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Application Details	
Application Type	Development Permit – Material Change of Use
Defined Use	Special Industry (Whisky Distillery) & Hotel
Street Address	25 Finchley St Milton
Client	Lynette Anne Lee, Michael Lee
Local Government Area	Brisbane City Council
Date	December 2019

In support of an application for

**Material Change of Use - Special Industry (Whisky  
Distillery) & Hotel -  
Air Quality Assessment (AUSPLUME MODELLING)**

Received

12/12/2019

BCC DS




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### Limitations

This report was prepared for the sole use of Lynette Anne Lee and Michael Lee in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has not been prepared for use by parties other than the client, the owner and their respective consulting advisors. It may not contain sufficient information for the purposes of other parties or for other uses. It is recommended that any works planned by others and relating specifically to the content of this report be reviewed by JT Environmental Pty Ltd to verify that the intent of our recommendations is properly reflected in the final design. To the best of our knowledge, information contained in this report is accurate at the date of issue.

Document Status					
Rev No.	Author	Reviewer	Approved for Issue		
			Name	Signature	Date
A	NDW	TCD	TCD		07.08.19
B	NDW	TCD	TCD		13.11.19
C	NDW	TCD	TCD		10.12.19

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## 1.0 INTRODUCTION

JT Environmental has been commissioned by Lynette Anne Lee and Michael Lee to prepare an Air Quality Assessment for the proposed Distillery at 25 Finchley St, Milton and a review of the production process adopted by the proposed distillery for point and fugitive emissions.

This report has been prepared to address the BCC Air Quality Planning Scheme Policy for potential odours from the beverage production and any possible impacts to the surrounding residential uses. The intent is to identify the worst-case potential design ground concentrations that are likely to occur at the nearest existing receptor locations identified within this report. These receptor locations have been modelled at the most exposed façade of the dwellings from the expected emissions, with a total of 16 dwellings being modelled.

The purpose of this document is to provide a detailed Air Quality Assessment using Ausplume Air Quality Modelling in accordance with the Brisbane City Council (BCC) Air Quality Planning Scheme Policy to determine the impacts from emissions discharged from the Distillery on the basis of the projected emissions in from full production, being 10,000L/yr.

This Report will serve to identify that the proposed development does not subject existing sensitive receptors to reduced air quality from the proposed Distillery with the use of the Brisbane (Woolloongabba) Meteorological data. The Brisbane City Council City Plan 2018 indicates for residential development within 150-metres to industrial development are require to provide due consideration of the applicable air quality impacts and ensure that both satisfactory air and noise quality assessments are prepared based on the uses associated with the land designation.

Therefore this AQA seeks to determine:

1. Air emissions from proposed Micro Distillery from NPI Calculations etc - Ausplume;
2. Ausplume modelling:
  - Estimation at existing residential receptors and associated impacts where appropriate (Discrete receptors, eg small commerce).



## 1.2 LIMITATIONS OF THE AQA (AIR QUALITY ASSESSMENT)

It is stressed that this AQA does not negate the need for site Owner/s, Managers of the General Industrial area to continue to improve the environmental performance of any pollutant emitting activity. The conclusions of this report are provided to demonstrate the current Air Quality Environment of the proposed site is suitable for the new Distillery being applied for by the Town Planning application.

## 1.3 BCC DECEMBER RFI

### **Air quality - limitation - alcohol production**

- 1) Please clarify and confirm that the annual production will not exceed the limit modelled in the air quality report, and the development will not include on-site brewing (as assumed in the report, there is no on-site brewing).

**Response: Confirmed. This is not a Brewery. Distilling is a completely different process to a brewery.**

General Advice - ERA - Alcohol Production Please ensure that the proposed alcohol production will not trigger a State ERA for alcohol production. A non-devolved Environmentally Relevant Activity (ERA) - such as ERA 5 Alcohol production would require further relevant approvals from the State government.

**Response: ERA 5 (AES 48) trigger is 200,000L p/a. Proposed production is 10,000L p/a. This has been stated and if the ERA5 was trigger the ERA application would have been lodged.**

## 1.4 BCC OCTOBER RFI

- 2) Vapour condenser or carbon filter could reduce potential odour / air emission from a distillery. Clarify whether there would be vapour condenser and odour filter added to the exhaust gas outlet of the fermentation equipment.

### **Response:**

**Fermentation is not conducted as part of the Distillery process. The Distillery process involves the heating of the liquids from which a small volume of liquid condenses (alcohol) and the remainder evaporates.**

**As noted by NPI the emissions from the site per/year=**

- Ethanol = 0.022kg/y = 22g/year or 0.06g/day
- TVOC = 0.022kg/y = 22g/year or 0.06g/day

## 2.0 SITE DESCRIPTION

### 2.1 SITE DETAILS

Local Government Authority :	Brisbane City Council
Address of Site :	25 Finchley St, Milton

### 2.2 APPLICATION DETAILS

Type of Application :	Special Industry (Whisky Distillery) & Hotel
Contact Person and Phone :	Tyson Dodd

## 2.3 AERIAL PHOTOGRAPH

Below illustrates the location of the subject site in Milton and the location of sensitive receptors modelled as Discrete Receptors in the AUSPLUME modelling.



**Figure 1: Site and receptors in the locality of the proposal (Source: Google Earth).**

As identified in **figure 1** above, the nearest sensitive receptors to the proposed development are Finchley St. The land use along Finchley St is predominantly commercial and light industrial uses. Although not residential, these businesses are treated as sensitive receptors for the purpose of this report.

Given the location of the site and sensitive receptors in proximity to the emissions from the Distillery, this Air Quality Investigation is to identify the worst case scenario associated with the air emissions from the release from the entire process for which the primary emission will be during the kettle process.

## 2.5 PROPOSED DEVELOPMENT ENVIRONMENT

The proposed distillery operations will remain small in comparison to large scale operations in that its projected production volume is only 10 000L/yr.

Distillation of spirit from low alcohol whisky 'wash' (essentially an un-hopped beer) via 2 distillation runs in the copper stills. This reduces volume of product from an initial batch size

of 1000 litres to a final 'new-make spirit' volume of approx. 100 litres at high ABV (approx 63%ABV confirmed by our client). This is then decanted into oak barrels for ageing on-site for at least 2 years. The estimated quantity of new make spirit produced annually is 10,000 litres. Total storage in the bond store will amount to approximately 50,000 litres at any one time. Barrels will be racked into stacked rows for storage on the basement and ground floors. The site has been registered with the ATO as a legal bond store, and the licence from the ATO to distill alcohol on the site has been approved. Final product will be transported off-site as whisky in bottles (bottling occurring on-site at the Finchley St premises) after payment of excise.

As indicated, the release from the stack (60-90min/week) will release negligible organic matter (odour) and steam from the process with this design. This design is a common setup utilised in Distillery (especially through Europe and the UK). The use of the electric vessels has been updated from our client. The Distillery partners involved in the on/off site production confirm that *“there is Zero emissions in the bottling process, it’s just like pouring a spirit into a glass. The stills are electric and the ABV of stored spirit will be standard strength into the barrel of 63% and this tends to fall with water evaporation during ageing”*.

### 3.0 ASSESSMENT CRITERIA

#### 3.1 AIR QUALITY

##### 3.1.1 BRISBANE CITY COUNCIL

The BCC City Plan AQPSP specifies specific limit values for a range of compounds that are hazardous to health or pose a potential health risk. Where appropriate criteria are not presented in the AQPSP (BCC), it is normal to refer to standards presented in other guidance such as the Qld EPP for Air or comprehensive lists of air quality goals prepared by Vic EPA.

It is important to note that the size and type of production that is to be employed by Martin Wood is minor in nature compared to the intent of the air emissions required to be assessed for typical alcohol manufacturers(eg: Breweries) in Brisbane. .

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##### 3.1.2 AIR QUALITY MANAGEMENT AND CRITERIA

Brisbane City Council provides an Air Quality Planning Scheme Policy in its City Plan, which recommends levels in the Air Quality Planning Scheme Policy contained in the Brisbane City Plan 2014 (and 2000) have been considered. These levels have been identified, as they are generally accepted levels and comparable to those adopted by the Victorian EPA.

The air quality criteria which would have been adopted for this assessment if emission sources were present are those of the EPA and BCC Air Quality Planning Scheme Policy, or whichever is the lower. **Table 3** summarises the relevant Design Ground Concentration criteria recommended at a sensitive receiving environment from the Vic EPA guidelines.

SUBSTANCE	REASON FOR CLASSIFICATION	AVERAGING TIME	DESIGN CRITERIA mg/m <sup>3</sup> <sup>8</sup>		DESIGN CRITERIA ppm <sup>9</sup>	
Zinc oxide fume	Toxicity	3-minute	0.17		–	
<b>Class 2 (odour-based)</b>			<b>Odour</b>	<b>Toxicity</b>	<b>Odour</b>	<b>Toxicity</b>
Acetaldehyde	Odour	3- minutes	0.076	5.9	0.042	3.2
Acetic acid	Odour	3- minutes	0.50	0.82	0.20	0.32
n-Butanol	Odour	3- minutes	0.9	5.1	0.3	1.7
n-Butyl acetate	Odour	3- minutes	1.85	23.8	0.39	5.0
Butyl acrylate	Odour	3- minute	0.18		0.035	
Butyl mercaptan	Odour	3- minutes	0.012	0.06	0.004	0.017
Carbon disulphide	Odour	3- minutes	0.13	1.01	0.042	0.32
Chlorobenzene	Odour	3- minute	0.20	1.5	0.042	0.32
Cumene (isopropyl benzene)	Odour	3- minutes	0.039	8.1	0.008	1.6
Cyclohexanone	Odour	3- minutes	0.48	3.2	0.12	0.82
Diacetone alcohol	Odour	3- minutes	1.3		0.28	
Diethylamine	Odour	3- minutes	0.06	0.97	0.02	0.32
Dimethylamine	Odour	3- minute	0.017	0.59	0.0094	0.32
Diphenyl ether	Odour	3- minutes	0.14		0.02	
Ethanol	Odour	3- minutes	3.8	62.7	2.0	33.3
Ethyl acetate	Odour	3- minutes	22.1	23.6	6.3	6.6
Ethyl acrylate	Odour	3- minutes	0.0008	0.66	0.0002	0.16

Victoria Government Gazette

S 240 21 December 2001 21

**Table 1: Pollutant guidelines(EPA Victoria)**

NPI “Emission Estimation Techniques Manual for Aggregated Emissions from Beer and ready-to-drink alcoholic beverage manufacturing” indicates TVOC and Ethanol emissions during the operation.

## 4.0 AIR QUALITY ASSESSMENT - AUSPLUME MODELLING

### 4.1 INTRODUCTION

The air quality assessment has been completed in accordance with the City Plan Air Quality Planning Scheme Policy – Brisbane City Plan (AQPSP).

The technical aspects of the air quality assessment for this site upon the adjacent existing residential development have been previously discussed.

### 4.2 MODEL INTRODUCTION

Air quality modelling for sensitive receiving environments is generally completed when the emissions sources are known. The location of the new proposed facility on-site can be identified in this instance. Based on the existence of these sensitive receptors, appropriate modelling can be completed to investigate potential impacts on surrounding uses from the proposed Distillery, and to highlight to council that the proposed use will not create negative amenity, or produce emissions exceeding those identified in **table 3** of with *City Plan's Air Quality Planning Scheme Policy*.

### 4.3 NPI AND EMISSIONS CALCULATIONS

The AUSPLUME model has been established to estimate emissions within 1000m radius and at discrete existing commercial receptors. The grid coordinates and source locations applied in the assessment are shown in the modelling results. The discrete receptor locations are detailed in **Table 2** below.

**Table 2: Discrete Receptor Locations**

Receptor/Source Point	Easting	Northing
SV1	500571.70 m E	6961899.92 m S
R1	500565.00 m E	6961906.00 m S
R2	500564.00 m E	6961889.00 m S
R3	500563.00 m E	6961924.00 m S
R4	500603.00 m E	6961926.00 m S
R5	500609.00 m E	6961913.00 m S
R6	500624.00 m E	6961891.00 m S
R7	500585.68 m E	6961874.45 m S

### 4.4 MODELLING APPROACH

The AUSPLUME model has been run using the Environmental Protection Agency meteorological data file for Brisbane, which is considered to be the most appropriate meteorological data for the subject site. This data file was created from weather monitoring by the Dept EHP at Woolloongabba.

Ausplume is one of the preferred plume dispersion models for use in air pollution modelling of releases from emission sources in Queensland. Ausplume (version 6.0) was used in this assessment. This model is a Gaussian plume dispersion model developed by the Victorian Environmental Protection Agency for use in Australian Meteorological conditions. The Ausplume Model considers a range of parameters that are relevant to atmospheric Dispersion. Each of these parameters is considered in the following sections.

#### 4.4 RECEPTORS

A series of gridded receptors for the proposed development site was included in the dispersion modelling. Polar grid spacing at 10-metre intervals and 45 degree separation angles was modelled, as this would demonstrate the worst case scenario for the separation distance.

#### 4.5 METEOROLOGICAL DATA

For the dispersion modelling, the Brisbane meteorological data set development by the Queensland EPA was incorporated.



## 4.6 EMISSION SOURCE DETAILS

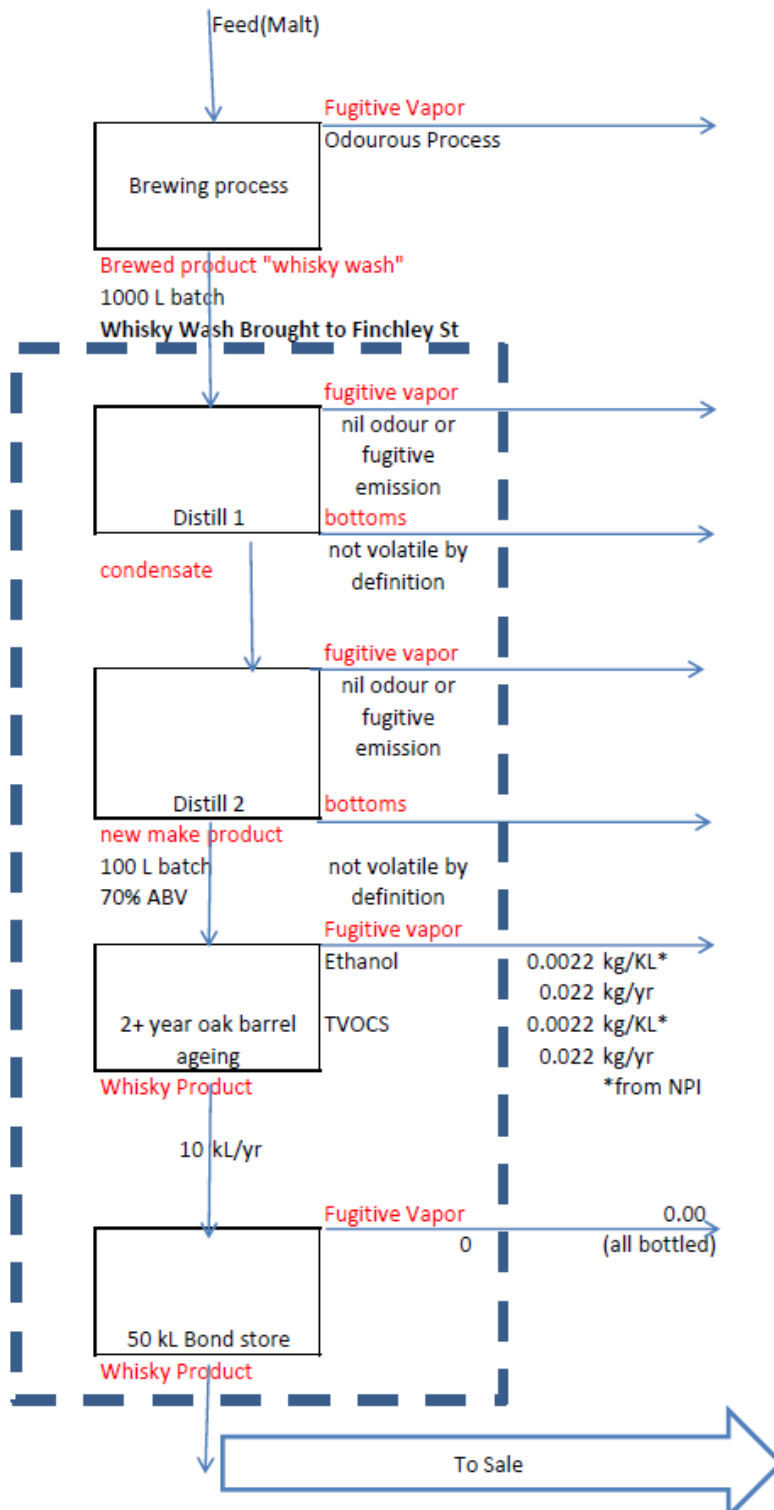
**Appendix B: Emission factors for ethanol and TVOCs emissions from beer and RTD beverage manufacturing**

Process emission source	Ethanol (kg/kL product packaged, unless otherwise specified)	TVOCs (kg/kL product packaged, unless otherwise specified)	Rating <sup>3</sup>
<b>Bottle filling<sup>1</sup></b>			
Bottle filling line (sterilised and unsterilised)	0.066	0.066	U
Bottle soaker and cleaner (currently not used in Australia)	0.091 kg/1000 cases (of bottles washed)	0.091 kg/1000 cases (of bottles washed)	U
<b>Can filling<sup>1,2</sup></b>			
Can crusher with pneumatic conveyer	10 kg/kL product recovered	10 kg/kL product recovered	U
Can filling line (sterilised and unsterilised)	0.054	0.054	U
Fermenter venting (closed fermenter)	0.0077	0.0077	U
<b>Keg filling<sup>1</sup></b>			
Keg filling line	0.0027	0.0027	U
<b>Cellaring<sup>1</sup></b>			
Cellaring	0.0022	0.0022	U
<b>Ready-to-drink (RTD) beverages – mixing technique<sup>3</sup></b>			
Filling alcohol storage tanks	0.052 kg/kL ethanol received	0.052 kg/kL ethanol received	U
Make-up area	0.036 kg/kL ethanol used	0.036 kg/kL ethanol used	U
Filling (sterilised and unsterilised)	0.066	0.066	U
<b>Ready-to-drink (RTD) beverages – cider fermentation technique<sup>2</sup></b>			
Fermentation	0.013	0.013	U
Cross blend tanks (storage)	0.0012	0.0012	U
Dilution tank	0.0007	0.0007	U
Filling	0.004	0.004	U
<b>Notes:</b> 1. Reference: USEPA AP-42 Section 9.12.1, 1996 2. Reference: Memo from Carlton and United Beverages Group, 2005 3. Details on the emission factor rating (EFR) can be found in this manual at Section 5.1.  The basis is ethanol in the solution. For example, if the solution was 65% (v/v) ethanol, the factor in terms off the solution would be $0.65 \times$ the EF provided.			

**Figure 3: NPI emissions information**

The modelling conducted includes the impact of the operation as individual stack source of the predicted VOC and OU concentrations at the adjacent receptor locations associated with the proposal from NPI total calculations in the emissions estimation technique.

## FINCHLEY ST DISTILERY EMISSION ESTIMATE



## 5.0 AUSPLUME MODELLING RESULTS

### 5.1 MAXIMUM PREDICTED DESIGN GROUND CONCENTRATIONS FOR THE RECEPTOR GRID

The results indicate that the design ground level concentrations at the receptor locations for directly affected Dwellings comply with the BCC and EPA criteria.

The modelling completed has been based on the emissions tool and guidelines from the NPI. The results for the Ausplume Dispersion Modelling for the identified receptors are presented in **table 5** below and Appendix B for the maximum predicted receptor concentrations occurring at the Discrete Receptors with the applied Maximum hourly emission rated determined.

**Table 3: Modelling ETHANOL results for each receptor location at upper levels (Max recordings – 1h).**

Receptors	Results (Ground level)	Time /date/year
R1	4.45E-01	@Hr18,23/05/64
R2	7.56E-01	@Hr18,25/07/85
R3	4.35E-02	@Hr18,03/07/85
R4	4.55E-04	@Hr18,29/07/85
R5	3.90E-02	@Hr18,16/07/85
R6	2.45E-02	@Hr18,20/06/63
R7	6.19E-02	@Hr18,26/07/85

**Table 4: Modelling TVOC results for each receptor location at upper levels (Max recordings – 1h).**

Receptors	Results (Ground level)	Time /date/year
R1	4.45E-01	@Hr18,23/05/64
R2	7.56E-01	@Hr18,25/07/85
R3	4.35E-02	@Hr18,03/07/85
R4	4.55E-04	@Hr18,29/07/85
R5	3.90E-02	@Hr18,16/07/85
R6	2.45E-02	@Hr18,20/06/63
R7	6.19E-02	@Hr18,26/07/85

As the Ausplume Output file indicates, *the maximum pollutant concentration occurs at the end of the day's operations and the pollutants disperse overnight*. The results in **tables 3 and 4** indicate that the emissions for each receptor achieve the required OU criteria for (BCC/EPA). As the source emissions are identical between TVOC and Ethanol, the receptor exposure is identical.

## 6.0 CONCLUSION

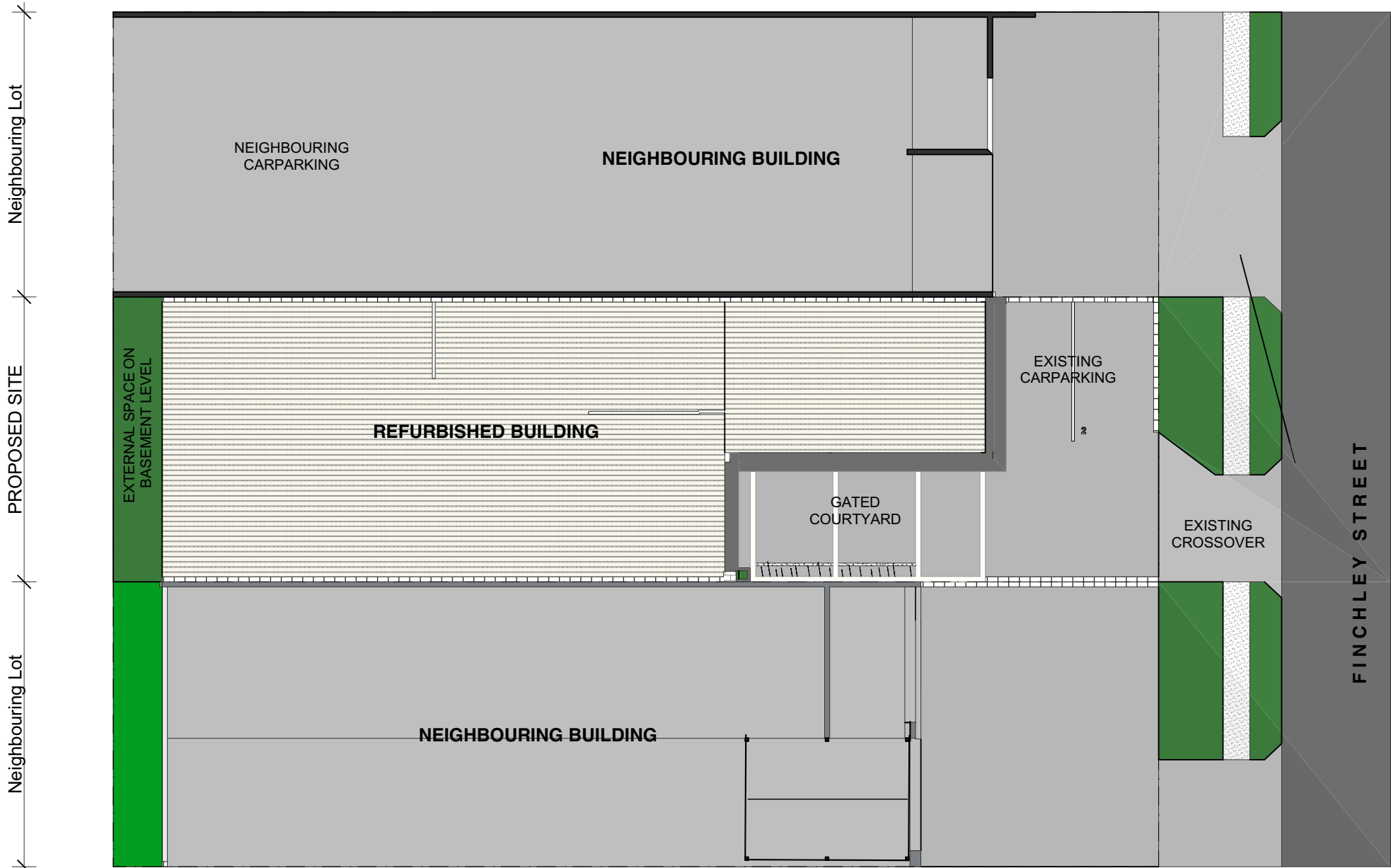
The proposed Distillery at Finchley St has been investigated for Odour emissions from the distilling process. As detailed, the proposed Distillery under ultimate conditions is expected to have the potential to produce 10kL/year. This operation is small in nature catering for boutique whisky types and recipes but provides a great opportunity to provide this type of service and exposure within the Brisbane area.

The modelling approach utilised for this assessment has been detailed within this report and is considered best practice and the emission level are based on NPI data for beverage production. The location was established with an appropriate receptor grid in addition to discrete receptor locations at relevant receptor locations of existing receptors.

As the output file indicates, the predicted worst-case levels for the discrete receptor modelled do not exceed the criteria indicated both BCC and EPA. The AUSPLUME output indicates that the proposed Distillery will not result in loss of amenity for the area in regards to air quality, and will not subject the sensitive receptors as indicated within this report to reduced air quality.

## 7.0 APPENDIX

### 7.1 APPENDIX A – SITE PLAN



**Finchley Street Whisky Distillery**  
25 Finchley Street Milton 4064  
**Mike Lee**

**Proposed Site Plan**  
scale: **1:200@A3**  
date: --/--/--

## SITE INFORMATION

Real Property Description: Lot 13 RP18886

Local Authority: Brisbane City Council  
Site Classification: Low Impact Industry

Site Area: 415 m<sup>2</sup>  
Building Area: 521.6 m<sup>2</sup>

## DEVELOPMENT INFO

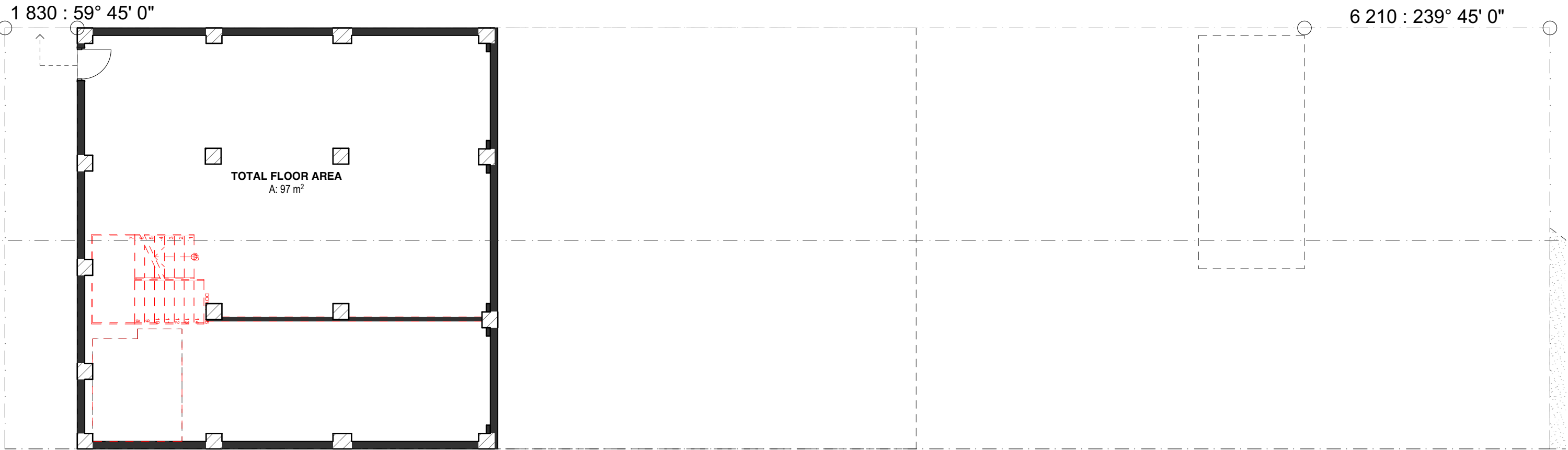
<b>GFA</b>	
<b>Licensed Bar Area (Hotel)</b>	
Kitchen	12.2 m <sup>2</sup>
Bar Space	22 m <sup>2</sup>
Function Space	82m <sup>2</sup>
Amenities	22.8 m <sup>2</sup>
Storage	30.4 m <sup>2</sup>
<b>TOTAL</b>	<b>169.4 m<sup>2</sup></b>
<i>External Dining</i>	<i>TOTAL 37m<sup>2</sup></i>

<b>Distilling Operations (Service Industry)</b>	
Distillery	13.5 m <sup>2</sup>
Bonded Storage	135.6 m <sup>2</sup>
<b>Ancillary to Distillery:</b>	
<b>Office (Office)</b>	
Existing Office Space	133.2 m <sup>2</sup>
Existing Amenities	7 m <sup>2</sup>
<b>TOTAL</b>	<b>289.3 m<sup>2</sup></b>
<b>TOTAL</b>	<b>458.7 m<sup>2</sup></b>

Site Area	415 m <sup>2</sup>
Existing Impervious Area	396.8 m <sup>2</sup>
Proposed Impervious Area	396.8 m <sup>2</sup>

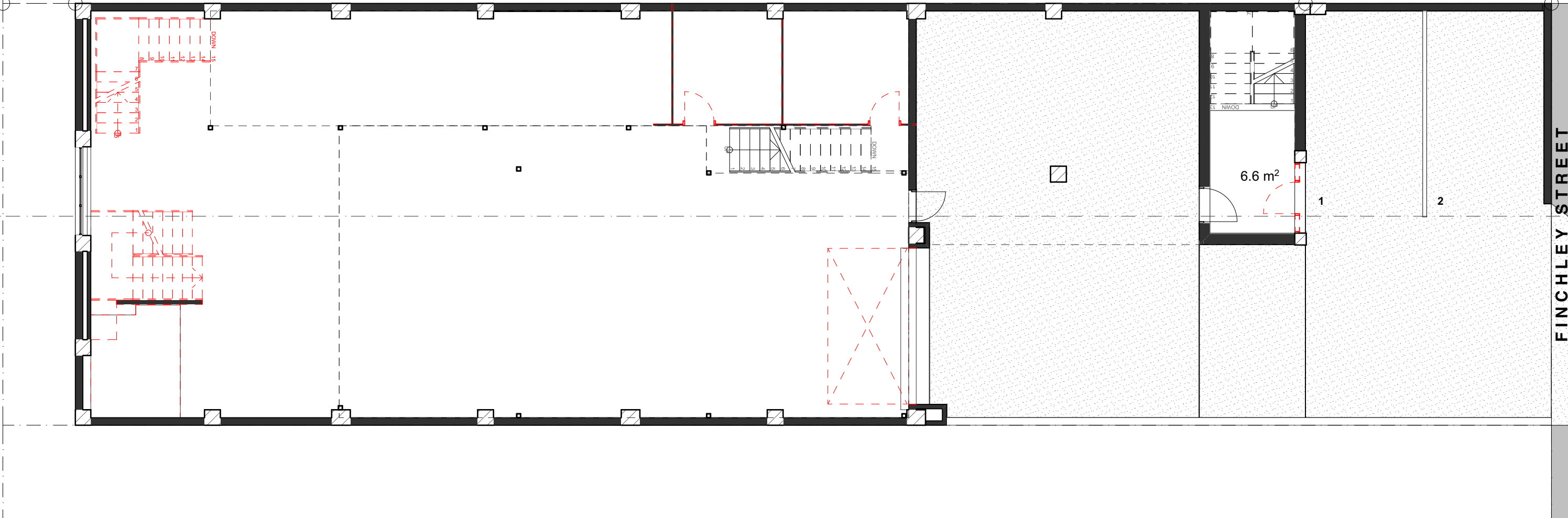


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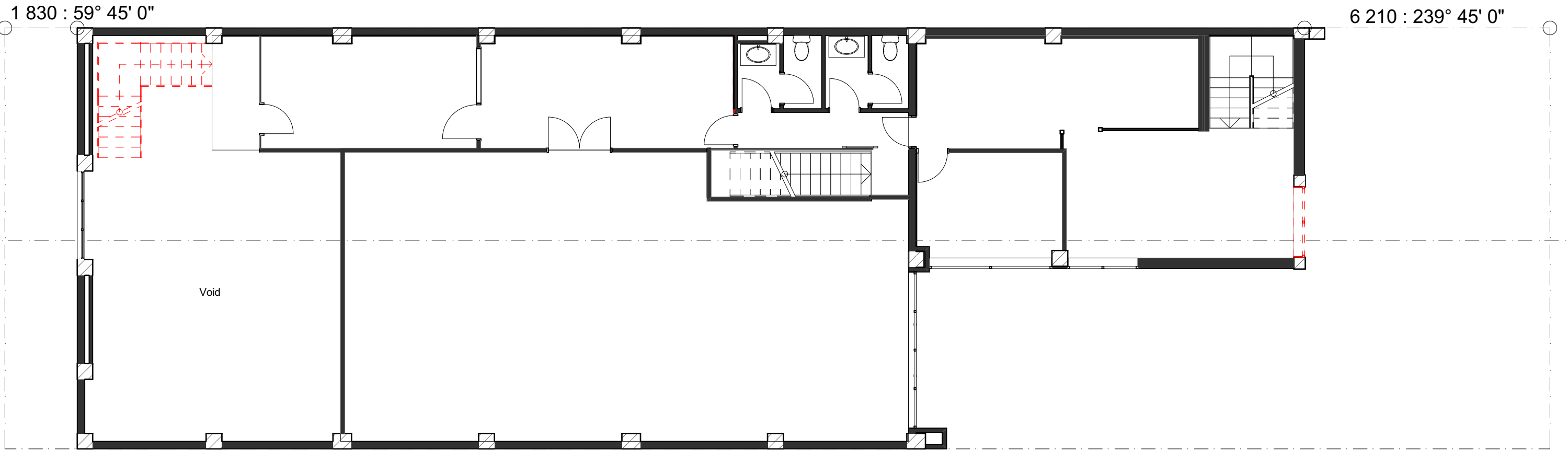


1 830 : 59° 45' 0"

6 210 : 239° 45' 0"







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Finchley Street Whisky Distillery  
25 Finchley Street Milton 4064  
Mike Lee

Proposed Basement Floor Plan

scale: 1:100@A3

date:



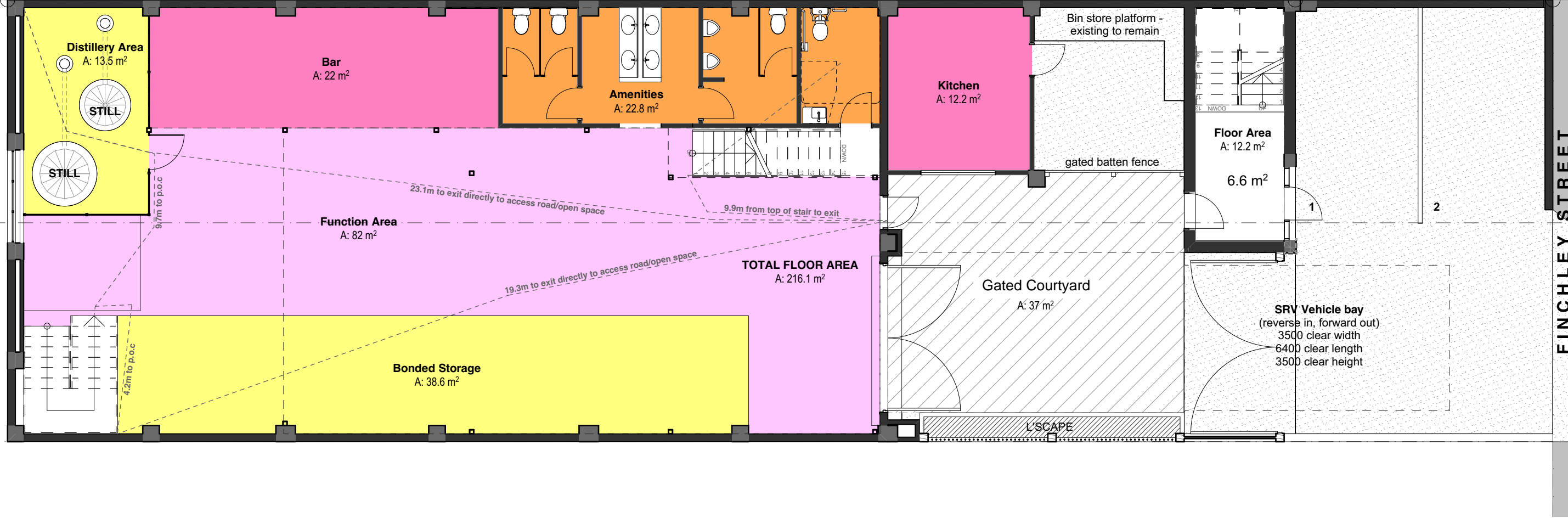
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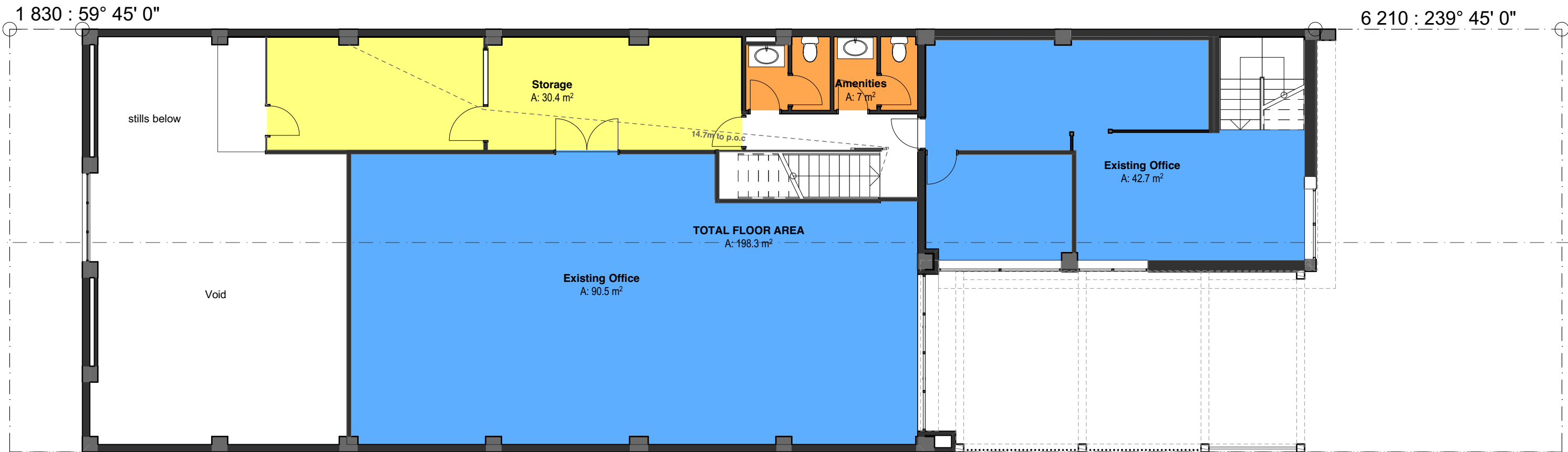
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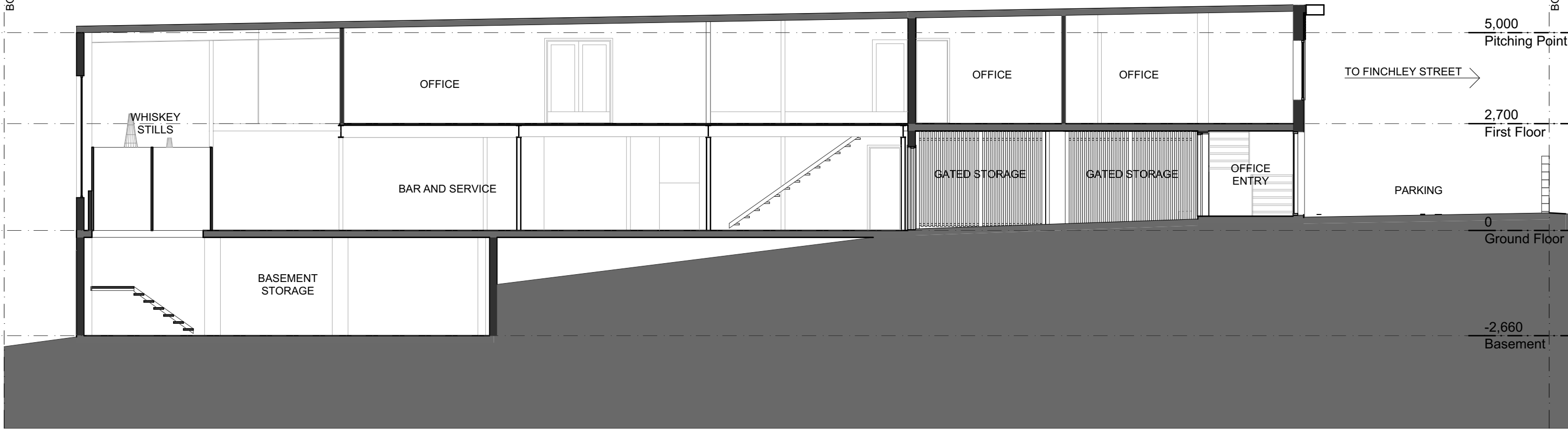
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Distillery	13.5 m <sup>2</sup>
Bonded Storage	135.6 m <sup>2</sup>
<b>Ancillary to Distillery:</b>	
<b>Office (Office)</b>	
Existing Office Space	133.2 m <sup>2</sup>
Existing Amenities	7 m <sup>2</sup>
<b>TOTAL</b>	<b>289.3 m<sup>2</sup></b>
<b>TOTAL</b>	<b>458.7 m<sup>2</sup></b>





1 Street Elevation  
SCALE 1:100 @ A3



# 1 Section 1





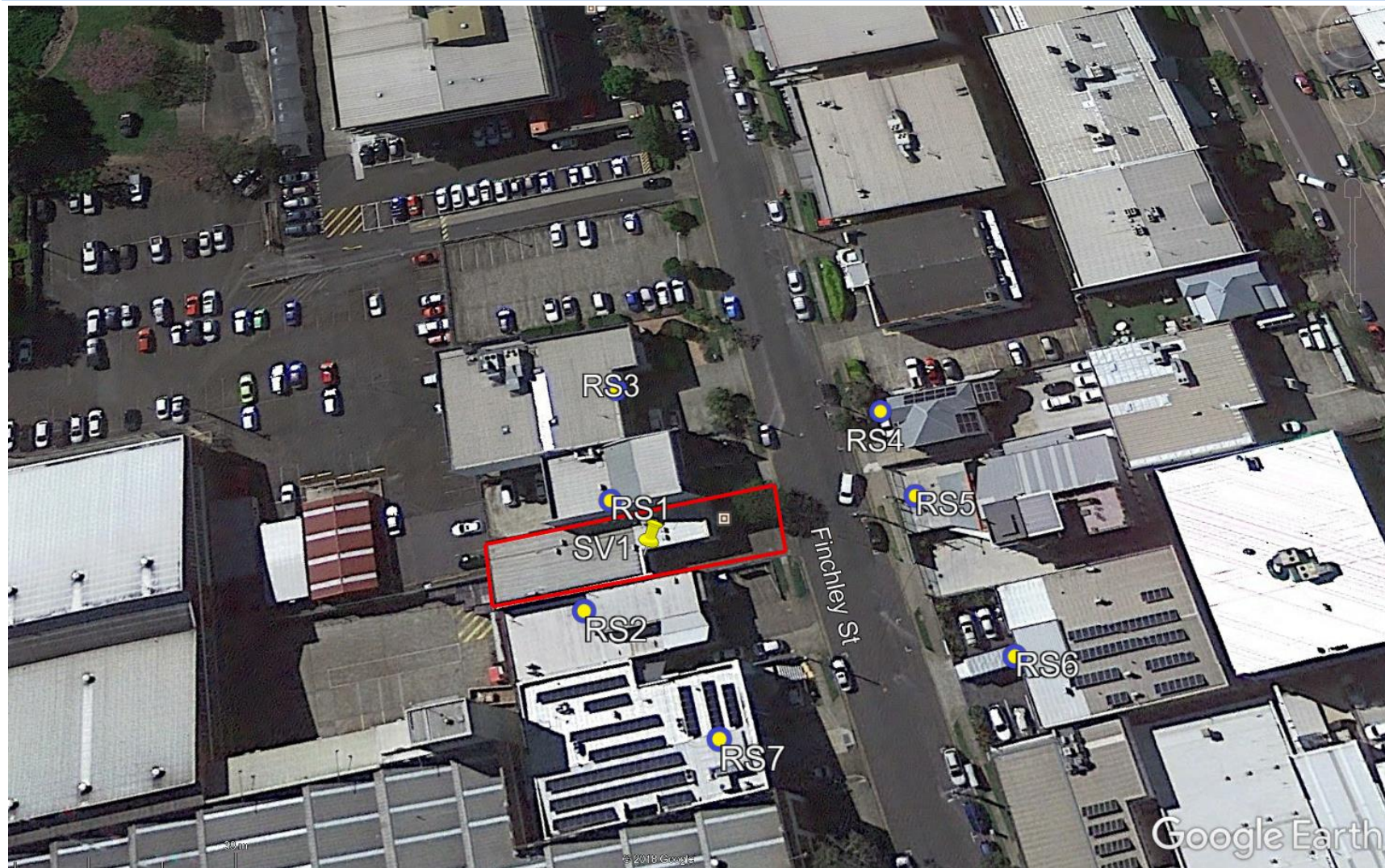
2 Streetscape View



1 Gated Courtyard



APPENDIX B – MODELLED RECEPTORS





## APPENDIX C – AUSPLUME OUTPUT TEXT CONCENTRATIONS AT RECEPTORS.

### ETHANOL

1

Finchley St AQA

Concentration or deposition	Concentration
Emission rate units	kg/hour
Concentration units	milligrams/m3
Units conversion factor	2.78E+02
Constant background concentration	0.00E+00
Terrain effects	None
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Roughness height at the wind vane site	0.300 m
Averaging time for sigma-theta values	60 min.

#### DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Sigma-theta
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.800m
Adjustment for wind directional shear	None

#### PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	PRIME method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed	Stability Class					
Category	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035

5 0.000 0.000 0.000 0.000 0.020 0.035  
 6 0.000 0.000 0.000 0.000 0.020 0.035

#### WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

#### AVERAGING TIMES

1 hour

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1

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Finchley St AQA

#### SOURCE CHARACTERISTICS

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STACK SOURCE: ETH

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
500571	6961899	0m	0m	0.01m	25C	0.0m/s

No building wake effects.

Emission rates by hour of day in kg/hour:

1 0.00E+00	2 0.00E+00	3 0.00E+00	4 0.00E+00
5 0.00E+00	6 0.00E+00	7 0.00E+00	8 6.00E-06
9 6.00E-06	10 6.00E-06	11 6.00E-06	12 6.00E-06
13 6.00E-06	14 6.00E-06	15 6.00E-06	16 6.00E-06
17 6.00E-06	18 6.00E-06	19 0.00E+00	20 0.00E+00
21 0.00E+00	22 0.00E+00	23 0.00E+00	24 0.00E+00

No gravitational settling or scavenging.

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1

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Finchley St AQA

#### RECEPTOR LOCATIONS

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The polar receptor grid has the following radii:

0.m	10.m	20.m	30.m	40.m	50.m	60.m	70.m
80.m	90.m	100.m	110.m	120.m	130.m	140.m	150.m
160.m	170.m	180.m	190.m	200.m			

and these bearings (in degrees):

0.0    45.0    90.0    135.0    180.0    225.0    270.0    315.0

DISCRETE RECEPTOR LOCATIONS (in metres)

No.	X	Y	ELEV	HEIGHT	No.	X	Y	ELEV	HEIGHT
1	500565	6961906	0.0	0.0	5	500609	6961913	0.0	0.0
2	500564	6961899	0.0	0.0	6	500624	6961891	0.0	0.0
3	500563	6961924	0.0	0.0	7	500585	6961874	0.0	0.0
4	500603	6961296	0.0	0.0					

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METEOROLOGICAL DATA : Ausplume Meteorological database for brisbane wool

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1    HIGHEST RECORDINGS FOR EACH RECEPTOR (in milligrams/m3)  
     AVERAGING TIME = 1 HOUR

At the discrete receptors:

1: 4.45E-04 @Hr18,23/05/64	5: 3.90E-05 @Hr18,16/07/85
2: 7.56E-04 @Hr18,25/07/85	6: 2.45E-05 @Hr18,20/06/63
3: 4.35E-05 @Hr18,03/07/85	7: 6.19E-05 @Hr18,26/07/85
4: 4.55E-07 @Hr18,29/07/85	

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1    Peak values for the 100 worst cases (in milligrams/m3)  
     Averaging time = 1 hour

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	7.56E-04	18,25/07/85	(500564, 6961899, 0.0)
2	7.23E-04	18,11/06/63	(500564, 6961899, 0.0)
3	7.23E-04	18,27/07/85	(500564, 6961899, 0.0)
4	5.91E-04	18,06/07/85	(500564, 6961899, 0.0)
5	4.45E-04	18,23/05/64	(500565, 6961906, 0.0)
6	4.31E-04	18,07/08/70	(500565, 6961906, 0.0)
7	4.04E-04	18,04/07/85	(500565, 6961906, 0.0)
8	3.33E-04	18,11/05/64	(500564, 6961899, 0.0)
9	2.97E-04	18,28/05/64	(500565, 6961906, 0.0)
10	2.93E-04	18,18/06/63	(500565, 6961906, 0.0)
11	2.15E-04	09,11/08/70	(500564, 6961899, 0.0)
12	2.14E-04	18,13/03/65	(500564, 6961899, 0.0)
13	2.10E-04	18,08/05/64	(500565, 6961906, 0.0)
14	2.07E-04	18,09/05/64	(500565, 6961906, 0.0)
15	2.05E-04	08,11/08/70	(500564, 6961899, 0.0)
16	2.04E-04	18,03/07/85	(500565, 6961906, 0.0)
17	1.99E-04	08,02/12/81	(500564, 6961899, 0.0)

18	1.81E-04	08,19/12/81	(500564, 6961899,	0.0)
19	1.80E-04	18,15/06/63	(500565, 6961906,	0.0)
20	1.75E-04	18,11/10/80	(500564, 6961899,	0.0)
21	1.65E-04	18,05/07/85	(500564, 6961899,	0.0)
22	1.52E-04	08,29/12/81	(500564, 6961899,	0.0)
23	1.40E-04	18,23/02/60	(500564, 6961899,	0.0)
24	1.40E-04	18,29/01/84	(500564, 6961899,	0.0)
25	1.39E-04	18,09/12/81	(500564, 6961899,	0.0)
26	1.32E-04	18,29/05/64	(500565, 6961906,	0.0)
27	1.31E-04	08,22/01/84	(500565, 6961906,	0.0)
28	1.31E-04	08,21/05/64	(500565, 6961906,	0.0)
29	1.30E-04	15,23/05/64	(500565, 6961906,	0.0)
30	1.30E-04	18,30/04/84	(500565, 6961906,	0.0)
31	1.25E-04	18,14/06/63	(500565, 6961906,	0.0)
32	1.21E-04	09,07/04/84	(500565, 6961906,	0.0)
33	1.20E-04	18,13/06/63	(500565, 6961906,	0.0)
34	1.16E-04	08,03/02/60	(500565, 6961906,	0.0)
35	1.11E-04	15,02/01/84	(500564, 6961899,	0.0)
36	1.08E-04	14,01/05/64	(500564, 6961899,	0.0)
37	1.06E-04	09,21/05/64	(500565, 6961906,	0.0)
38	1.04E-04	15,07/04/84	(500564, 6961899,	0.0)
39	1.03E-04	09,15/02/60	(500565, 6961906,	0.0)
40	1.02E-04	08,01/05/64	(500565, 6961906,	0.0)
41	9.95E-05	08,24/03/65	(500564, 6961899,	0.0)
42	9.92E-05	08,08/01/84	(500564, 6961899,	0.0)
43	9.90E-05	08,15/02/60	(500564, 6961899,	0.0)
44	9.88E-05	10,17/02/60	(500564, 6961899,	0.0)
45	9.88E-05	09,24/03/65	(500564, 6961899,	0.0)
46	9.85E-05	12,03/01/84	(500564, 6961899,	0.0)
47	9.81E-05	09,02/12/81	(500564, 6961899,	0.0)
48	9.78E-05	16,10/12/81	(500564, 6961899,	0.0)
49	9.72E-05	15,20/05/64	(500564, 6961899,	0.0)
50	9.67E-05	11,16/11/66	(500564, 6961899,	0.0)
51	9.67E-05	09,20/11/66	(500564, 6961899,	0.0)
52	9.61E-05	09,14/02/60	(500564, 6961899,	0.0)
53	9.61E-05	12,26/12/81	(500564, 6961899,	0.0)
54	9.54E-05	12,02/01/84	(500564, 6961899,	0.0)
55	9.54E-05	16,17/04/84	(500564, 6961899,	0.0)
56	9.54E-05	10,16/11/66	(500564, 6961899,	0.0)
57	9.51E-05	18,07/07/85	(500565, 6961906,	0.0)
58	9.30E-05	18,17/04/84	(500564, 6961899,	0.0)
59	9.27E-05	15,10/12/81	(500564, 6961899,	0.0)
60	9.21E-05	17,23/04/84	(500564, 6961899,	0.0)
61	9.06E-05	17,10/12/81	(500564, 6961899,	0.0)
62	9.00E-05	08,14/02/60	(500564, 6961899,	0.0)
63	9.00E-05	09,16/04/84	(500564, 6961899,	0.0)
64	9.00E-05	18,18/09/68	(500564, 6961899,	0.0)
65	9.00E-05	18,02/01/84	(500564, 6961899,	0.0)
66	8.89E-05	15,17/04/84	(500564, 6961899,	0.0)
67	8.77E-05	17,17/04/84	(500564, 6961899,	0.0)
68	8.77E-05	08,16/04/84	(500564, 6961899,	0.0)
69	8.64E-05	16,25/07/85	(500564, 6961899,	0.0)
70	8.51E-05	11,02/01/84	(500564, 6961899,	0.0)
71	8.30E-05	15,03/12/81	(500564, 6961899,	0.0)
72	8.28E-05	11,09/02/60	(500564, 6961899,	0.0)

73	8.11E-05	13,10/12/81	(500564, 6961899,	0.0)
74	8.08E-05	13,01/05/64	(500565, 6961906,	0.0)
75	8.06E-05	18,24/06/63	(500565, 6961906,	0.0)
76	7.88E-05	14,02/01/84	(500564, 6961899,	0.0)
77	7.75E-05	08,07/04/84	(500565, 6961906,	0.0)
78	7.71E-05	14,20/05/64	(500564, 6961899,	0.0)
79	7.52E-05	11,18/12/81	(500564, 6961899,	0.0)
80	7.49E-05	18,30/12/81	(500564, 6961899,	0.0)
81	7.33E-05	14,17/04/84	(500564, 6961899,	0.0)
82	7.29E-05	08,08/02/60	(500565, 6961906,	0.0)
83	7.29E-05	14,07/04/84	(500564, 6961899,	0.0)
84	7.10E-05	11,26/12/81	(500564, 6961899,	0.0)
85	6.95E-05	18,12/02/60	(500564, 6961899,	0.0)
86	6.94E-05	08,07/01/84	(500564, 6961899,	0.0)
87	6.93E-05	08,18/12/81	(500564, 6961899,	0.0)
88	6.89E-05	14,10/12/81	(500564, 6961899,	0.0)
89	6.89E-05	18,25/05/64	(500564, 6961899,	0.0)
90	6.86E-05	08,11/12/81	(500564, 6961899,	0.0)
91	6.75E-05	11,06/11/66	(500565, 6961906,	0.0)
92	6.70E-05	12,16/11/66	(500564, 6961899,	0.0)
93	6.70E-05	13,02/01/84	(500564, 6961899,	0.0)
94	6.64E-05	18,19/05/64	(500565, 6961906,	0.0)
95	6.62E-05	17,06/07/85	(500564, 6961899,	0.0)
96	6.62E-05	15,04/11/66	(500564, 6961899,	0.0)
97	6.62E-05	12,11/02/60	(500564, 6961899,	0.0)
98	6.57E-05	12,09/09/68	(500564, 6961899,	0.0)
99	6.56E-05	16,04/11/66	(500564, 6961899,	0.0)
100	6.56E-05	11,01/12/81	(500565, 6961906,	0.0)

## TVOCs

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Finchley St AQA

Concentration or deposition	Concentration
Emission rate units	tonnes/year
Concentration units	milligrams/m3
Units conversion factor	3.17E+01
Constant background concentration	0.00E+00
Terrain effects	None
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Roughness height at the wind vane site	0.300 m
Averaging time for sigma-theta values	60 min.

### DISPERSION CURVES

Horizontal dispersion curves for sources <100m high Sigma-theta  
 Vertical dispersion curves for sources <100m high Pasquill-Gifford

Horizontal dispersion curves for sources >100m high Briggs Rural  
Vertical dispersion curves for sources >100m high Briggs Rural  
Enhance horizontal plume spreads for buoyancy? Yes  
Enhance vertical plume spreads for buoyancy? Yes  
Adjust horizontal P-G formulae for roughness height? Yes  
Adjust vertical P-G formulae for roughness height? Yes  
Roughness height 0.800m  
Adjustment for wind directional shear None

#### PLUME RISE OPTIONS

Gradual plume rise? Yes  
Stack-tip downwash included? Yes  
Building downwash algorithm: PRIME method.  
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60  
Partial penetration of elevated inversions? No  
Disregard temp. gradients in the hourly met. file? No

and in the absence of boundary-layer potential temperature gradients  
given by the hourly met. file, a value from the following table  
(in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

#### WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

#### AVERAGING TIMES

1 hour

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1

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Finchley St AQA

#### SOURCE CHARACTERISTICS

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STACK SOURCE: VOC

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
500571	6961899	0m	0m	0.01m	25C	0.0m/s

No building wake effects.  
(Constant) emission rate = 2.20E-05 tonnes/year  
No gravitational settling or scavenging.

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Finchley St AQA

RECEPTOR LOCATIONS

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The polar receptor grid has the following radii:

0.m	10.m	20.m	30.m	40.m	50.m	60.m	70.m
80.m	90.m	100.m	110.m	120.m	130.m	140.m	150.m
160.m	170.m	180.m	190.m	200.m			

and these bearings (in degrees):

0.0	45.0	90.0	135.0	180.0	225.0	270.0	315.0
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DISCRETE RECEPTOR LOCATIONS (in metres)

No.	X	Y	ELEV	N	HEIGHT	No.	X	Y	ELEV	N	HEIGHT
1	500565	6961906	0.0	0.0		5	500609	6961913	0.0	0.0	
2	500564	6961899	0.0	0.0		6	500624	6961891	0.0	0.0	
3	500563	6961924	0.0	0.0		7	500585	6961874	0.0	0.0	
4	500603	6961296	0.0	0.0							

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METEOROLOGICAL DATA : Ausplume Meteorological database for brisbane wool

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1 Peak values for the 100 worst cases (in milligrams/m<sup>3</sup>)  
Averaging time = 1 hour

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	3.16E-04	02,01/02/60	(500564, 6961899, 0.0)
2	3.16E-04	20,11/06/63	(500564, 6961899, 0.0)
3	3.16E-04	21,02/03/65	(500564, 6961899, 0.0)
4	3.16E-04	02,03/03/65	(500564, 6961899, 0.0)
5	3.16E-04	21,16/11/66	(500564, 6961899, 0.0)
6	3.16E-04	03,20/08/70	(500564, 6961899, 0.0)
7	3.16E-04	01,28/04/84	(500564, 6961899, 0.0)
8	3.16E-04	18,25/07/85	(500564, 6961899, 0.0)
9	3.15E-04	05,12/03/65	(500564, 6961899, 0.0)
10	3.15E-04	22,13/03/65	(500564, 6961899, 0.0)
11	3.15E-04	21,09/12/81	(500564, 6961899, 0.0)

12	3.15E-04	19,03/04/84	(500564, 6961899,	0.0)
13	3.15E-04	20,13/03/65	(500564, 6961899,	0.0)
14	3.15E-04	21,13/03/65	(500564, 6961899,	0.0)
15	3.15E-04	01,17/11/66	(500564, 6961899,	0.0)
16	3.15E-04	22,19/08/70	(500564, 6961899,	0.0)
17	3.15E-04	19,27/04/84	(500564, 6961899,	0.0)
18	3.15E-04	22,27/04/84	(500564, 6961899,	0.0)
19	3.10E-04	24,02/03/65	(500564, 6961899,	0.0)
20	3.10E-04	01,03/03/65	(500564, 6961899,	0.0)
21	3.10E-04	04,12/03/65	(500564, 6961899,	0.0)
22	3.10E-04	24,30/12/81	(500564, 6961899,	0.0)
23	3.10E-04	21,11/06/63	(500564, 6961899,	0.0)
24	3.10E-04	24,11/06/63	(500564, 6961899,	0.0)
25	3.10E-04	23,19/08/70	(500564, 6961899,	0.0)
26	3.10E-04	24,19/08/70	(500564, 6961899,	0.0)
27	3.10E-04	21,31/08/70	(500564, 6961899,	0.0)
28	3.10E-04	04,03/01/84	(500564, 6961899,	0.0)
29	3.02E-04	01,01/02/60	(500564, 6961899,	0.0)
30	3.02E-04	18,11/06/63	(500564, 6961899,	0.0)
31	3.02E-04	21,21/08/70	(500564, 6961899,	0.0)
32	3.02E-04	24,21/08/70	(500564, 6961899,	0.0)
33	3.02E-04	02,20/10/80	(500564, 6961899,	0.0)
34	3.02E-04	23,03/04/84	(500564, 6961899,	0.0)
35	3.02E-04	18,27/07/85	(500564, 6961899,	0.0)
36	3.02E-04	03,12/03/65	(500564, 6961899,	0.0)
37	3.02E-04	24,13/03/65	(500564, 6961899,	0.0)
38	3.02E-04	23,16/11/66	(500564, 6961899,	0.0)
39	3.02E-04	21,15/09/68	(500564, 6961899,	0.0)
40	3.02E-04	20,10/08/70	(500564, 6961899,	0.0)
41	3.02E-04	03,11/12/81	(500564, 6961899,	0.0)
42	2.92E-04	21,23/02/60	(500564, 6961899,	0.0)
43	2.92E-04	23,11/03/65	(500564, 6961899,	0.0)
44	2.92E-04	21,28/08/70	(500564, 6961899,	0.0)
45	2.92E-04	24,03/04/84	(500564, 6961899,	0.0)
46	2.92E-04	23,27/04/84	(500564, 6961899,	0.0)
47	2.92E-04	23,11/06/63	(500564, 6961899,	0.0)
48	2.92E-04	02,12/03/65	(500564, 6961899,	0.0)
49	2.92E-04	21,19/08/70	(500564, 6961899,	0.0)
50	2.79E-04	19,11/06/63	(500564, 6961899,	0.0)
51	2.79E-04	22,03/04/84	(500564, 6961899,	0.0)
52	2.79E-04	03,03/03/65	(500564, 6961899,	0.0)
53	2.79E-04	23,12/11/66	(500564, 6961899,	0.0)
54	2.79E-04	24,16/11/66	(500564, 6961899,	0.0)
55	2.79E-04	01,15/08/70	(500564, 6961899,	0.0)
56	2.79E-04	01,20/08/70	(500564, 6961899,	0.0)
57	2.79E-04	20,03/04/84	(500564, 6961899,	0.0)
58	2.79E-04	21,27/04/84	(500564, 6961899,	0.0)
59	2.79E-04	04,28/04/84	(500564, 6961899,	0.0)
60	2.64E-04	24,11/03/65	(500564, 6961899,	0.0)
61	2.64E-04	19,10/08/70	(500564, 6961899,	0.0)
62	2.64E-04	22,21/08/70	(500564, 6961899,	0.0)
63	2.64E-04	04,11/12/81	(500564, 6961899,	0.0)
64	2.64E-04	03,28/04/84	(500564, 6961899,	0.0)
65	2.64E-04	19,21/08/70	(500564, 6961899,	0.0)
66	2.64E-04	24,27/04/84	(500564, 6961899,	0.0)



67	2.62E-04	20,23/02/60	(500564, 6961899,	0.0)
68	2.47E-04	22,11/06/63	(500564, 6961899,	0.0)
69	2.47E-04	20,21/08/70	(500564, 6961899,	0.0)
70	2.47E-04	02,11/12/81	(500564, 6961899,	0.0)
71	2.47E-04	02,28/04/84	(500564, 6961899,	0.0)
72	2.47E-04	18,06/07/85	(500564, 6961899,	0.0)
73	2.29E-04	05,03/03/65	(500564, 6961899,	0.0)
74	2.29E-04	01,12/03/65	(500564, 6961899,	0.0)
75	2.29E-04	02,17/11/66	(500564, 6961899,	0.0)
76	2.29E-04	22,28/08/70	(500564, 6961899,	0.0)
77	2.29E-04	24,12/11/66	(500564, 6961899,	0.0)
78	2.29E-04	01,13/11/66	(500564, 6961899,	0.0)
79	2.29E-04	22,16/11/66	(500564, 6961899,	0.0)
80	2.29E-04	21,10/08/70	(500564, 6961899,	0.0)
81	2.29E-04	03,11/08/70	(500564, 6961899,	0.0)
82	2.29E-04	02,20/08/70	(500564, 6961899,	0.0)
83	2.29E-04	21,01/04/84	(500564, 6961899,	0.0)
84	2.25E-04	20,05/09/68	(500564, 6961899,	0.0)
85	2.10E-04	05,28/04/84	(500564, 6961899,	0.0)
86	2.10E-04	21,28/12/81	(500564, 6961899,	0.0)
87	2.09E-04	20,12/11/66	(500564, 6961899,	0.0)
88	1.99E-04	03,04/08/70	(500565, 6961906,	0.0)
89	1.99E-04	22,14/04/84	(500565, 6961906,	0.0)
90	1.99E-04	03,27/12/81	(500565, 6961906,	0.0)
91	1.96E-04	24,05/04/84	(500565, 6961906,	0.0)
92	1.93E-04	19,04/07/85	(500565, 6961906,	0.0)
93	1.92E-04	21,15/03/65	(500565, 6961906,	0.0)
94	1.91E-04	20,09/12/81	(500564, 6961899,	0.0)
95	1.90E-04	04,03/03/65	(500564, 6961899,	0.0)
96	1.90E-04	22,11/03/65	(500564, 6961899,	0.0)
97	1.90E-04	22,12/11/66	(500564, 6961899,	0.0)
98	1.90E-04	21,05/09/68	(500564, 6961899,	0.0)
99	1.90E-04	22,05/09/68	(500564, 6961899,	0.0)
100	1.90E-04	21,03/04/84	(500564, 6961899,	0.0)