_{10}	49.72[1]	0.25	49.97	50	✓
NO_2	135	16.4	151.4	246	✓
$CO_{15\ min\ average}$	NA	14.7	NA	100,000	✓
$CO_{1\ hour\ average}$	6,300	13.8	6,313.8	30,000	✓
$CO_{8\ hour\ average}$	3,000	5.77	3,005.8	10,000	✓

[1] Highest background concentration below criteria value has been adopted to show that there are no *new* exceedances of the criteria

These results indicate that the boiler stack emissions are not likely to result in any new exceedances of the criteria at sensitive receptors and that therefore the impact of boiler emissions upon air quality in the vicinity of the site will not adversely affect sensitive receptors.

Furthermore the predictions are likely to represent overestimations rather than underestimations due to:

- the low probability of both adverse meteorological conditions and elevated background concentrations occurring on the same day;
- the inclusion of emissions attributable to the existing Tooheys brewery in the background concentrations recorded at Chullora; and
- the modelling assumption that the facility is running at peak heat load for 100% of the time.

It is therefore considered that the proposed stack will result in sufficient dispersion of PM_{10}, NO_2 and CO so as to prevent impact to sensitive receptors so long as:

- the stack height is no less than 25m;
- the stack internal diameter is no more than 1.95m;

- the flue gas exit temperature is no less than 250°C; and
- the peak heat load does not exceed 19.3MW.

10.2.6 Greenhouse Gas Emissions

There are currently no legislated criteria for greenhouse gas emissions. The existing greenhouse gas emissions from the facility are small in comparison to the emissions from other industrial facilities and in isolation are not likely to significantly impact upon the environment. However, under its commitment to the Australian Government's Greenhouse Challenge programme, Tooheys is committed to achieving reductions in greenhouse gas emissions. The upgrade is likely to result in a decrease of approximately 21% of existing levels as presented in Table 19.

Table 19 Greenhouse Gas Emission Reductions

Emission Source	Existing Facility ($kg\ CO_2$ e-/ kL beer)	Upgraded Facility ($kg\ CO_2$ e-/ kL beer)	%Decrease
Process Emissions	10	0	100%
Electricity	101	89	12%
Natural Gas Usage	58	50	14%
LPG Usage	2	2	0%
Waste	1	1	0%
Total	**179**	**142**	**21%**

The decrease in greenhouse gas emissions associated with electricity consumption will be achieved by:

- introduction of an Energy Management System;
- repair of steam and air leaks;
- increased use of variable speed drives for pumps, motors and fans;
- installation of a local air compressor for spent grains discharge;
- high efficiency motors for new equipment;
- installation of new and more efficient evaporative condenser plant for the main ammonia refrigeration plant; and
- utility systems designed to stand-by capacity to ensure the utility plant does not perform at all times, only when required.

A decrease in greenhouse gas emissions associated with natural gas consumption will be achieved by:

- installation of new more efficient boilers;
- repair of steam and air leaks;
- repair and increase in insulation;
- improved condensate return rate; and
- improved hot water balance.

10.2.7 Construction Impacts

During construction, emissions to air are likely to include dust generation as result of soil exposure during earthworks and vehicle emissions as a result of the slightly increased traffic volumes required to deliver the new process equipment, building materials and concrete for the upgrade.

These emissions include particulates, carbon monoxide, nitrogen oxides and volatile organic compounds. Where earthworks are undertaken at locations of potential and identified contamination, there is also potential for the release of volatile organic compounds to the atmosphere or the generation of airborne contaminated particulates.

The construction phase is estimated to take nearly a year, with ground breaking, concrete works lasting four weeks, followed by a period of up to 22 weeks for external building works. The rest of the construction period would consist primarily of internal works and building fit-out which are unlikely to involve earthworks. The construction impacts are likely to be temporary.

It is anticipated that additional heavy vehicle trips and a minor number of construction staff vehicles to and from the site will be generated by construction activities during the proposed upgrade. At this stage it is estimated these would amount to an average of around 10-20 vehicles per day, peaking at 40 vehicles per day during concrete works. The majority of these trips would occur outside of the road network peak hours where peak pollution concentrations are usually experienced.

Dust generation may occur where soil is exposed during excavation for the new buildings and may be transported off site in windy conditions or by vehicles.

10.3 Management Measures

Management measures to reduce air quality impacts during construction include:

- assigning access and haul roads to permanent paved areas where possible;
- stabilising temporary designated haul roads with road base or watering;
- watering of exposed soil and excavations;
- reducing the requirement for soil stockpiles (i.e. dispose or re-use immediately);
- minimising the duration of soil stockpiling by expedient disposal or re-use;
- minimising the duration of open excavations by construction programming;
- implementing OH&S control measures to reduce the potential for dust generation at locations of contaminated soil;
- implementing OH&S control measures ensure adequate dispersion of volatile organic compounds during excavation at locations of contaminated soil;
- ensuring vehicles, plant and equipment are adequately maintained so as to minimise air quality impacts from exhaust;
- ensuring vehicle or items of plant or equipment generating excessive exhaust (smoke) are not permitted on site;
- ensuring vehicles entering and leaving the site are to be free of excessive mud by utilising a truck wash, dry brushing area or shake down strip; and
- ensuring all trucks have canopies secured over the load and their tailgates closed on entering and leaving the site.

Chapter 11

Odour

Summary

Current Operation and Performance:

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.

Waste water 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.

Proposed Upgrade/Changes:

The proposed upgrade will reduce post-fermentation gaseous emissions including the odorous compounds ethanol and ethyl acetate.

Potential Impacts:

The overall odour emissions from the site are likely to be reduced with a corresponding decrease in off site odour impacts.

Statement of Commitments:

Tooheys will continue to investigate opportunities to reduce odour emissions from the site.

The proposed upgrade is expected to result in no additional odour emissions and no specific commitments are made in relation to odour. Some waste management commitments may further reduce the potential for odour impacts.

11 Odour

Section 11 provides an assessment to identify the effect of the upgrade on the existing sources of odour at the brewery and the corresponding impact to sensitive receptors within the vicinity of the site.

11.1 Baseline Conditions

Generally, odours from breweries are associated with volatile organic compound released during the heating stages of the process prior to fermentation. Malodours during the post-fermentation operations include ethanol and small quantities of other total volatile organic compounds (TVOCs), including ethyl acetate.

From a review of the Tooheys brewery process and facilities, sources of potential odour have been identified as:

- direct emissions from wort boiling;
- direct emissions from the maturation and fermentation vessels;
- brewery waste water;
- leaks from the ammonia cooling plant;
- ventilation of beer cellars and packaging lines;
- leaks and spills from valves and pipelines; and
- storage of spent grains.

The largest potential source of odour from the existing brewery operations is the evaporation of volatile organic compounds derived from wort boiling. Wort boiling occurs in brew kettles, within the brewhouse, during which the boil vapour is recompressed and reused before being condensed, cooled and disposed of as a liquid effluent.

The fermentation and maturation stage of the process produces volatile organic compounds including ethanol and ethyl acetate. However, the gases from the fermentation and maturation process are collected to recover carbon dioxide. During this process, the carbon dioxide is purified, so that it may be reused in further stages of the beer making process. In this process, the fermentation gas is passed through a gas scrubber, where it is cleaned by counterflow of water removing the water soluble impurities and a gas purifier, removing further substances influencing odour and taste of the beer.

Waste water 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. The on site trade waste system is well contained within grated underground drainage channels.

11.1.1 Sensitive Receptors

The nearest sensitive receptors have been identified as the residences to the east and south east of the brewery site, with the closest properties located on Nyrang Street. These receptors are most likely to be impacts by light westerly to north westerly winds which typically occur during in the morning from Autumn to Winter (see Appendix F).

Since 1998, six odour complaints from three complainants have been documented by Tooheys with the majority occurring prior to 2000 as shown in Table 20.

Table 20 Odour Complaints

Date	Complainant	Details
5/06/1997	Resident, Calool Crescent	Described as a mashing malt brewery odour
22/07/1998	Worker at nearby factory	Odour at nearby factory, source unknown
27/07/1998	Resident, Calool Crescent	Particularly strong malt/mashing/brewery odour
14/05/1999	Resident, Boronia Street	Odour at corner of Boronia and Nyrang Streets, attributed to Tooheys. Burning rubber odour detected upon inspection which could not be attributed to brewery.
03/09/2002	Resident, Calool Crescent	
12/09/2003	Resident, Calool Crescent	
16/12/2005	Resident, Calool Crescent	

The complaint received in 2002 was due to a mechanical failure of the brewhouse vapour compressor. EPA was notified of the issue in September 2002 after which Tooheys was required to implement an odour reduction plan as a requirement of their EPA licence.

The odour reduction programme specifically addressed the risk of volatile wort odours escaping to the atmosphere during wort boiling. These include management and engineering control methods as presented in Table 21.

Table 21 Odour Reduction Programme

Target	Method
Decrease the amount of time for heat to boil in the brew kettles	Optimise steam pressure
Decrease the amount of time for heating in the brew kettles	Ensure that wort is cast from kettles upon completion of boiling
Optimise cast time	Reassess time for external wort boiler emptying
Replacement vapour compressor available	Replacement vapour compressor ready to install within 1 day of failure
Reduce risk of simultaneous operation of brew kettles	Work instruction to assist operators to reduce the risk of brew kettles operating simultaneously

The ongoing implementation of the above measures is anticipated to result in a continued decrease in odour emissions from the existing operations.

11.2 Impact Assessment

As discussed in Section 4.2, one of the main drivers for the upgrade is to decrease production losses which include post-fermentation gaseous emissions of ethanol and ethyl acetate. Therefore the upgrade itself will specifically address the loss of these odorous compounds and result in an overall decrease in post-fermentation odour emissions. This will be achieved by replacement of old and outdated equipment, reducing leaks and spills and increasing the degree of automation and control.

Pre-fermentation emissions from the wort boiling stage do not represent production losses and are specifically addressed by management measures adopted in Tooheys Odour

Reduction Programme. However, in order to increase the energy efficiency of the facility, the wort boiling stage will be optimised so as to occur over the shortest time possible.

Specific odour emissions that are anticipated to decrease are presented in Table 22.

Table 22 Odour Reductions

Odour Source	Source of Odour Reduction
Direct emissions from wort boiling	• increased automation and control in brewhouse • increase in heating efficiency
Direct emissions from the maturation and fermentation vessels	• upgraded CO_2 recovery plant • increased automation and control
Brewery waste water	• reduction in spills diverted to trade waste
Leaks from the ammonia cooling plant	• upgrade of outdated equipment • partial replacement of ammonia with glycol (non odorous)
Ventilation of beer cellars and packaging lines	• reduction in spills and leaks due to increased automation and control
Leaks and spills from valves and pipelines	• increased automation and control • replacement of old equipment
Storage of spent grains and spent kieselguhr	• improved technology for use, storage and handling of kieselguhr and spent kieselguhr • potential elimination of kieselguhr if membrane filters are selected

It is therefore anticipated that overall odour emissions from the site are likely to decrease as a result of the upgrade. It is anticipated that there will be a corresponding decrease in off site odour impacts.

11.3 Management Measures

Management measures to reduce odour include:

- improved hot water balance;
- increase level of automation and control in brewhouse and across facility so as to minimise leakage of odorous gases and spills of liquids containing volatile compounds;
- replacement of outdated equipment so as to minimise leakage of odorous gases and spills of liquids containing volatile compounds;
- review of waste management process to minimise storage of spent grain on site;
- continued implementation of odour reduction programme for wort boiling operation; and
- maintaining a register of odour complaints and responses.

Chapter 12

Noise and Vibration

Summary

Current Operation and Performance:

The dominant noise sources are the warehousing and truck loading buildings at the front of the site.

These warehousing buildings provide significant shielding from mechanical plant noise sources from the operational areas of the brewery. As such, mechanical plant does not significantly influence existing noise levels at the residences.

There have previously been nine community complaints associated with noise impacts at nearby residences, and noise monitoring indicates that the noise limits in the EPL have been exceeded in the past.

Tooheys are currently implementing a number of noise reduction strategies to reduce noise from the site.

Proposed Upgrade/Changes:

New mechanical plant as part of the upgrade may change the noise emissions from the site. New mechanical plant as a result of the upgrade includes replacement of gas fired boilers, new ammonia condensers and new centrifuges.

Potential Impacts:

The proposed development is entirely in the operational area of the brewery, with a relatively large distance to residences on Nyrang Street, and with significant shielding provided by the Tooheys buildings that front Nyrang Street.

The predicted noise levels from construction noise are below the relevant criterion.

The predicted operational noise levels resulting from the proposed upgrade are all below the most stringent noise criterion at the closest residences along Nyrang Street.

Noise impacts on the residences along Nyrang Street are expected to be negligible.

Statement of Commitments:

Statement of Commitments to minimise or manage potential impacts associated with noise and vibration include continuing to investigate ways to reduce noise from the site, and to ensure best practice is employed. An Operational Noise Management Report will be prepared detailing ongoing noise mitigation and management measures.

A Construction Noise Management Plan will be prepared which identifies noisy activities and ensures reasonable and feasible measures are employed to minimise potential noise impacts to neighbours. Acoustic monitoring will be undertaken if complaints are received.

12 Noise and Vibration

Section 12 summarises the Acoustic Assessment provided in Appendix G. The assessment identifies the existing noise situation at the brewery, with reference to the existing Environment Protection Licence and current noise reduction strategies. The assessment calculates the predicted noise impacts associated with the construction and operation of the proposed, and compares this with the relevant noise criteria.

12.1 Baseline Conditions

12.1.1 Existing Background Noise Environment

The area around the Tooheys site is of an industrial/urban nature where the dominant noise sources are traffic on Parramatta Road and the M4 Freeway that runs parallel and just to the north of Parramatta Road. St Hilliers Road to the north west of the site is also a heavily trafficked road and contributes to the background noise level.

In addition to the traffic, industrial noise from Tooheys and the other industries in the area is also audible in the form of a continuous hum from mechanical plant and activity noise such as impact from loading and unloading of beer bottles and kegs and from the bottling operations which are located at the front of the Tooheys site. The brewery is operational 24 hours per day.

An attended noise survey was undertaken by Wilkinson Murray on 28 March 2006, including noise monitoring between approximately 04:30 to 08:15 and 11:30 to 13:30. Further noise monitoring was undertaken on 27 October 2006 by Arup. These times covered representative day time and night time periods coinciding with periods of maximum activity levels at the brewery in terms of production and truck movements. Background noise levels (L_{A90}) for both day time and night time at the residences on Nyrang Street were typically 51 dB to 55 dB.

12.1.2 Existing Noise Limits

Noise from the brewery is limited by an Environment Protection Licence (EPL). The EPL specifies that:

- Noise at 1 m from the brewery boundary must not exceed:
  - L_{A10} dB(15 minute) noise emission criterion of 70 dBA between 07:00 and 22:00.
  - L_{A10} dB (15 minute) noise emission criterion of 65 dBA at all other times.
- Noise at any point within 1 m of the boundary of any residential boundary (or other noise sensitive area) in the vicinity must not exceed an L_{A10} dB (15 minute) noise emission criterion of 50 dBA at any time.

12.1.3 Current Noise from Tooheys Brewery

The on site noise generated by Tooheys identified as being the primary contributors to noise levels at the closest residences on Nyrang Street are:

- mid to high frequency noise from the bottling plant caused by bottle and keg impact and transmitted via the façade openings (roller door and entry door) and façade louvers;
- continuous noise from the ventilation duct (and possibly other fixed mechanical plant);
- trucks on site, truck movement and air brakes;
- loading of trucks using forklifts, engine revving and forks hitting the ground; and
- impact noise from the loading and unloading of kegs.

On site noise levels in outside areas generally do not exceed 65 dB - 70 dB(L_{A10}) site boundary noise limit.

The L_{A10} noise level at the residences nearest to Nyrang Street are primarily influenced by road traffic noise from Nyrang Street, including vehicular movements generated by Tooheys, and on site operational activities associated with the Tooheys brewery. L_{A10} noise levels at some nearby residences have exceeded the 50 dB(A) criterion by between 8 and 12 dB(A).

Outdoor noise levels were measured at 63 dB to 73 dB (L_{A10}) on the proposed Beer Processing Building area. The dominant noise sources were noise breaking out through an open door of the brewhouse and the dust extraction system relating to the malt silos. Higher noise levels exist inside existing buildings, however, the sound insulation provided by the building reduces outside sound levels significantly.

Overall the dominant noise from the Tooheys brewery for Nyrang Street residences is from the buildings at the site that front Nyrang Street, being the packaging and loading buildings. The reason for this is two-fold. Firstly, the acoustic nature of the packaging and loading activities are largely impact related or they have high level transient sounds (i.e. heavy vehicle movements). Secondly, these buildings provide significant shielding to the residences from the noise sources behind the buildings, meaning that noise sources from behind theses buildings do not significantly influence noise levels on Nyrang Street.

From the noise measurements, it is clear that the background noise level is made up from traffic on Parramatta and other surrounding roads and noise from Tooheys operations at the front of the site. It is highly unlikely that noise from the rear of the site will be contributing to background noise levels.

12.1.4 Previous Noise Complaints

Since 1997 Tooheys has received 9 complaints relating to noise. Complainants are from the nearby residential streets, in particular Goreen Street and Frampton Street. A summary of noise complaints is provided in Table 23.

In all cases the noise complaint was investigated and where it was attributable to faulty equipment or inappropriate behaviour by employees or contractors then corrective action was taken. Also in all cases the outcome of the investigation and the corrective actions were provided to the complainant.

Table 23 Summary of Noise Complaints

Date	Complainant	Details
22/01/1998	Resident Frampton Ave	Truck noise on Frampton Ave.
11/08/1998	Resident	Noise from safety pressure valve and sirens.
24/09/1998	Resident	Complaint of loud music.
4/08/1999	Resident Goreen St	Noise from brewery at night and conduct of truck drivers.
5/11/1999	Resident Goreen St	Traffic noise.
22/05/2000	Resident Goreen St	Noise form the keghall.
10/07/2000	Resident Frampton St	Intermittent alarm noise.
12/07/2000	Resident Frampton St	Alarm sounding again.
14/05/2004	Resident	Loading of kegs.

12.1.5 Existing Noise Reduction Strategies

A range of noise reduction strategies have been implemented over the past 5 years. Furthermore, a cross-functional noise minimisation team has been established and a noise minimisation action plan has been drafted to continue noise reduction initiatives at the brewery.

In addition, a range of additional noise mitigation strategies are currently being investigated and implemented. These primarily relate to reducing noise from the noisy activities, such as the handling of kegs, noise at the bottling plant and noise from truck loading activities.

Should these measures be implemented, a noise reduction from the Tooheys site in the order of 5 to 10 dB(A) can be expected at the residences on Nyrang Street.

12.2 Impact Assessment – Construction

12.2.1 Construction Noise Criteria

The EPA's Environmental Noise Control Manual (1994) provides a guide to noise conditions that may minimise the likelihood of annoyance being caused to residential noise sensitive receivers during periods of construction. These are as follows:

- The $L_{A10,\ 15\ min}$ noise level must not exceed the background noise level ($L_{A90,\ 15\ min}$) + 20 dB(A) for construction periods of 4 weeks and under.
- The $L_{A10,\ 15\ min}$ noise level must not exceed the background noise level ($L_{A90,\ 15\ min}$) + 10 dB(A) for construction periods between 4 and 26 weeks.
- The $L_{A10,\ 15\ min}$ noise level must not exceed the background noise level ($L_{A90,\ 15\ min}$) + 5 dB(A) for construction periods greater than 26 weeks.

A 63 dB(A) construction noise criterion has been identified, based on background noise level of 53 dB(A) and construction works taking place during the daytime hours between 07:00 and 18:00 for between 4 and 26 weeks.

12.2.2 Predicted Construction Noise and Vibration

For the purposes of prediction, various plant types, numbers and on-times have been assumed for certain construction activities. This is based on experience of similar activities. Plant source noise levels have been taken from *British Standard BS5228: 1997 Part 1: noise and vibration control on construction and open sites* and a shielding attenuation of 10 dB has been applied to all situations where there is no line of sight to Nyrang Street.

The noisiest construction activities are demolition, breaking of concrete footings, and concrete pouring. These activities produce noise of approximately 120 dB(A) for demolition and breaking and 110 dB(A) for concrete pouring. Piling will be undertaken by auger piling which does not create significant noise levels compared to the other activities.

The predicted noise levels from construction noise are all significantly below the criterion due to the relatively large distances between the source and receiver, significant shielding provided by the Tooheys buildings that front Nyrang Street, and the background noise levels existing at the residences along Nyrang Street.

Due to the distance between the demolition works and the residences on Nyrang Street it can be considered highly unlikely that the human comfort criterion for vibration will be exceeded at any time.

12.3 Impact Assessment – Operational

All changes relating to the proposed upgrade are occurring behind the buildings fronting Nyrang Street. These buildings provide significant shielding to the areas behind, where the

upgrade works are proposed to take place. Furthermore, in addition to road traffic noise, activities from these front buildings currently dominate the noise environment on Nyrang Street.

The key noise areas relating to the proposed upgrade are described and discussed in the following sections. Noise levels from these key areas have been predicted at the nearest residences on Nyrang Street. The predicted noise levels are given in Table 24.

Noise levels at the nearest noise sensitive receivers on Nyrang Street have been predicted based on the key noise areas cited above and noise levels of proposed plant provided by a combination of measured levels of existing plant on site, plant and equipment specifications and some measured data.

The noise predictions take account of distance, shielding by structures and sound insulation of building elements where applicable. Worst case assumptions for shielding (5 dB attenuation for grazing incidence and 10 dB attenuation for no line of sight) and sound insulation (10 dB assuming open windows or doors) effects have been assumed to illustrate the potential noise levels at the receivers. The intervening ground has been taken to be hard and no attenuation for air absorption has been considered.

A discussion of each component of the upgrade is also provided below.

Table 24 Predicted Operational Noise Levels

Noise producing plant	Source Noise Level	Most stringent Criterion (EPL L_{A10} dB)	Character correction?	Predicted noise level L_{A10} dB	Meets criterion?
Beer Processing Building					
Centrifuges	88 dBA per centrifuge at 1m	50	×	26	✓
Refrigeration Plant					
Ammonia compressor plant	95 dBA per compressor at 1m	50	×	37	✓
Water-cooled condensers	68 dBA per condenser at 15m	50	×	42	✓
Cooling tower	95 dBA at 1m	50	+ 5 dB tonal	46	✓
Engine Room / Utility Building					
Compressed air plant	84 dBA per compressor at 1m	50	×	25	✓
Boilers	85 dBA per boiler at 1m	50	×	34	✓
Total Noise Level at residences on Nyrang Street		**50**		**48**	✓

12.3.1 Beer Processing Building

Centrifuges from the Elephant House will be relocated into the new Beer Processing Building. There will be five centrifuges altogether including the addition of two new centrifuges. The existing centrifuges are located within a building and do not contribute to

noise levels at the residences on Nyrang Street. The new Beer Processing Building will also be enclosed and therefore represents a minimal risk with respect to noise impacts.

12.3.2 Refrigeration Plant to South of Engine Room

Refrigeration plant associated with the ammonia receivers and the glycol plant is located outside the south façade of the engine room. Currently there are nine air cooled condensers located at this location serving the ammonia receivers and glycol plant. The proposed upgrade works will remove all nine of these condensers and replace them with three water cooled condensers and a cooling tower. As such it is likely that noise levels will reduce and noise impacts are not expected.

12.3.3 Engine Room / Utility Building

Noise levels in the engine room/utility building are generally above 85 dB(A). The upgrade includes replacement of the three existing boilers with two new more efficient boilers. The existing noise levels from the engine room do not currently contribute to the noise levels experienced at the residences on Nyrang Street, due to the building envelope, sound insulation, significant shielding from the buildings fronting Nyrang Street and existing background noise being dominated by road traffic and activity noise from Tooheys operations at the front of the site. Noise levels in the engine room are highly likely to reduce as a result of the upgrade works, so there is expected to be insignificant noise impact relating to changes due to take place in the engine room / utility building.

12.3.4 Bright Beer Tank Cellar

The BBT Cellar stores the finished beer product ready for transfer into kegs, cans and bottles in the bottling facility. There are no noise issues associated with the BBT Cellar.

12.3.5 Summary

The predicted noise levels resulting from the proposed upgrade are all below the most stringent noise criterion at the closest residences along Nyrang Street. This is as expected due to the relatively large distances between the source and receiver, significant shielding provided by the Tooheys buildings that front Nyrang Street, old plant being replaced by fewer modern and more efficient plant, and the background noise levels existing at the residences along Nyrang Street.

On this basis, and with consideration of the nature of the proposed upgrade, the noise impact at the residences along Nyrang Street is expected to be negligible. With the continued implementation of the noise reduction strategies, it is expected that noise from the site will be further reduced.

12.4 Management Measures

12.4.1 Construction

Despite the expected negligible noise impact from construction related noise and vibration on the closest residences at Nyrang Street, steps to minimise noise and vibration and maintain good practice will still be applied and include:

- acoustic monitoring if complaints are received;
- where appropriate, obtaining acoustic test certificates for machinery, noisy plant and machinery brought on to the site;
- control of working hours such that there is no work audible at nearby residences on Sundays, public holidays, or during the night time or evening work;
- fitting silencers to plant including residential grade mufflers to the exhausts of noisy items of plant;

- regular maintenance of plant to prevent plant from becoming noisy due to poor maintenance, such as blowing exhausts and loose and rattling components etc; and
- ensuring machinery is turned off when not in use, and machine enclosures are kept closed.

Tooheys also commit to regular communication with residents including notification of any changes to the works and reports on progress and provision of a telephone number that residents can call to make complaints and request information.

12.4.2 Operational

Notwithstanding the likelihood of noise levels reducing as a result of the proposed upgrade, Tooheys will review, and where feasible implement, the following measures as part of the continuing commitment to noise reduction across the site:

- doors, windows and any other openings in building envelopes to be closed wherever and whenever possible;
- acoustic louvres to replace standard ventilation louvres;
- attenuators to be fitted to the dust extraction fans for the malt and grain silos;
- noisy items of plant located outdoors, such as the cooling tower and condensers, to have a barrier erected around them;
- attenuators to be fitted to the fans of the cooling tower;
- all plant to be well maintained by a program of preventative inspection; and
- access hatches on all plant to be closed firmly at all times when not being used.

An Operational Noise Management Report will be prepared to document the noise mitigation measures that have been or will be implemented to minimise noise from the brewery.

Chapter 13

Flooding

Summary

Current Operation and Performance:

Haslams Creek, which runs parallel to the north-western boundary of the site, is the main flood channel for the catchment area. There is an existing concrete bridge crossing Haslams Creek which has the potential to obstruct Haslams Creek flood waters.

Proposed Upgrade/Changes:

The proposed new beer processing building is approximately 75 m away from the Haslams Creek channel centreline.

Tooheys may require land adjacent to Haslams Creek to be utilised for temporary buildings during construction.

Potential Impacts:

There will be a negligible increase in terms of the volume of runoff and peak flow generated as a result of the proposed upgrade.

The upgrade will not change or impact on the current overland flow paths regime.

Statement of Commitments:

Commitments to minimise or manage potential impacts associated with flooding include:

- the building floor level will likely be set at 500mm above the 1 in 100 year flood levels, which will be confirmed once the distribution centre development and Haslams Creek bridge replacement has been finalised;
- no equipment or materials will be stored within 10m of the Haslams Creek channel embankment; and
- should Tooheys seek to erect temporary buildings in this zone the configuration will be such that they do not affect the flood regime of Haslams Creek and will be immune to flooding in the 1 in 100 year flood event.

13 Flooding

Section 13 reviews the existing flooding regime at the site, taking into account the distribution centre development, and assesses potential changes to the flooding regime associated with the proposed upgrade.

13.1 Baseline Conditions

The Tooheys brewery site is within the Haslams Creek Catchment draining to Homebush Bay. Existing overland flow routes within the brewery (i.e. internal path and roadways) convey major event flows to Haslams Creek for the western side of the site. For the eastern side of the site overland flows are directed to Nyrang Street.

The main branch in the catchment is the Haslams Creek channel with a 150 m long section running parallel to the north-western boundary of the site. The concrete channel is in the order of 7 m wide by 2 m deep and falls at approximately 0.6%. Midway along the north-western boundary of the site is the confluence of the St Hilliers Road Branch channel and Haslams Creek.

The St Hilliers Road Branch flows west-east in a smaller concrete channel in the order of 2.5 m wide by 1.4m deep; falling at 0.7% approximately. The centrelines of these two channels are at about 90º, with the St Hilliers Road Branch flowing through a curved section of channel immediately upstream of the confluence. The curved section results in the two channel flows merging at an angle of about 35º. The channel arrangement results in some backwater effects in each channel during major flooding events.

There is an existing concrete bridge crossing Haslams Creek approximately 60 m downstream from the confluence and near the north-western corner of the site. Figure 18 shows Haslams Creek from the bridge looking south towards the confluence, which can also be seen.

Figure 18 Haslams Creek and Bridge

This bridge and its abutments have the potential to obstruct Haslams Creek flood waters and are therefore likely to result in backwater flooding upstream of the bridge and on the site during major flooding events. The development of the adjacent distribution centre includes replacement of the bridge over Haslams Creek, which will alleviate flood obstruction associated with the bridge abutments.

There have been several flood studies commissioned to predict and assess the impact of flooding in the Haslams Creek Catchment. A study by Bewsher Consulting Pty Ltd; *Haslams Creek Floodplain Risk Management Study and Plan* (July 2002) has been adopted by Auburn Council to form the basis for flood impact assessments within the Haslams Creek Catchment. A further detailed two dimensional flood model was undertaken as part of the Development Application (DA) submission for the proposed distribution centre development. The outcomes of this modelling have been presented in Buckton Lysenko Consulting Engineers' Report *Flood Study for 17 to 19 Percy Street* (August 2006).

13.2 Impact Assessment

The two dimensional modelling results presented in the Buckton Lysenko report indicate that under the existing conditions as well as following the construction of the proposed distribution centre and Haslams Creek bridge replacement, the 1 in 100 year flood waters are likely to encroach onto a small area on the north western corner of the Tooheys brewery site.

The following review is based on interpretation of the results of the two dimensional modelling with no additional modelling being undertaken.

The only proposed building within the scope of the proposed brewery upgrade works with the potential to obstruct floodwater flows is the new Beer Processing Building. The new Beer Processing Building has its closest point approximately 75 m away from the Haslams Creek channel centreline. The flow velocities within the upgrade areas (as indicated in Buckton Lysenko report) are less than 0.5 m/sec indicating that these areas are outside the main 1 in 100 year flowpath and therefore will not directly obstruct flooding flows.

In regards to flood plain storage, the majority of the new Beer Processing Building is outside the 1 in 100 year extent with the exception of the north western corner. Depending on the condition considered, the flood water level would be approximately RL6.5 m to 6.6 m for the existing condition and approximately RL6.3 m to 6.4 m following the development of the distribution centre site and Haslams Creek bridge replacement. When comparing these flood levels to the existing ground levels within the area proposed for the new Beer Processing Building (RL 6.1 m to 6.9 m) it is anticipated that the loss of storage would be negligible. In terms of the inundated flood area, the rise in the flood level from the upgrade works would also be negligible.

In addition, there will be minimal increase in terms of the volume of runoff and peak flow generated as a result of the proposed upgrade. There is an approximate increase of 4% in impervious area of the portion of the site draining to Haslams Creek. This is related to the new Beer Processing Building that will be located on that land that is currently grassed. When taking into account the semi-permeability of the existing grassed area, it is estimated that there would be less than a 2% increase in peak site discharge as a result of the upgrade works. This increase is negligible when compared to the combined Haslams Creek/St Hilliers flows.

As the upgrade works are outside Haslams Creek's main flowpath and do not impact on flood plain storage, there will be negligible effect on flow velocities and flow regimes. In this way there will be negligible impact on channel erosion as a result of the works.

The upgrade works do not change or impact on the current overland flow paths regime.

The proposed brewery upgrade works do not alter the existing land profile with major basement excavations or site grading. Consequently, the upgrade works will have negligible impact of the on the existing ground water table.

13.3 Management Measures

Since there is an area of the Tooheys brewery site that is already within the 1 in 100 year Haslams Creek floodplain, and the upgrade would not impact on flood plain storage, it is not proposed to incorporate any on site stormwater detention to attenuate the minimal stormwater flow increase resulting from the upgrade.

In regard to floor levels, it is proposed to set the building floor levels 500mm above the 1 in 100 year flood levels. This level will be finalised once the distribution centre development and Haslams Creek bridge replacement have been finalised.

All drainage and site grading design will be undertaken with reference to Auburn Council's *Stormwater Drainage Development Control Plan*, June 2002.

Council have specifically requested that construction of the proposed upgrade not result in the storage of equipment, materials or temporary buildings within 10 m of the Haslams Creek channel embankment due to the potential flooding risk.

With regards to the storage of equipment and materials, Tooheys intend to comply with this request, however, Tooheys may seek to use this zone for temporary buildings during construction. Should Tooheys seek to erect temporary buildings in this zone, the configuration will be such that they do not affect the flood regime of Haslams Creek, and will be immune to flooding in the 1 in 100 year flood event.

Chapter 14

Stormwater

Summary

Current Operation and Performance:

Tooheys have a first flush system that diverts potentially contaminated stormwater to trade waste.

Stormwater runoff contamination from the brewery represents a real risk that is continually being addressed by Tooheys.

Increased automation and improved containment systems are part of an ongoing plan to lower risk of stormwater contamination from beer spills.

Proposed Upgrade/Changes:

The proposed upgrade does not include structures or buildings that would be expected to significantly alter overland flows or the amount of or quality of stormwater runoff.

Potential Impacts:

The proposed upgrade would not cause significant impacts on stormwater quality or water quality of Haslams Creek.

Statement of Commitments:

An indicative ESCP has been prepared and is provided in Appendix I. A final ESCP will be prepared prior to construction activities in accordance with Landcom's Managing Urban Stormwater – Soils and Construction, 4th Edition (March 2004) and any additional requirements contained in Auburn Council's Stormwater Development Control Plan (June 2005).

14 Stormwater

Section 14 describes the existing stormwater drainage network at the Tooheys brewery site, which drains to Haslams Creek via a first flush system, and assesses how stormwater flows are likely to change as a result of the proposed upgrade. This Section also identifies proposed measures to reduce the risk of off site water contamination from the tank farm.

14.1 Baseline Conditions

Within the Tooheys brewery site there is an established stormwater drainage network draining to Haslams Creek to the north-west and north of the site via a first flush system. This network is considered to provide an adequate drainage network for minor (normal level, higher occurrence) stormwater events.

During major storm events, where the capacity of the minor drainage network is usually exceeded, the existing overland flow routes within the site (i.e. internal path and roadways) would convey these major event flows to either Haslams Creek or Nyrang Street.

The contamination risks are posed through a number of possible scenarios from medium scale spills through mechanical failure to large scale spills of an entire vessel in conjunction with wet weather. Tooheys currently has in place a first flush stormwater protection system in operation which is capable of handling spills with a high occurrence and a moderate magnitude of severity.

14.1.1 Existing First Flush System

The first flush stormwater protection system diverts spills and contaminated runoff to trade waste rather than discharge to Haslams Creek. This system includes four first flush pits; servicing corresponding catchment areas, as shown in Figure 19. Figure 20 and Figure 21 provide a schematic showing how the stormwater management operates.

These catchment areas are based on the Spill Containment Action Plan, and subsequent site observations, and are described below.

- Pit Z drains a catchment that includes roofed warehousing, car parking, administrative buildings and loading areas. The proposed upgrade will not affect this catchment.
- Pits F, G, and H drain the catchments which include the brewing areas, workshops, tank farms, and chemical storage facilities.

In all cases, when a low level switch is covered for over 30 seconds, a pump located in each of the pits will be initiated.

During dry weather, all flows retained in the first flush pits are pumped to trade waste. If the water level inside the pits triggers a high level alarm or the pumps operate for more than an hour, a visual inspection from an on site operator is initiated.

In the event of wet weather, the pumps will operate for seven minutes or until the low level switch is uncovered. This is approximately 840 litres for Pit Z and approximately 3,360 litres for Pits F, G and H.

For Pit Z, to avoid pumping large quantities of rainwater to trade waste, during intermittent rain, the pump will not operate if it has previously operated within the last 24 hours. After seven minutes of diversion to trade waste a valve at the base of the pit opens and releases the remaining runoff into Haslams Creek.

For Pits F, G and H, an additional rain sensor determines if the rain is heavy. If heavy rain is detected, the initial seven minutes of pumping to trade waste is bypassed and the valve in the base of each pit opens and releases the runoff into Haslams Creek.

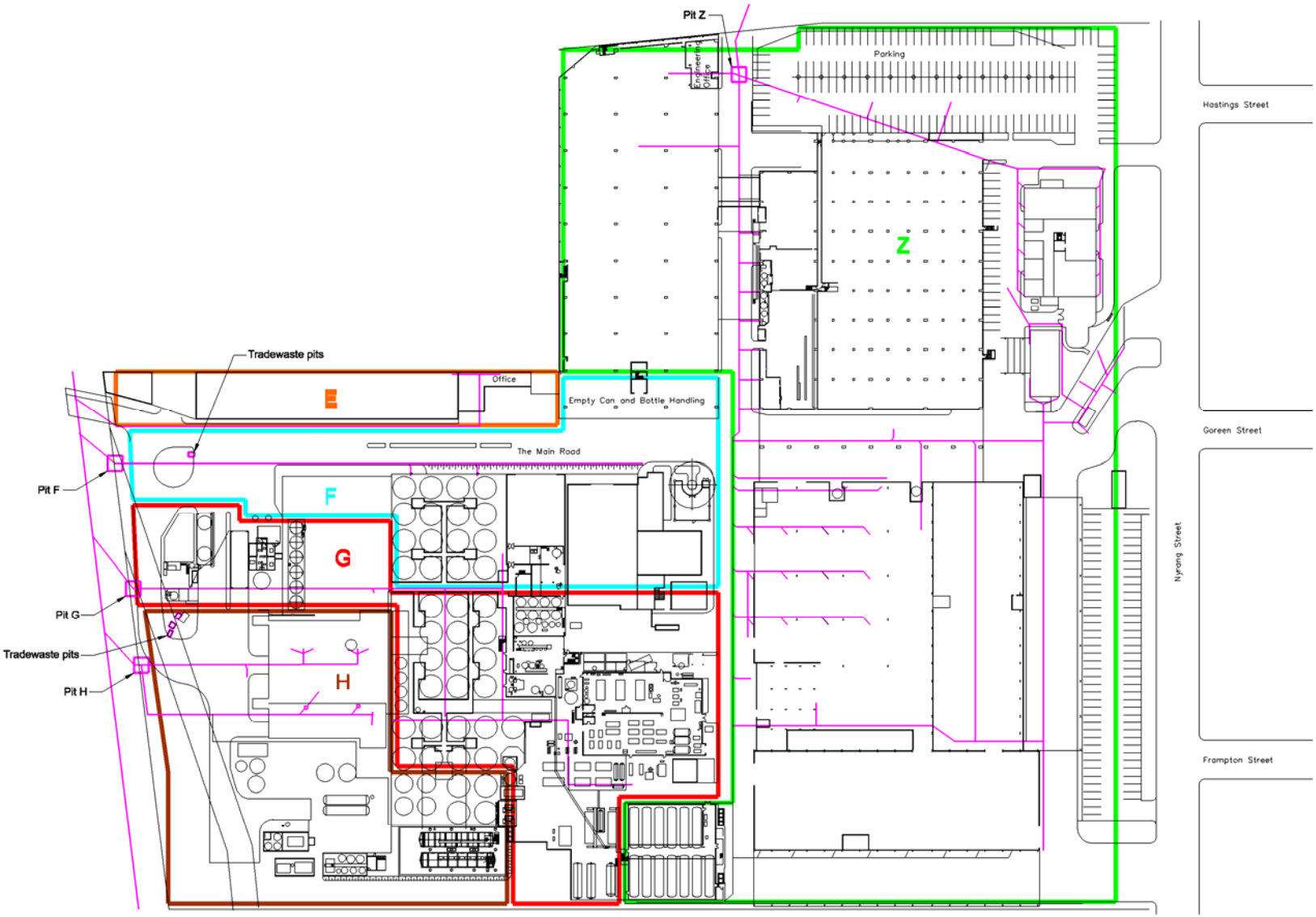


Figure 19 Stormwater Management System

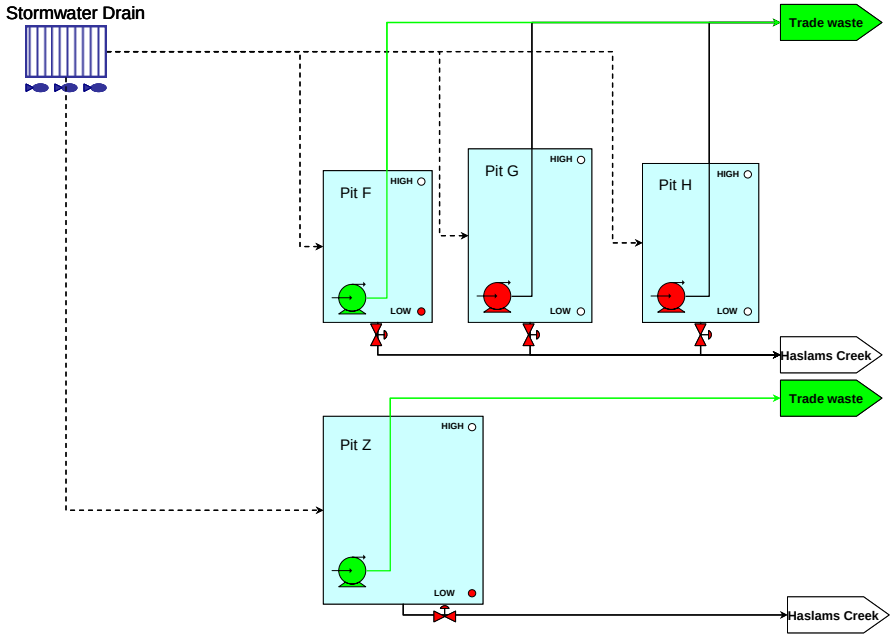


Figure 21 Stormwater Management System – Dry Weather

If the low level switch is activated during dry weather (shown by a red mark in the low level switch), the pump operates (shown by a green pump) and water in the pit is pumped to trade waste.

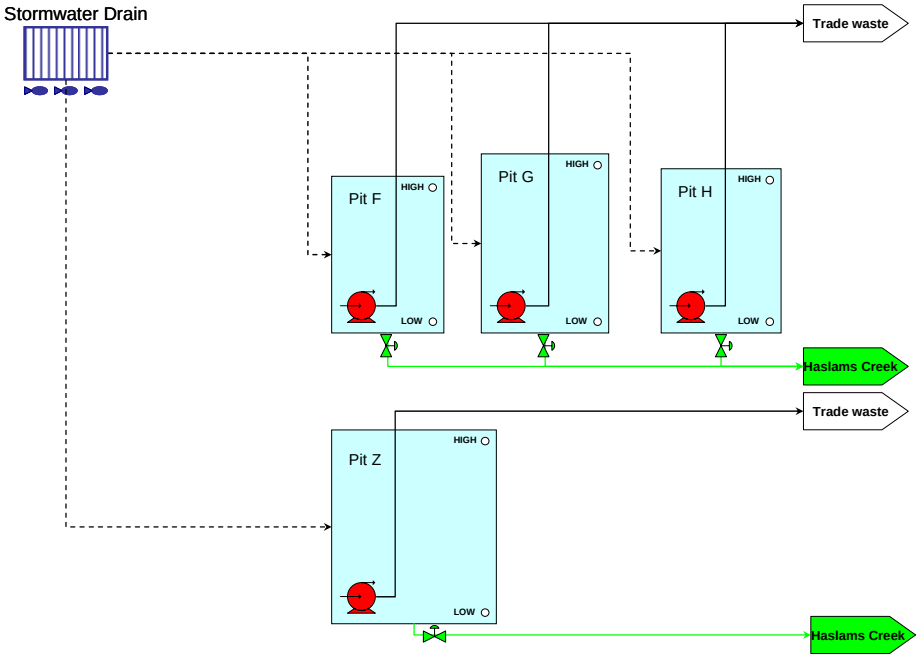


Figure 22 Stormwater Management System – Wet Weather

After a period of rain, the pumps are shut off (shown by a red pump) and water in all of the pits drains to Haslams Creek.

Following the first flush principle, it is considered after this period of time that all potential contaminants have been flushed from the site and diverted to trade waste.

Tooheys currently has a Consent to Discharge Industrial Trade Wastewater permit with Sydney Water Corporation which specifies criteria for pH, temperature, biological oxygen demand (BOD), suspended solids concentration, total dissolved solids concentration and grease concentration. Potentially contaminated water captured within the first flush system is treated and disposed of in accordance with this Consent to Discharge.

14.1.2 Spill Containment Action Plan

Tooheys is aware of the risk posed by the tank farm to the water quality of Haslams Creek resulting from beer spilling into the existing stormwater drainage network. Stormwater contamination risks and control measures are documented in a Spill Containment Action Plan prepared for the DEC by Tooheys.

As part of the management of spill events within Tooheys brewery, measures have been developed over and above the first flush system to prevent and reduce the risk of off site water contamination from the tank farm. Improvements that are being made include:

- The tank farm system valve manifolds will be located beneath the tanks, automated and bunded, removing the need for roofing over the tanks or between the tanks and preventing stormwater runoff washing spillage into stormwater drains. There will also be a reduction in the number of pumps that can fail.
- Pump house keystations and pumps will be centralised to provide consistency, simplification and a central layout across the entire tank farm allowing for early detection and containment of spills.
- Development of level control on all vessels in the external tank farm to detect leaks and automate spill response procedures.

14.2 Impact Assessment

From a stormwater drainage perspective, the proposed upgrade of the brewery site will see approximately 4% increase in impervious area as compared to the present site configuration. Though this increase in impervious area would lead to a minimal increase in the peak flow rate, the current site configuration includes a similar proportion of imperviousness. Accordingly, the existing drainage network/overland flow routes are considered sufficient to cater for the proposed upgrade works.

Through the prevention and containment measures outlined in the Spill Containment Action Plan, stormwater quality is likely to improve by reducing and eliminating the risk and impact of beer spills. This is an ongoing capital works project and will continue during the brewery upgrade.

14.3 Management Measures

14.3.1 Construction

An Erosion and Sediment Control Plan (ESCP) will be prepared for the construction activities to be undertaken for the proposed upgrade. The ESCP will identify the construction activities that could cause soil erosion or discharge sediment or water pollutants from the site and describe management methods to minimise such pollution. This will include a strategy to minimise the area of bare surfaces during construction.

The ESCP will be prepared in accordance with Landcom's *Managing Urban Stormwater – Soils and Construction, 4th Edition, March 2004*, and any additional requirements of Auburn Council's *Stormwater Development Control Plan, June 2005*.

An indicative ESCP has been prepared and is provided in Appendix I.

14.3.2 Operation

It is proposed to utilise the existing stormwater drainage network for the upgraded brewery. Where new drainage construction is required, the design and installation will be, where feasible, carried out in accordance with Auburn Council's *Stormwater Development Control Plan, June 2005* and applicable Australian Standards. In addition, where feasible, rainwater re-use measures will be utilised as an alternate water source at the site.

Chapter 15

Traffic

Summary

Current Operation and Performance:

There are approximately 345 vehicles associated with brewery operations that access the site daily. Approximately 95% are heavy vehicles including B-Doubles, semi-trailers and rigid trucks.

Heavy vehicles currently access the site via the main gate on Nyrang Street, or the secure entrance on Percy Street.

Proposed Upgrade/Changes:

No increase in traffic generation or staffing levels is anticipated as there is no change in overall production.

Potential Impacts:

There will be an increase in traffic accessing the site during construction of around 10 to 20 heavy vehicles per day, with a peak of up to 40 heavy vehicles per day during a concrete pour.

Construction related traffic will be over and above operational traffic generation of approximately 330 heavy vehicles per day. All of these vehicles will be required to use Nyrang Street as the Percy Street access will be used for the construction of the new distribution centre.

Once operational, the new distribution centre will reduce the number of heavy vehicles accessing the Tooheys brewery site via Nyrang Street, redirecting them to Percy Street.

Statement of Commitments:

Commitments to minimise or manage potential impacts associated with traffic will be addressed in a Construction Traffic Management Plan which will identify measures to minimise traffic impacts on local roads and to avoid conflict between the operational and construction traffic at the brewery.

Construction traffic would be restricted from using roads through residential areas.

15 Traffic

Section 15 summarises the Traffic Assessment provided in Appendix H. The traffic assessment includes investigation of the relevant intersections and consideration of the benefits associated with the close proximity of the proposed new distribution centre.

15.1 Baseline Conditions

15.1.1 Site Access

The site is located to the south of Parramatta Road, with site access through existing driveways on both Percy Street and Nyrang Street. Nyrang Street is the main entrance to the site, where the gatehouse is located. The access on Percy Street is a secure entrance operated remotely from the gatehouse and is primarily used for heavy vehicle access to the site. Nyrang Street is bound by industrial development on one side and residential development on the other, whereas Percy Street runs entirely through the industrial estate. The secure Percy Street site access is shown in Figure 22.

Figure 22 Percy Street Entrance

Nyrang Street and Percy Street both provide connections to Parramatta Road in the north. Nyrang Street is a two way local road with left-in, left-out access to Parramatta Road. Percy Street is one way southbound at Parramatta Road providing left-in access only. To the south, connection to St Hilliers Road from Percy Street is available via Hall Street. A connection to Olympic Drive from Nyrang Street is available via Boorea Street.

15.1.2 Existing Operational Traffic

The brewery has a range of vehicles that access the site, including small utility vehicles, rigid trucks, semi trailers, B-Doubles and tankers. The average number of vehicles that access the site daily is 345, with the following approximate breakdown:

- Semi-trailers (41%) – for keg and stock deliveries, and for packaging materials (such as bottles and cans).
- Rigid trucks (41%), primarily for transport of empty kegs and pallets, as well as for stock delivery, brewing supplies and store materials.
- B-doubles (15%) – primarily for keg and stock deliveries.
- Tankers (1%) – for brewing supplies and caustic.
- Small vehicles including vans and utes (1%) – for delivery of store materials.

Currently most heavy vehicles enter the site via Percy Street, and exit via Nyrang Street. The exception is the smaller rigid trucks that supply the general store. These smaller vehicles enter and exit the brewery via Nyrang Street.

The warehouse currently operates 24 hours per day. As such, truck movements associated with the stock delivery, and the bulk of packaging materials, also occur 24 hours per day, corresponding to over 75% of heavy vehicles movements and 72% of semi-trailer and B-Double movements. The remaining truck movements, including some heavy vehicles, the smaller rigid trucks, vans and utility vehicles generally access the site during daytime hours, between 6 am and 6 pm.

15.1.3 Intersection Analysis

Traffic surveys were undertaken during November 2006 in the morning and afternoon peaks. Intersections included in the survey were:

- Percy Street / Hall Street (signals).
- Parramatta Road / Nyrang Street (all movements possible, right turn bay provided from Parramatta Road into Nyrang Street).
- Nyrang Street / Boorea Street (roundabout).
- Percy Street / brewery access driveway.
- Nyrang Street / brewery access driveway.

The peak hours for traffic through these intersections were found to be 8:00am to 9:00am and 5:00pm to 6:00pm. The traffic counting identified that there were 20 vehicles entering or leaving the site via the Percy Street access during the morning peak, and 29 via the Nyrang Street access. During the afternoon peak, the respective number of vehicles was 15 at Percy Street and 17 at Nyrang Street.

The intersections of Parramatta Road/Nyrang Street, Nyrang Street/Boorea Street and Percy Street/Hall Street were analysed using SIDRA, an intersection analysis software package. The Level of Service (LOS) of these intersections was analysed. LOS is a performance measure based on the average delay experienced by vehicles through an intersection. LOS performance ratings can range from A (good) to F (poor), where D is considered acceptable.

The results of the analysis identify that the Nyrang Street/Boorea Street and Percy Street/Hall intersections operated at LOS A during the peak periods. Both Nyrang Street/Boorea Street and Percy Street/Hall Street have excess capacity.

The Parramatta Road/Nyrang Street intersection was analysed to operate at LOS F. However, observation during the survey revealed that the Parramatta Road/John Street signals provided sufficient gaps in the Parramatta Road through traffic such that vehicles turning out of Nyrang Street onto Parramatta Road and vehicles turning right from Parramatta Road into Nyrang Street did not experience excessive delays. The number of

vehicles queued for these movements rarely exceeded 5 vehicles, suggesting an acceptable LOS for the intersection.

15.1.4 Car Parking

Both off-street and on-street parking is available in and around the site. There are 385 off-street car parking spaces reserved for Tooheys staff and contractors (catering for approximately 200 staff). There are also 37 car parking spaces for visitors. The Tooheys car park access is off Nyrang Street adjacent to and on the north side of the site entrance. On-street car parking is available along both sides of Nyrang Street, with a typical parking occupancy of less than 50% of capacity throughout the day.

15.2 Impact Assessment

15.2.1 Construction

It is anticipated that additional heavy vehicle trips and a minor number of construction staff vehicles to and from the site will be generated by construction activities during the proposed upgrade. It is conservatively estimated that there would be an increase in traffic accessing the site during construction of around 10 to 20 heavy vehicles per day. A peak of approximately 40 heavy vehicles in one day would be expected during major concrete works.

The majority of construction related heavy vehicle trips would occur outside of the road network peak hours. Oversize prefabricated machinery and vessels will also need to be transported to site. This would most likely occur at night.

As the brewery will remain in operation for the duration of construction, construction related traffic will be over and above operational traffic generation of approximately 345 vehicles per day, which includes approximately 330 heavy vehicles per day.

Programming for construction works associated with the brewery upgrade and the distribution centre are due to overlap during 2007. Due to this overlap, the Percy Street site will be available for use by distribution centre construction traffic only. Traffic associated with the brewery upgrade will be required to use Nyrang Street during this time.

Furthermore, heavy vehicles that currently enter the brewery site via Percy Street will have to do so via Nyrang Street during the construction overlap period. This represents an increase of up to 50% of operational heavy vehicle movements on top of the additional construction traffic described above.

This period of overlap is expected to take place for approximately 6 months up to the end of 2007. After this time, there will be a significant reduction in the amount of operational brewery heavy vehicle traffic accessing the brewery (due to the direct internal movement of stock to the adjacent distribution centre – see below), significantly reducing the potential for conflict at the Nyrang Street site access.

Construction traffic will be prohibited from using local roads in residential areas to access the site. In particular, construction traffic routes will be restricted to the following:

- Nyrang Street north to directly access Parramatta Road; or
- Nyrang Street south, with a right turn into Booreal Road for westerly access, or left turn into Olympic Drive for southerly access.

The proposed construction traffic routes are shown in Figure 23.

Figure 23 Proposed Construction Traffic Routes

15.2.2 Operational

As it is not intended to increase the production rate of the brewery, no increase in traffic generation or staffing levels is anticipated and the project is not expected to have any significant impact on traffic or parking in the area.

Once the distribution centre is operational there will be a significant reduction in heavy vehicles accessing the brewery. Stock from the warehouse (other than keg deliveries) would be transported internally from the brewery to the adjacent distribution centre, where the loading and dispatch of finished product would be made solely via Percy Street.

Heavy vehicles associated with keg delivery, packaging and brewing that currently access the site via Percy Street will be required to do so via Nyrang Street once the distribution centre is operational. Due to the large proportion of heavy vehicles associated with stock deliveries, the total volume of heavy vehicles that leave the brewery site via Nyrang Street are expected to reduce significantly, by approximately 138 movements per day.

15.3 Management Measures

A Construction Traffic Management Plan would be prepared to identify likely vehicle trips for each stage of construction and to restrict construction traffic from using roads through residential areas. The Plan would also identify measures to address potential conflict between construction and operational vehicles at the brewery, and potential conflict with construction or operational traffic from the adjacent distribution centre.

Chapter 16

Visual

Summary

Current Operation and Performance:

The Tooheys brewery has a number of landmarks of significance within the local townscape, including the concrete water tower, the boiler stack and the malt tower with the Tooheys logo.

From Nyrang Street the site is dominated by the warehousing, packaging and administration buildings, as well as the car parking areas.

Proposed Upgrade/Changes:

The new buildings and structures associated with the proposed upgrade will be consistent with the existing buildings and structures.

The upgrade does not affect the buildings that create the Nyrang Street frontage.

Potential Impacts:

The new stack and buildings will be visible from certain locations in the vicinity of the site. In particular, the new stack is potentially sensitive from a visual impact perspective.

Statement of Commitments:

No specific commitments in relation to visual amenity and landscape are provided as the extent of visual impact is considered to be negligible.

16 Visual

Section 16 summarises the Visual Impact Assessment provided in Appendix J. The assessment identifies the key visual components of the brewery from the surrounding area and how this will change as a result of the proposed upgrade.

16.1 Baseline Conditions

The Tooheys brewery has evolved from a bottling plant and therefore the site has developed incrementally with a range of building types distributed across the site.

On the Nyrang Street frontage is the main administrative building, a five storey structure constructed c. 1980s. Flanked by this and set further back to accommodate on site parking is a two storey building with a saw-tooth roof. Together with the gatehouse, these buildings create the public frontage of the brewery. This area is the main entrance, via the gatehouse, to the operational aspects of the brewery beyond the Nyrang Street facing buildings. The upgrade does not physically or visually change the Nyrang Street frontage.

Other buildings within the site, which are not generally visible from public places, include a range of simple industrial-type buildings of varying heights and lengths purpose built to accommodate racking cellars, bottle handling and holding tanks for example. Other equipment, such as tanks, is stored externally. The brewhouse is the main structure sited at the western end of the site in proximity to Haslams Creek. It is currently visible from Percy Street owing to the adjacent vacant site.

Of greater significance within the local townscape are the landmarks which form part of the brewery operations. The concrete water tower, stack and malt tower with the Tooheys logo are prominent local landmarks. Other reference points proximate to the brewery are a brick stack, presumably relating to an early 20th century industrial use, and the dome and minarets of a mosque to the south of the development site.

16.2 Impact Assessment

Viewpoints were identified based on those that are publicly accessible and which illustrate the urban relationships that are likely to arise between the development and the urban environment, including those from within the residential area.

The sensitivity of the changes to views was assessed using wire line images for the new buildings and stack. The visual impact assessment is provided in Appendix I, including wire line images. A summary of the impacts from the different views is provided below.

- The new Beer Processing Building and part of the new stack will be visible from parts of Percy Street, however, this is not considered a sensitive viewing location and the impact is neutral.
- The development proposal would not be seen from Boorea Street.
- The new buildings will not be seen from Frampton Street due to differences in topography falling sharply towards Haslams Creek. The top portion of the new stack will be seen just north of the malt house. Changes to this view are negligible and are considered to have a neutral impact.
- On Gooreen Street the impact of the new stack will be negligible as only a small portion of it will be visible from this viewpoint position. As the other proposed buildings will be sited beyond the structures in the foreground, there will be little change to the Nyrang Street frontage.
- Owing to occlusion, the proposed changes will not be visible from Parramatta Road immediately to the north of the brewery.

16.3 Management Measures

The new buildings and structures associated with the proposed upgrade will be consistent with the existing buildings and structures at the brewery site. Except for the new stack, they will generally not be able to be seen from any sensitive view points. No additional mitigation or management measures are proposed.

Chapter 17

Heritage

Summary

Current Operation and Performance:

The site has been significantly modified from historical and existing industrial use.

Proposed Upgrade/Changes:

The new buildings and structures associated with the proposed upgrade are to be located within existing buildings or disturbed areas. However, Tooheys may require the area within 10 m of the banks of Haslams Creek for temporary buildings during construction works.

Potential Impacts:

While possible, it is unlikely for a relic in the land at the site to be uncovered during the construction works.

Works will not impact on the canalisation of Haslams Creek.

Statement of Commitments:

Tooheys will ensure that if a relic or artefact, either Indigenous or non-Indigenous, is discovered during construction then notification of the appropriate authority would occur and the appropriate approvals will be obtained.

17 Heritage

17.1 Baseline Conditions

17.1.1 Indigenous Heritage

The Wangal clan of the Eora Aboriginal tribe were the original inhabitants of the Auburn area and its surrounds.

17.1.2 Non-Indigenous Heritage

The Tooheys brewery site forms part of a larger land holding which was occupied by the Sydney Meat Preserving Company and originally part of Samuel Haslam's land grant. It opened in 1869 occupying a 146 acre site between Parramatta Road in the north and Haslams Creek Railway Station in the south.

From the 1960s the brewery site was used as a packaging and bottling facility until the commencement of actual brewing processes in 1978. The original brewhouse was formerly located on the grassed area to the north of the existing brewhouse, which is the proposed location of the new Beer Processing Building.

Sydney Meat Preserving Company

The Sydney Meat Preserving Company specialised in 'Apert's' method of preserving meat which refers to meat being boned, tinned and cooked in vacuum and received many prizes at international exhibitions including a Gold Medal at the Paris Exhibition in 1878.

When the Sydney Meat Preserving Company closed in 1955, the site was progressively reduced in size to 32 acres. Written descriptions and photographs of the site illustrate the majority of buildings were concentrated on the western side of Haslams Creek towards Parramatta Road. Originally a modest collection of buildings, the site grew to contain a number of industrial structures and stock yards. Buildings were of a simple form with saw tooth roofs clad in corrugated iron and brick chimney stacks and a number of small weather board buildings with shingle roofs. Buildings were also erected along the creek line which was made navigable. An aerial photograph of the site taken in 1948 shows what appears to be a large cleared building pad (possibly the result of a demolished structure) on the Tooheys site.

The *Auburn Heritage Study* (volume 3, 1996) identified the meat preserving works site, being the block bound by Parramatta Road, Percy, Nyrang and Boorea Streets (including the Tooheys site) as being of archaeological significance. While buildings and structures associated with the Sydney Meat Preserving Works have been removed and the ground surface has been disturbed, the study identifies that below ground archaeological features are likely to survive. According to the study, 'the site is significant because it may preserve remains of archaeological significance, pertaining to the technology of meat preserving.' The site has not been formally identified in Auburn Council's register of archaeological sites and potential archaeological sites.

Canalisation of Haslams Creek

Although the brewery site is not within a conservation area, nor is it a listed heritage item, it is adjacent to a non-indigenous heritage item of local significance, being the canalisation of Haslams Creek. The creek is named after Samuel Haslam who received two land grants in the area, one being on the eastern side of the creek, on 8 October 1816. In the late 1800s, Haslams Creek was used to transport timber from the area into Sydney by boats. It was also used for domestic purposes and by adjoining industrial properties, including the Sydney Meat Preserving Works.

In the mid 1920s, the quality of the creek had degraded to such an extent that swimming in the creek was prohibited. Effluent from meat preserving activities and leachate from the Rookwood cemetery were thought to be the causes. Ministerial inspections were undertaken in the late 1920s and a decision was made by the Public Works Department to fill in the original creek bed and construct a concrete channel. The project was undertaken during the 1930s and is considered to be as much of a scheme geared toward unemployment relief.

17.2 Impact Assessment

17.2.1 Indigenous Heritage

The site has been significantly modified and it is considered unlikely for indigenous artefacts to remain.

17.2.2 Non-Indigenous Heritage

Meat Works Archaeological Site

The site has been identified as a potential archaeological site, relating to the former Sydney Meat Preserving Company.

Clause 46 of the LEP concerns development of archaeological sites or potential archaeological sites. Potential archaeological features may exist on the brewery site, specifically remains relating to the meat processing use of the site.

While the potential for archaeological remains has been identified, it is not known to what extent the Sydney Meat Processing Company covered the brewery site or what level of change has occurred on the site.

It is noted that the site has been in continuous operation since 1955 and that the land has been significantly disturbed during that time. As such, while it is possible for a relic to be in the land at the site, the potential for such archaeological features is limited and it is considered unlikely for a relic to be present at the locations where works are required for the proposed upgrade.

Haslams Creek Canalisation

The canalisation of Haslams Creek south of Parramatta Road is identified in Schedule 2 of the Auburn Local Environmental Plan 2000 (Auburn LEP) as a heritage item. Clause 43 of the Auburn LEP relates to development in the vicinity of heritage items or heritage groups and requires the consent authority to consider the likely effect the proposed development on the heritage significance of the heritage item.

The Auburn Heritage Study considers the canalisation of Haslams Creek to be significant as it is ‘representative of drainage channels in the area, and is associated with government employment schemes in the 1930s Depression’. The Study recommends that the canalisation be conserved.

Although a number of works are proposed on the Tooheys site, none of these will physically impact upon the canalisation of Haslams Creek. All permanent buildings will be located within or adjacent to the existing developed area. In particular, the new Beer Processing Building is approximately 50 metres away from the bank of Haslams Creek. New buildings will be in keeping with the existing industrial setting of the site.

It is considered the redevelopment within the Tooheys site will not adversely affect the canalisation of Haslams Creek heritage item. The significance of the creek and its setting are also not considered to be affected by the brewery upgrade works.

Summary

The site has been significantly modified and it is considered unlikely for non-Indigenous artefacts to remain in the ground. The site has not been formally identified in Auburn Council's register of archaeological sites and potential archaeological sites.

17.3 Management Measures

During construction Tooheys will ensure that contractors are suitably aware of the potential for heritage items to be discovered during construction works and what their obligations are in the event that an artefact or relic is uncovered.

If a relic is uncovered during works, notice will be give to the appropriate Authority and the relevant permits obtained, under either the *Heritage Act 1977* with regards to non-Indigenous relics or the *National Parks and Wildlife Act 1979* with regards to Indigenous artefacts.

Council identify that avoiding the storage of construction materials and equipment within 10 m of the bank of Haslams Creek, and avoiding locating temporary buildings in this area would help to conserve the canalisation of Haslams Creek.

With regards to the storage of equipment and materials, Tooheys intends to comply with this request. However, if necessary, Tooheys may seek to use this zone for temporary buildings during construction.

Chapter 18

Cumulative Impacts

18 Cumulative Impacts

An assessment of cumulative environmental impacts considers the potential impact of a proposal in the context of existing developments and future developments to ensure that any potential environmental impacts are not considered in isolation. The extent of cumulative impacts to be considered depends upon the nature of the environmental issue.

The brewery upgrade is not considered to make a significant contribution to cumulative impacts associated with wider strategic policy such as greenhouse, resource consumption and waste disposal. The improved efficiencies that will occur as a result of the upgrade will reduce the brewery's load on natural resource consumption and waste systems resulting in a reduction in cumulative impact to wider environmental systems.

In the context of local cumulative impacts, including noise, odour, air quality, visual and traffic, the impact of the brewery upgrade is to be considered in combination with:

- the surrounding industrial developments;
- future developments including the proposed distribution centre to the west of the site;
- the nearby Parramatta Road and M4 Freeway; and
- the existing brewery operations.

For the most part, the impacts of these developments have already been incorporated as baseline conditions in the environmental assessment presented in Section 8 to Section 16. However, the baseline conditions do not incorporate future developments including the proposed Bevchain distribution centre. Therefore the cumulative impact assessment is limited to consideration of the combined impact of the brewery upgrade and the distribution centre.

Bevchain propose to construct a distribution centre at the site located 17- 19 Percy Street Lidcombe to the west of Tooheys brewery and Haslams Creek. The distribution centre development is described in Section 5.5.

As part of the development application process, a Statement of Environmental Effects (SEE) was produced to determine the potential environmental impact of the proposed distribution centre. This document has been reviewed to determine the cumulative impacts of the brewery upgrade and distribution centre developments.

18.1 Bevchain Distribution Centre

18.1.1 Traffic

The SEE for the distribution centre included a traffic assessment based on a 4-hour period made up of the busiest 2-hour period in the morning (7:00 am to 9:00 am) and the busiest 2-hour period in the afternoon, (3:30 pm to 5:30 pm).

With regards to heavy vehicles, the SEE identified an increase in the number of heavy vehicle movements at Percy Street from 28 to 109 movements across the 4-hour period once the distribution centre is operational. This corresponds to a reduction in heavy vehicle movements at Nyrang Street across this 4-hour period from 130 to 22 movements, a reduction of 108 movements. This is consistent with the estimation made in Section 15 that once the distribution centre is operational there would be a reduction in the order of 138 heavy vehicle movements per day.

The SEE traffic assessment also included an analysis of intersections potentially affected by the heavy vehicles accessing the distribution centre via Percy Street. The analysis identified the intersection between St Hilliers Road and Hall Street as being the critical intersection. Based on the additional estimated traffic from the distribution centre, this

intersection would operate at Level of Service B (LOS B) during both the AM and PM peak periods once the distribution centre is operational.

The traffic assessment provided in Section 1 includes a detailed discussion of the traffic benefits associated with the co-location of the distribution centre and the Tooheys brewery.

18.1.2 Construction Traffic

Construction of the distribution centre is programmed to commence in early 2007. There will therefore likely be programming and staging issues associated with potential access implications via Percy Street for transportation of construction materials, plant and equipment for the brewery upgrade. It is proposed that potential conflict between the construction traffic associated with the distribution centre and the brewery upgrade be addressed via the Construction Traffic Management Plan.

It is expected that the distribution centre will be completed prior to the completion of the brewery upgrade works. As such, the potential conflicts between Tooheys brewery site construction traffic and operational traffic from the distribution centre will also be considered in the Construction Traffic Management Plan.

18.1.3 Flooding

The flooding analysis in Section 13 includes the outcomes and results of the flooding study undertaken for the distribution centre development.

The new distribution centre includes redevelopment of the bridge across Haslams Creek. The redevelopment of this bridge, as well as the new warehouse structures on the site, will alter the flood regime in the vicinity of the Tooheys brewery site. The distribution centre and the redevelopment of the bridge have been designed to ensure they are consistent with the objectives and outcomes of the Haslams Creek Flood Study. The distribution centre site has therefore included construction of a riparian corridor and overland flow path to contain and carry floodwaters. The redeveloped bridge over Haslams will improve the flooding regime by reducing the impedance of floodwaters.

18.1.4 Noise

A significant proportion of Tooheys products will be diverted internally to the distribution centre resulting in heavy vehicles being rerouted to use Percy Street rather than Nyrang Street. This would include all stock deliveries from the warehouse, except for kegs, likely to reduce the existing noise impact of heavy vehicle movements on the residents of Nyrang Street.

Percy Street does not contain any residential receivers with the land either side being used for light industrial uses. The nearest residences are to the north west of St Hilliers Road, which is north west of the new distribution centre. St Hilliers Road is a busy road that is likely to mask any noise impact from heavy vehicle movements on Percy Street.

The noise assessment undertaken for the SEE concludes that the proposed distribution centre would not adversely impact nearby residential receivers or industrial land users provided that heavy vehicles do not drive on residential roads and do not use the Percy Street/Boorea Street intersection between 10pm and 7am.

18.1.5 Visual

The new distribution centre includes warehouse components between 11 m and 23 m high, generally to the west and north-west of the brewery site. These building structures would provide further shielding of the brewery from the Percy Street and other locations to the west.

18.1.6 Summary

The cumulative impact assessment indicates that the combined environmental impact of the Bevchain distribution centre and the brewery upgrade is not likely to significantly impact the environment. The main cumulative impacts are associated with construction traffic and noise which are able to be addressed by construction programming and staging and will be outlined in the relevant construction management plans.

PART C

Commitments and Conclusions

Chapter 19

Environmental Management & Commitments

19 Environmental Management and Commitments

Based on the outcomes of the environmental impact assessment documented in Section 7 to Section 18, there are a number of environmental management or mitigation measures that are proposed to be implemented to ensure that there are no environmental impacts that exceed acceptable levels. These proposed management and/or mitigation measures have been consolidated into a draft Statement of Commitments, which is attached in Appendix J.

The draft Statement of Commitments includes the following important management and mitigation measures:

- **Compliance:** Prior to the commencement of construction a Statement of Compliance will be provided to the Department of Planning, specifying that all relevant conditions of approval (including commitments listed in the Statement of Commitments) have been complied with.
- **Staging:** If Tooheys decide to stage certain aspects of the upgrade, then a Staging Programme will be prepared to ensure that potential conflicts between the ongoing operation of the brewery and the construction works associated with the upgrade are addressed.
- **Community Consultation:** During construction of the upgrade works, and ongoing.
- **Construction Environmental Management:** A Construction Environmental Management Plan (CEMP) will be prepared. The CEMP will include:
  - a Construction Noise Management Plan;
  - an Erosion and Sediment Control Plan;
  - a Site Management Plan;
  - an Acid Sulfate Soil Management Plan;
  - a Construction Waste Management Plan; and
  - a Construction Traffic Management Plan.

  The CEMP will also deal with managing the potential for finding heritage items of relics at the site during construction.
- **Operational Environmental Management:** An Operational Environmental Management Plan (OEMP) will be prepared. The OEMP will include details of how the upgrade will be integrated into the existing environmental management systems at the brewery and will incorporate an Operational Waste Management Plan.
- **Hazard Management:** Tooheys will provide details of the existing risk management procedures at the brewery and how the upgrade is integrated into those systems. A Construction Safety Plan will also be prepared to ensure that the construction activities do not affect the operational parts of the brewery in a manner which might cause potential for off site risk to people or the environment.
- **Contaminated Land:** A Site Management Plan will be prepared and implemented to detail how potentially contaminated soils will be stored and handled at the site, and how contaminated soils will be disposed of from the site as part of the CEMP. The refuelling UST and associated pipe work and any disturbed contaminated soil will be removed and validation sampling of soils will be carried out.
- **Air Quality:** Mitigation measure to reduce dust generation and volatile organic compounds dispersion will be implemented during construction.

  The stack will be designed to ensure adequate dispersion of air pollutants, including:

- minimum discharge temperature of 250°C;
- minimum stack height of 25 metres; and
- maximum internal stack diameter of 1.95 metres.

- **Noise:** Construction hours for all construction activities that are audible at nearby residences will be limited to between 7:00 am and 6:00 pm, Monday to Friday.

  Tooheys will also document for the Department of Planning, by way of an Operational Noise Management Report, noise mitigation measures that have been or will be implemented to minimise noise from the brewery site.

- **Flooding:** Equipment and materials will not be stored within 10 m of Haslams Creek, however this area may be required to be used for temporary buildings associated with construction. Any such buildings will be immune to the 1 in 100 year flood event.

- **Stormwater:** Where feasible all drainage and site grading design will be undertaken in accordance with Auburn Council's *Stormwater Drainage Development Control Plan*, June 2002.

- **Traffic:** Construction traffic will be required to use Nyrang Street to directly access Parramatta Road or Olympic Drive via Booreal Road. No other local roads will be used during construction.

- **Heritage:** If a heritage item is discovered during construction works then work in the vicinity of the item will stop and the appropriate authority will be contacted.

Chapter 20

Ecologically Sustainable Development

20 Ecologically Sustainable Development (ESD)

20.1 The Principles of ESD

Sustainability principles are outlined in both NSW and Commonwealth legislation. The NSW *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) includes the following principles of ESD as considerations which must be given regard in justifying the carrying out of a development or activity*:*

a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

ii) an assessment of the risk-weighted consequences of various options.

b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

c) conservation of biological diversity and ecological integrity—namely that conservation of biological diversity and ecological integrity should be a fundamental consideration.

d) improved valuation, pricing and incentive mechanisms—namely, that environmental factors should be included in the valuation of assets and services such as:

i) polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance and abatement,

ii) the users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

ESD is given further planning impetus through the Auburn Local Environmental Plan. Clause 8 promotes the conservation of natural resources and non-renewable energy resources through energy efficient design, construction techniques, choice of building materials and the utilisation of ecologically sustainable development techniques.

20.2 Consideration of the Principles

The application of ESD principles requires consideration of the project drivers and benefits against the cumulative environmental impacts of the project.

In the case of the proposed upgrade the principal drivers of the project are associated with the technological improvement of the brewery. The existing brewery includes several components of outdated and inefficient plant and equipment. Capital expenditure to replace this plant and equipment with modern and more efficient plant and equipment has a number of benefits. In the case of this project, some of the key benefits include:

- Reduced resource consumption per hectolitre of beer, including water, energy (electricity and natural gas), raw materials (including malt and grain) and process chemicals (including CO_2 and ammonia).

- Reduced waste (including solid waste, trade waste and emissions to air) from reduced leaks and spills and improved process efficiencies.
- Ongoing viability of the Tooheys brewery as a manufacturing facility, major employer, and iconic trademark in western Sydney.

Within this context, an assessment of the upgrade against the principles of ESD is provided.

a) *The precautionary principle:* It is not considered that the upgrade incorporates a threat of serious or irreversible environmental damage. There are a number of potential environmental issues associated with storage and use of dangerous goods (primarily ammonia), emission of air pollutants and potential for contamination of stormwater. However, this Environmental Assessment demonstrates that the potential environmental issues are either within established limits of acceptability and/or the potential for environmental damage is reduced as a result of the upgrade.

b) *Inter-generational equity:* The Environmental Assessment demonstrates that the health, diversity and productivity of the environment will not be affected detrimentally by the upgrade. Through the improved efficiencies resulting from the upgrade, the ongoing viability and capital investment into the brewery can continue, with the resultant employment opportunities retained. The improvements will also result in a lower rate of natural resources per hectolitre of beer, improving the overall environmental performance of the brewery.

c) *Conservation of biological diversity and ecological integrity:* The proposed upgrade will not impact on any threatened species or Endangered Ecological Communities. There will be no impact to biological diversity or ecological integrity of the locality, which is an area that is already largely devoid of natural ecosystems. However, even in the absence of identified natural ecosystems, potential off site impacts will be mitigated or have been assessed as within established limits of acceptability to safeguard biological diversity and ecological integrity.

d) *Improved valuation, pricing and incentive mechanisms:* The proposed upgrade will result in an improvement in the environmental performance of the brewery in parallel with improved economic efficiency. This illustrates that the existing valuation, pricing and incentive mechanisms for reduced natural resource consumption and reduced pollution are sufficient for Tooheys to make a capital investment in improving its environmental performance.

The choice of materials and techniques is subject to detailed design, and has not been finalised at this stage of the process. Notwithstanding this, it is intended for ESD techniques and energy and water efficiency measures to be incorporated into the detailed design of the new buildings and structures, and Tooheys will ensure compliance with section J of the Building Code of Australia (BCA).

Regarding the design of new buildings and the redesign of existing buildings, the features that will be incorporated into the design include:

- maximisation of natural light in the new Beer Processing Building, possibly by means of glazed wall panels and areas of polycarbonate sheeting and roof monitors at roof level;
- incorporation of natural ventilation and lighting into the existing utilities building; and
- incorporation of natural lighting on the southern façade of the new BBT Cellar.

Chapter 21

Conclusion

21 Conclusion

21.1 Conclusion

The justification for the project draws on the objectives of the project, the planning and statutory context of the project, and the outcomes of the environmental assessment that has been undertaken.

The objectives of the proposal are to improve energy and labour efficiency, lower water consumption and reduce production losses, improving the overall efficiency and environmental performance of the brewery.

The site is permissible with consent in the 4(a) zoning and is generally consistent with the objectives of the zone as set out in the Auburn LEP.

The site is currently used for brewing, and the continued use of the site for this purpose is considered to be consistent with the provisions of relevant environmental planning instruments as well as the Metropolitan Strategy. In particular, the continued use of the Tooheys brewery ensures that a significant industrial facility is retained within the existing industrial area that is serviced by infrastructure and currently operates as an employment hub.

Environmental assessment has identified that environmental impacts will be within acceptable guidelines or can be managed to be so. In particular, the site currently operates a range of environmental management systems, including stormwater, odour and noise controls, and Tooheys has in place procedures for continual improvements in regards to potential environmental impacts.

Measures have been proposed to ensure suitable mitigation and management provisions are employed during construction and operations. Tooheys has committed to these measures by their inclusion within the draft Statement of Commitments which is provided in Appendix K.

The proposal is generally consistent with the principles of Ecologically Sustainable Development.

21.2 What Next?

This Environmental Assessment details the potential environmental impacts associated with the proposal by Tooheys to upgrade the existing brewery.

The Environmental Assessment will be subject to stringent review by the relevant environmental regulators in NSW, being the Department of Planning and the Department of Environment and Conservation. During this time, the Environmental Assessment will also be made available to other relevant stakeholders, including Auburn Council and members of the local community.

Under the *Environmental Planning and Assessment Act 1979*, the Environmental Assessment will be advertised and publicly exhibited by the Department of Planning, and all interested parties will be invited to make a submission. Submissions must be made to the Department of Planning in accordance with any notice advertised by the Department. Submissions may include comments or suggestions regarding the proposal or an objection to the proposal.

The issues raised in all submissions will be provided to Tooheys and where warranted a response will be provided. At the time of responding to issues raised in submissions, Tooheys may make modifications to the proposed project to improve the environmental outcomes of the proposal.

The Minister for Planning will then determine the proposal by granting approval, which may be subject to conditions, or by refusing the project.

If the project is approved, Tooheys will then commence the process of finalising detailed design of the upgrade and securing a contractor to carry out the proposed works. If the approval is subject to conditions, Tooheys and the contractor, will be required to comply with conditions at all times during the construction and operation of the upgraded brewery.

References

A W Cox, F P Lees and M L Ang, 1990, Classification of Hazardous Locations, Institution of Chemical Engineers

Arup, 2006, Project KEY, Tooheys Brewery Upgrade, Geotechnical Interpretative Report, December 2006

AS/NZS 3931:1998 Risk Analysis of Technological Systems – Application Guide

AS/NZS 4360:1999 Risk Management

Auburn Council (2003), Auburn Development Control Plan 2000, Guidelines for Erosion & Sediment Control

Auburn Council Auburn Development Control Plans 2000, Car Parking and Loading

Auburn Development Control Plans 2000, Industrial Area Development Control Plan

Auburn Development Control Plans 2000, Stormwater Drainage

Auburn Local Environment Plan, 2000

Bewsher Consulting, 2002, Haslams Creek Floodplain Risk Management Study and Plan, July 2002.

Bewsher Consulting, 2003, Percy Street Flood Constraints (Ref: J1195), Letter to Tooheys dated 17 April, 2003

Buckton Lysenko Consulting Engineers, Flood Study for 17 to 19 Percy Street, August 2006

Danbrew, 2006, Project Key-Tooheys, Technical Clarification (18972), November 2006

Danbrew, 2006, Tooheys Masterplan (18692), April 2006

Davies Geotechnical Pty Ltd, Report on Geotechnical Investigation, Proposed Malt Silos, Tooheys Limited Brewery, Auburn NSW (Ref R/04-043.D), August 2004

Department of Environment and Conservation (NSW), 2006, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, August 2005

Department of Environment and Heritage, 2003, National Pollutant Inventory, Emission Estimation Technique Manual for Combustion in Boilers, Version 1.2, June 2003 <http://www.npi.gov.au/handbooks/approved_handbooks/fboilers.html>

Department of Environment and Heritage, 2005, National Pollutant Inventory Emission Estimation Technique Manual, Beer and Ready to Drink Alcoholic Beverage Manufacturing-Version 1.1, May 2005 < http://www.npi.gov.au/handbooks/approved_handbooks/beer.html>

Department of Environment and Heritage, Australian Greenhouse Office, 2005, AGO Factors and Methods Workbook, December 2005

Energeering, 2006, Confidential DEUS Energy Audit for Energy Saving Action Plan prepared for Tooheys Pty Ltd

Environmental Essentials, 2006, Environmental Legal Compliance Audit of Tooheys Brewery, Lidcome, January 2006

Environmental Investigation Systems, 2006, Report to Lion Nathan on Phase 1 Environmental Site Screening for Proposed Brewery Alterations at 29 Nyrang Street, Lidcombe, NSW, June 2006

European Commission, 2006, Integrated Pollution Prevention and Control Reference Document on Best Available Techniques in the Food, Drink and Milk Industries, August 2006 <http://eippcb.jrc.es/>

ICI Engineering Department, Process Safety Guide 14 - Reliability Data, ICI PLC (UK)

Ireland Environment Protection Agency, 2006, Draft BAT Guidance Note on Best Available Techniques for the Brewing, Malting and Distilling Sector

Jeffery & Katauskas, 2003. Geotechnical Investigation Proposed Warehouses Percy Street, Auburn.

Lees F.P., Loss Prevention in the Process Industries, 2nd Edition 1996

Maxitherm Boilers Pty Ltd, 2006 Gas Fuel Calculations for Water-Tube Boiler

NSW Department of Commerce, 2005, Water Efficiency Audit Report – Tooheys Brewery, September 2005

NSW Department of Environment and Conservation, 2003-2005,Quarterly Air Quality Reports 2003 (1-4), 2004 (1-4), 2005 (1-4) <http://www.epa.nsw.gov.au/air/airdata.htm>

NSW Department of Planning, 1997, Hazardous and Offensive Development Application Guidelines SEPP 33: Hazardous and Offensive Development Application Guidelines

NSW Department of Planning, 1998, Managing Land Contamination, Planning Guidelines, SEPP 55–Remediation of Land

NSW Department of Urban Affairs & Planning, 1992, Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning

NSW Department of Urban Affairs & Planning,1992, Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis

NSW Environment Protection Authority, 2006, Environment Protection Licence 1167, May 2006

NSW Government BioNet Database <http://www.bionet.nsw.gov.au> (accessed 22 September 2006)

Orica Engineering, Elgas, Victoria, Quantitative Risk Analysis, 2002

Orica Material Safety Data Sheet, Ammonia, July 2000

Philatus, 2003, Statement of Environmental Effects, Cooling Towers Required for Upgrading of Cooling Plant, October 2003.

Schwager Brooks and Partners Pty Ltd, 1996, Auburn Heritage Study: Draft Final Report (Volume 3)

Smyth Planning, 2004, Statement of Environmental Effects to Accompany Development Application for 6 Silos and 2 Fermenting Tanks Street Lidcombe, for Tooheys, May 2004.

Smyth Planning, 2006, Statement of Environmental Effects to Accompany Development Application for One CO2 tank, at No 29 Nyrang Street Lidcombe, for Tooheys, July 2006.

Sydney Water Corporation, 2005, Consent to Discharge Industrial Trade Wastewater (Consent Number 397.4 A)

Tooheys (Lion Nathan), 2005 Greenhouse Challenge 2004/05 Progress Report

Tooheys, (Lion Nathan), 2006, NPI Emissions Report 1 Jul 2005 – 30June 2006

Tooheys, 2006 Environmental Aspects & Impacts Register (REG-AT-OPS-ENV-0-007-01)

Tooheys, 2006, Dangerous Goods Listing

Tooheys, 2006, Environmental Management Programme, Objective and Targets F07

Tooheys, 2006, Noise Emission Results, Environmental Licence No. 1167, Update and Action Plan for Noise Reduction, July 2006

Tooheys, 2006, Spill Containment Action Plan, (Ref. PIN 7616958187), March 2006

Tooheys, Contingency Plan – Dangerous Goods on Site (PROC-AT-OPS-QUAL-CP-040-5)

Tooheys, Environmental External Communication Register1997 – 2006

Urban Environmental Consultants, 2006, Phase II Contamination Assessment Targeted Acid Sulfate Soil Assessment, Tooheys, 17 – 19 Percy Street, Auburn, August 2006.

US Environment Protection Agency,, AP 42, Fifth Edition Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Chapter 9.12.1, Malt beverages, <http://www.epa.gov/ttn/chief/ap42/>

Walker Corporation Pty Ltd, Statement of Environmental Effects, Demolition of existinf Buildings, Construction and Use of a New Warehouse & Associated Office Building, and Relocation of Bridge Over Stormwater Chanel, Lot 2 DP 230253, Lots 10(PT) & 11 DP 1008367, 17-19 Percy Street, Auburn and 290 Nyrang Street, Lidcombe

Wilkinson Murray, 2006, Tooheys Lidcombe Brewery, Environmental Noise Compliance Noise Monitoring, Environment Protection Licence No. 001167April 2006

WorkCover NSW, 2006, Acknowledgment of Dangerous Goods on Premises

Environmental Assessment Team

Roger Hayim	Project Director
Jonathan Garrett	Project Manager and Geotechnical Engineer
Stuart Hodgson	Environmental Manager
Tim Ward	Environmental Planner
Melanie Koerner	Environmental Engineer
Georgia Vitale	Senior Planner
Leanne Laughton	Environmental Scientist
Keith Hewett	Acoustic Engineer
Tim Bryant	Transport Engineer

Sub-consultants

Hazard and Risk	Pinnacle Risk
Contamination	Douglas and Partners