ENVIROGUARD PRIVATE LIMITED

Mechanically Stabilised Earth (MSE) Wall – Erskine Park Landfill Air Quality & Odour Impact Assessment Study

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Erskine Park, NSW

Final Report

Revision 3

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EXECUTIVE SUMMARY

A mechanically stabilised earthen (**MSE**) wall is proposed to be constructed at the Enviroguard Private Limited Erskine Park Landfill located at 4 Quarry Road, Erskine Park, New South Wales (**the Erskine Park Landfill**). The function of the MSE wall will be to increase landfill airspace by approximately 450,000 cubic metres (**m³**), leading to an extension of 36 months in landfill operation capacity, with existing capacity estimated to be consumed by December 2021. An air quality and odour impact assessment (**AQOIA**) study was conducted by The Odour Unit Pty Ltd (**TOU**) to assess the impact on odour and dust emissions associated with the proposed construction of the MSE wall.

AQOIA Study Methodology

The AQOIA study consisted of the undertaking of dispersion modelling to determine potential impacts due to the relocation of the landfill surface operations to a more elevated setting compared to the current operations at the Erskine Park Landfill. The AQOIA study incorporated site-specific meteorological data, emissions sources, and geographic representation of receptors in the surrounding environment.

AQOIA Study Modelling Data Inputs and Justification

The site-specific meteorological data was based on a dataset generated using The Air Pollution Model (**TAPM**) and CALMET meteorological modelling system utilised for the Erskine Park Waste Transfer Station (SLR, 2015 and TOU, 2019), located adjacent to the Erskine Park Landfill. As there are no other proposed changes to operations, dust and odour emissions from the landfill have been assumed to be consistent with current operations. Moreover, the estimated dust and odour emission rates were based on air quality assessments conducted for previous and current operations of the Erskine Park Landfill (Holmes, 2005 and GHD, 2019). The CALPUFF model was configured in consideration of assessments conducted for current and previous operations of the Erskine Park Landfill (GHD, 2019 and Holmes, 2005). The characterisation of the vertical profile of the landfill surface was adjusted to account for the increase in elevation due to the installation of the MSE wall. The Ground-level pollutant concentrations were predicted at identified discrete receptors selected to represent the surrounding environment.

AQOIA Study Findings

The AQOIA study findings under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations are as follows:

- The predicted ground-level concentrations of TSP, PM_{10} and $PM_{2.5}$ and dust deposition rates satisfies the relevant IAC in the surrounding environment; and
- The predicted ground-level concentrations of odour have met the impact assessment criteria for dense urban populations in the surrounding environment.

The construction phase of the proposed MSE wall at the Erskine Park Landfill is anticipated to last between 6 months and 12 months. The construction consists of a series of activities, with a definable beginning and end. Therefore, dust emissions will vary substantially over different phases of the construction process. The appropriate implementation of management measures, such as a dust management plan, will ensure that potential impacts due to construction will be significantly lower than operational impacts.

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LIST OF ABBREVIATIONS & DEFINITIONS

AHD	Australian Height Datum
AQOIA study	The Air Quality and Odour Impact Assessment Study conducted at the Principal Erskine Park Landfill dated April 2020
AS/NZS 4323.3	Australian Standard 4323.3: 2001: *Determination of odour concentration by dynamic olfactometry*
AS/NZS 4323.4	Australian Standard 4323.4:2009: *Stationary source emissions – Method 4: Area source sampling – Flux chamber technique*.
IAC	impact assessment criteria
MSE wall	mechanically stabilised earth wall
NSW EPA	New South Wales Environment Protection Authority
OER	odour emission rate, ou.m^3/s
P/M	peak-to-mean ratio
Principal	Enviroguard Private Limited
SOER	specific odour emission rate, ou.m^3/m^2/s
TOU	The Odour Unit Pty Ltd

UNITS OF MEASUREMENT

µg/m^3	microgram per cubic metre
µm	micron or micrometre
atm	atmosphere (unit of air pressure)
d	day
g	gram
g/s	gram per second
h	hour
K	kelvin (unit of temperature)
kg	kilogram
km	kilometre
m	metre
m/s	metres per second
m^2	square metres
m^3	cubic metres
m^3/s	cubic metres per second
mg	milligram
mg/m^3	milligram per cubic metre
min	minute
mm	millimetre
Nm^3/s	normalised cubic metres per second (20^{o}C, 1 atm)
^{o}C	degrees Celsius
s	second
Sm^3/s	standard cubic metres per second (0^{o}C, 1 atm)

yr	year
µg	microgram

AIR POLLUTANTS AND CHEMICAL NOMENCLATURE

ou	odour units
PM	particulate matter (dust)
PM_{10}	particulate matter with diameter less than 10 microns
$PM_{2.5}$	particulate matter with diameter less than 2.5 microns
TSP	total suspended particulates

1 INTRODUCTION

Enviroguard Private Limited (**Principal**) engaged The Odour Unit Pty Ltd (**TOU**) in February 2020 to complete an air quality and odour impact assessment (**AQOIA**) study to assess potential impacts relating to the proposed installation of a mechanically stabilised earthen (**MSE**) wall to the Erskine Park Landfill located at 4 Quarry Road, Erskine Park, New South Wales (**the Erskine Park Landfill**).

The following report documents the details, methodology, and findings of the AQOIA Study conducted at the Erskine Park Landfill.

1.1 PROJECT BACKGROUND

An MSE wall is proposed to be installed at the Erskine Park Landfill. The proposed peak height of the MSE wall will be at 81 metres (**m**) AHD, tapering to zero at both ends, with a total length of 930 m. The MSE wall will be situated along the west, south, and part of the eastern perimeter of the landfill.

The most recent modification to the landform at landfill operation was approved on 8 August 2019 to connect two domes on the crown on the landfill to a single ridgeline. This has provided additional airspace of 140,000 cubic metres (**m³**) for the current operations, with existing capacity estimated to be consumed by December 2021. The proposed MSE wall will provide an additional landfill airspace of approximately 450,000 m³ and extend the landfill operation by an extra 36 months. **Figure 1.1** illustrates the proposed MSE wall airspace gain by the construction of the proposed MSE wall at the Erskine Park Landfill.

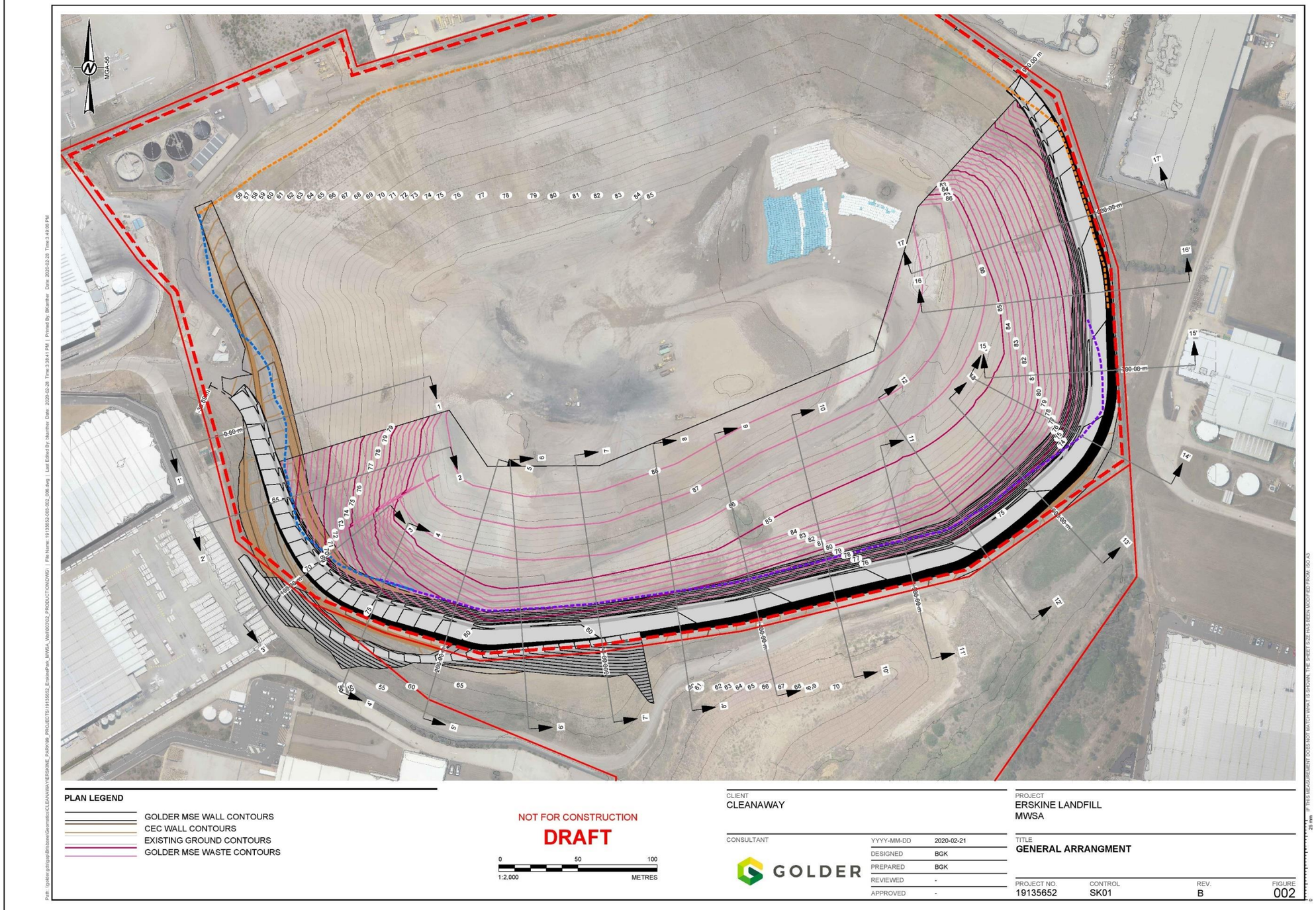

Figure 1.1 – An illustration of the landfill airspace gain by the proposed MSE wall (1 of 2)

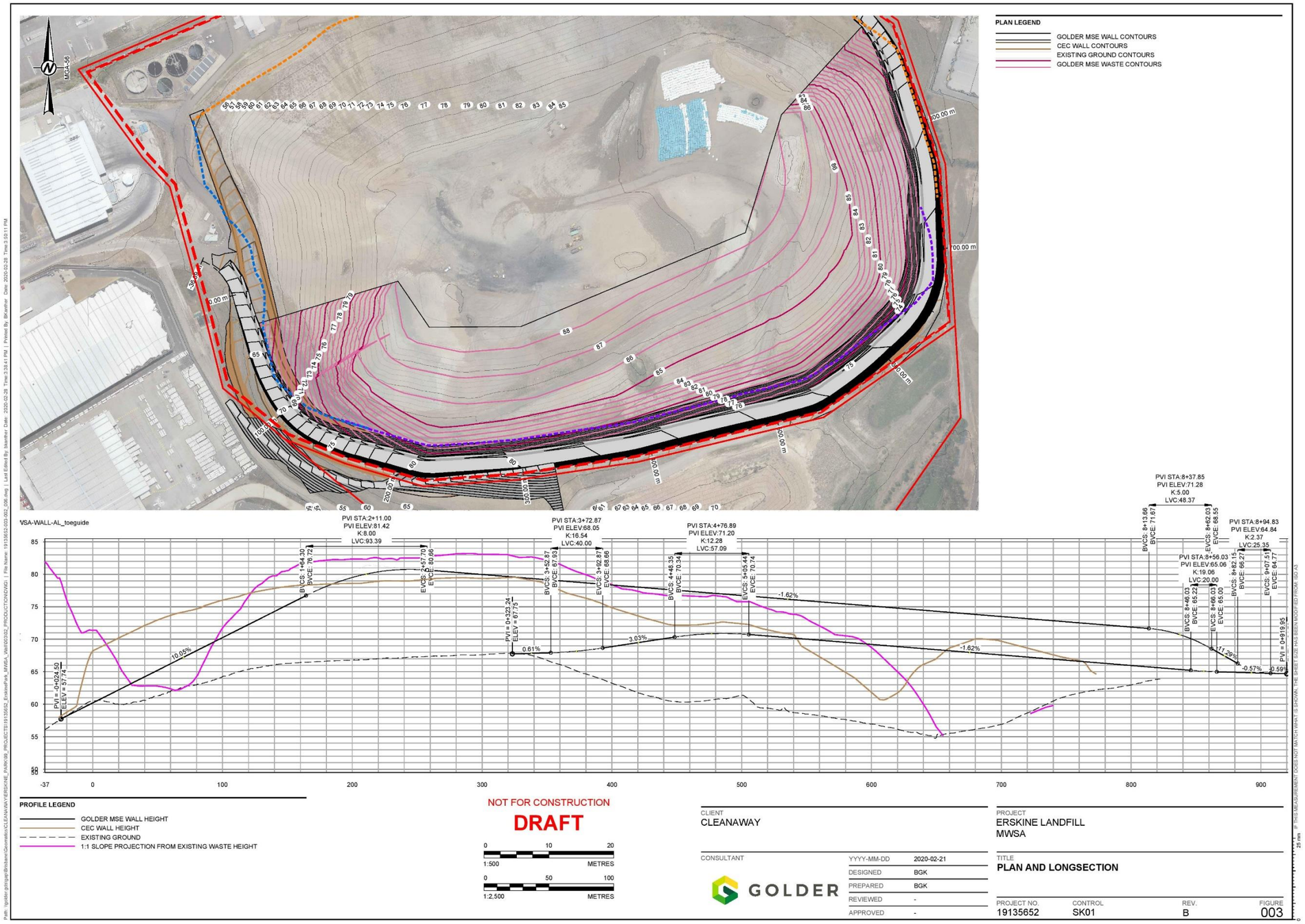

Figure 1.2 – An illustration of the landfill airspace gain by the proposed MSE wall (2 of 2)

There are no other proposed changes to operations. The current operating hours of the Erskine Park Landfill will continue as follows:

- Monday to Friday (0600 hrs to 1700 hrs);
- Saturday (0600 hrs to 1600 hrs); and
- Sunday & Public Holidays (0700 hrs to 1600 hrs).

1.2 QUALIFICATIONS AND ASSUMPTIONS

The components of the AQOIA study conducted for the Erskine Park Landfill and the proposed MSE wall has been based on following relevant studies:

- Emission rates for dust and odour are based on AQOIA studies for previous and current operations of the Erskine Park Landfill (Holmes, 2005 and GHD, 2019);
- The meteorological data used to drive the dispersion model is based on the dataset generated for the Erskine Park Waste Transfer Station (SLR, 2015), located adjacent to the Erskine Park Landfill;
- Configuration of the dispersion model including the identified sensitive receptors, originally developed by SLR in its Air Quality and Management Report (SLR, 2015), is based on the modelling conducted by TOU as part of the Erskine Park Waste Transfer Station Odour Audit (TOU, 2019); and
- The AQOIA Study is documented on the basis of a 450,000 m^3 landfill airspace gain. The actual landfill airspace gain from the proposed MSE wall is expected to be between 400,000 m^3 to 420,000 m^3 upon completion of the detailed design and when due consideration to the constructability is taken into account.

1.2.1 Site-specific data collection

As part of a screening analysis, TOU undertook odour sampling and testing of two bore hole test locations associated with the geotechnical assessment for the construction of the MSE wall at the Erskine Park Landfill. The purpose of this screening analysis was to validate the historical data utilised in previous studies conducted at the Erskine Park Landfill. As will be found in the AQOIA study, the odour testing results were well below that utilised in the previous relevant studies, suggest that the modelling predictions are realistic for future operations at the Erskine Park Landfill under the proposed MSE wall.

2 LEGISLATIVE FRAMEWORK

The impact assessment criteria (**IAC**) and dispersion modelling methodology used for the AQOIA study are contained within the following New South Wales Environment Protection Authority (**NSW EPA**) documents, namely:

- *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2016)*;*
- *Technical framework: assessment and management of odour from stationary sources in NSW* (EPA, 2006a); and
- *Technical notes: assessment and management of odour from stationary sources in NSW* (EPA, 2006b)*.*

The IAC for dust relevant to the AQOIA study are summarised in **Table 2.1**.

The IAC for complex mixtures of odours is summarised in **Table 2.2**. These are designed to consider the range of sensitivity to odours with the community and to provide additional protection for individuals with a heightened response to odours. A statistical approach dependent on population size is applied.

Table 2.1 – IAC for dust

Pollutant	Averaging Period	Concentration (µg/m³)
Total suspended particulates (**TSP**)	Annual	90
Particulate matter as PM_{10}	24-Hour	50
	Annual	25
Particulate matter as $PM_{2.5}$	24-Hour	25
	Annual	8
Dust deposition rate	Annual	2 g/m²/month [a]

[a] Maximum increase in deposited dust level

Table 2.2 – IAC for odour

Population of affected community	Impact assessment criteria for complex mixtures of odour air pollutants (OU)
Urban (≥ 2000) and/or schools and hospitals	2.0
~ 500	3.0
~ 125	4.0
~ 30	5.0
~ 10	6.0
Single rural residence (≤ 2)	7.0

3 EMISSIONS ESTIMATION

3.1 CONSTRUCTION

The construction phase activities associated with the MSE wall at the Erskine Park Landfill can be broadly described as follows:

- Site clearance for activities, including vegetation stripping, topsoil removal and storage, and earthworks;
- Civil works including any temporary or permanent drainage works;
- Structure installation; and
- The construction process is anticipated to last from 6 to 12 months.

The construction consists of a series of activities, each with its own duration and potential for dust generation. Therefore, dust emissions from any single construction activity can be expected to have a definable beginning and end. This will vary substantially over different phases of the construction process. This contrasts with the operational phase where emissions are either relatively consistent or follow an identifiable temporal (e.g. diurnal or seasonal) pattern. The emissions of dust during the construction phase will be minimised through a dust management plan (see **Section 3.1.1** for details).

3.1.1 Dust Management Plan

The appropriate implementation of management measures, such as a dust management plan, will ensure that potential impacts due to construction will be significantly lower than operational impacts. In particular, the following measures can be implemented to minimise dust emissions from construction activities:

- Watering of haul road;
- Progressive clearing to minimise the area of exposure subject to wind erosion;
- Erection of physical barriers such as wind breaks during earthmoving;
- Earth moving activities should be avoided or restricted during particularly unfavourable meteorological conditions;
- Restricting the speed of on-site traffic to minimise wheel-generated dust; and
- Compaction of construction site and stabilisation of vegetation to minimise dust lift off due to wind erosion.

3.2 OPERATIONS

3.2.1 Dust

The key activities that contribute to dust emissions at the Erskine Park Landfill include wheel-generated dust from travelling on sealed and unsealed roads, earth moving equipment (e.g. dozers), and wind erosion of exposed areas. It is understood that there will be no significant changes to the landfill operations from the construction of the MSE wall at the Erskine Park Landfill, except for the increased elevation of the dust sources. Therefore, it is reasonable to retain the estimated dust emissions from landfill activities and assume that they will remain consistent with the current landfill operations (Holmes, 2005 and GHD, 2019). The annual dust emission rates from individual activities are summarised in **Table 3.1**. The particle size distributions (Holmes, 2005) are summarised in **Table 3.2**.

Table 3.1 – Emission rates from the activities at the Erskine Park Landfill

Activity	Hours per year	Annual dust emissions (kg/yr)
Dozers working in landfill	2,920 [a]	40,880
Hauling waste on unsealed road	2,878 [b]	16,790
Haul waste on sealed road	2,878 [b]	3,358
Wind erosion from exposed landfill areas	8,760	5,196
Total		66,224

[an] assumed to operate 8 hours per day
[b] based on-site operating hours of 11 hours per day (M-F), 10 hours (Sat), and 8 hours (Sun)

Table 3.2 – Particle size distribution of the utilised emission rates

Dust particle	Particle diameter (µm)	% of dust
PM_{10-30}	10 – 30	60.9 %
$PM_{2.5-10}$	2.5 – 10	34.4 %
$PM_{2.5}$	< 2.5	4.68 %

3.2.2 Odour

The odour emission rate (**OER**) estimates were based on the studies conducted for the previous and current operations of the Erskine Park Landfill (Holmes, 2005 and GHD, 2019). These are based on the peak-to-mean ratios (**P/M60**) for area sources based on atmospheric stability. The peak and base specific odour emission rate (**SOER**) estimates used in the dispersion modelling are summarised in **Table 3.3**. The area occupied by the landfill is 125,472 m^2 square metres (**m^2**) (Holmes, 2005). This dataset has been used for AQOIA studies for previous and current operations of the Erskine Park Landfill (Holmes, 2005 and GHD, 2019), and are considered appropriate (see **Section 3.2.1**)

3.2.2.1 Site-specific screening analysis

TOU undertook odour sampling and testing of two bore hole test locations associated with the geotechnical assessment for the construction of the MSE wall at the Erskine Park Landfill, as this is a key environmental consideration associated with the increase in landfill capacity. The sampling and testing were conducted on 4 February 2020

according to the methods consistent with Australian Standard/New Zealand Standard 4323.3 (**AS/NZS 4323.3**) and AS/NZS 4323.4. The samples were collected using the isolation flux hood method. The collected samples were analysed for odour concentration at TOU NATA accredited laboratory in Mascot, New South Wales. The laboratory results report is **appended** as **Appendix A**, with the summary of the results and photos of sampling context provided in **Table 3.4**, **Photo 3.1**, **Photo 3.2** and **Photo 3.3**, respectively.

Table 3.3 – Odour emission rates from the activities at the Erskine Park Landfill

Atmospheric stability	Pasquill Gifford class	Base SOER ($ou.m^3/m^2.s$)	Peak SOER ($ou.m^3/m^2.s$)	Peak OER ($ou.m^3/s$)
Unstable (day)	A	0.051	0.127	15,935
	B			
	C			
Neutral	D			
Stable (night)	E		0.117	14,680
	F			

Table 3.4 – SOER from sampling at the Erskine Park Landfill on 4 February 2020

Location	TOU Sample ID	Odour concentration (ou)	SOER ($ou.m^3/m^2.s$)
Landfill Pit #1	SC 20102	< 16	< 0.0097
Landfill Pit #2	SC 20103	< 16	< 0.0097

Photo 3.1 – Sampling of a bore hole test location (Pit 1) by TOU on 4 February 2020

Photo 3.2 – Sampling of a bore hole test location (Pit 2) by TOU on 4 February 2020

Photo 3.3 – Excavation of bore hole test location (Pit 2) sampled by TOU on 4 February 2020

4 DISPERSION MODELLING

The dispersion modelling for the AQOIA study at the Erskine Park Landfill was conducted by incorporating source characteristics and pollutant emission rates into a dispersion modelling study using CALPUFF. CALPUFF is included in the list of dispersion models approved for use in New South Wales (NSW EPA, 2016).

CALPUFF is a standard regulatory model, preferred for complex meteorological conditions (i.e., non-steady state) and/or influences from geophysical factors such as coastal areas (i.e., land-sea breeze), recirculation, reversal flows and other conditions such as stagnation. CALPUFF considers the geophysical features of the study area that affects the dispersion of pollutants and ground-level concentrations of those pollutants in identified regions of interest. CALPUFF contains algorithms that can resolve near-source effects such as building downwash, transitional plume rise, partial plume penetration, sub-grid scale terrain interactions, as well as the long-range effects of removal, transformation, vertical wind shear, overwater transport and coastal interactions. Emission sources can be characterised as arbitrarily varying point, area, volume and lines or any combination of those sources within the modelling domain.

The CALPUFF configuration is consistent with the assessment conducted for the Erskine Park Waste Transfer Station (SLR, 2015), located adjacent to the Erskine Park Landfill. The model is configured in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2016).

4.1 CALPUFF MODELLING FEATURES

The key features of the CALPUFF model used in the AQOIA study include:

- CALPUFF version 6.42 was used;
- Modelling period of 1 year from 1 January to 31 December 2013;
- Gridded 3D hourly-varying meteorological conditions generated by the TAPM and CALMET meteorological modelling system (SLR, 2015).
    - model computation domain consistent with CALMET domain covering an area of 12 kilometres (**km**) × 12 km (120 × 120 grids at 100 m spacing);
    - model domain southwest corner configured at 289 309 mE, 6249 681 mN (GDA 1994 MGA Zone 56S); and
    - Ten ZFACE levels set at 20 m, 40 m, 80 m, 160 m, 320 m, 640 m, 1200 m, 2000 m, 3000 m and 4000 m.
- Erskine Park Landfill modelled as area source (**Figure 4.1**);
- Source effective height and initial release height (sigma-z) used to represent the proposed modification of the final landform with the construction of the proposed MSE wall;

- 3034 discrete receptors (**Figure 4.1**);
- Partial plume path adjustment for terrain modelled;
- Dry deposition or settlement of dust particles due to gravity incorporated in the dispersion modelling;
- Dispersion coefficients calculated internally from sigma v and sigma w using micrometeorological variables; and
- All other options set to default.

The CALPUFF model was used to predict ground-level concentrations of pollutants at the identified receptors within the modelling domain (**Figure 4.1**). The contour plots were generated using the predicted concentrations and compared with the relevant air quality objectives.

The source parameters and dust emission rates used in dispersion modelling are summarised in **Table 4.1**. The odour emission rates used in dispersion modelling are summarised in **Table 3.3**.

Table 4.1 – Dust emission rates from Erskine Park Landfill activities

Activity	Unit	Dozers, Haul roads (sealed and unsealed)	Wind Erosion
Hours of operation modelled	hours / day	12	24
Effective Height	m	40	40
Initial release height	m	10	10
TSP	g/s	5.83	0.16
PM_{10}	g/s	2.28	0.06
$PM_{2.5}$	g/s	0.27	0.01

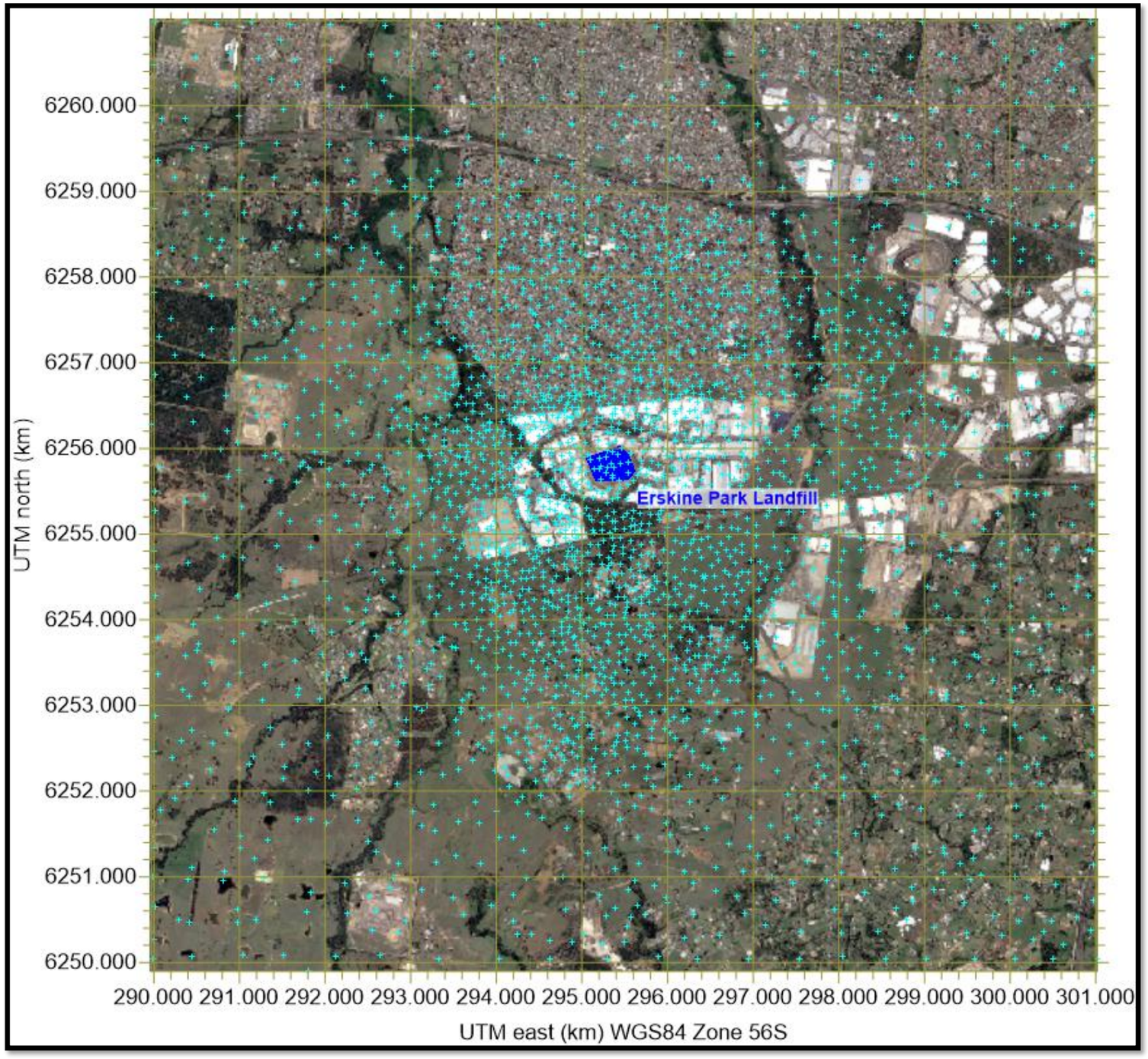

Figure 4.1 – Location of Erskine Park Landfill and model discrete receptors

5 RESULTS

This section presents the results of the dispersion modelling conducted in the AQOIA Study for the proposed construction of the MSE wall and the Erskine Park Landfill operations. The contour plots showing the spatial distribution of ground-level concentration of pollutants within the modelling domain are presented. These were assessed against the relevant IAC as outlined in the referenced NSW EPA guidelines.

As will be shown in **Section 5.2** to **Section 5.5**, no significant odour or dust sources were identified in the immediate project area under the construction of the proposed MSE wall scenario at the Erskine Park Landfill. Therefore, cumulative impacts are not anticipated, and the results are presented in isolation. This approach is consistent with the air quality assessment conducted for the current landfill operations (GHD, 2019).

5.1 ODOUR

The contour plots showing the spatial distribution of the predicted maximum and 99th percentile P/M60 concentrations of odour across the modelling domain are shown in **Figure 5.1** and **Figure 5.2**, respectively.

The results show that:

- The predicted 99th percentile P/M60 ground-level odour concentrations due to Erskine Park Landfill operations comply with the strictest IAC of 2 odour unit (**ou**), designed for sensitive receptors and dense urban population density at any location within the modelling domain; and
- The predicted maximum one-hour ground-level odour concentrations due to Erskine Park Landfill operations does not exceed 5 ou beyond the site boundary and is provided in the AQOIA study for informative purposes only.

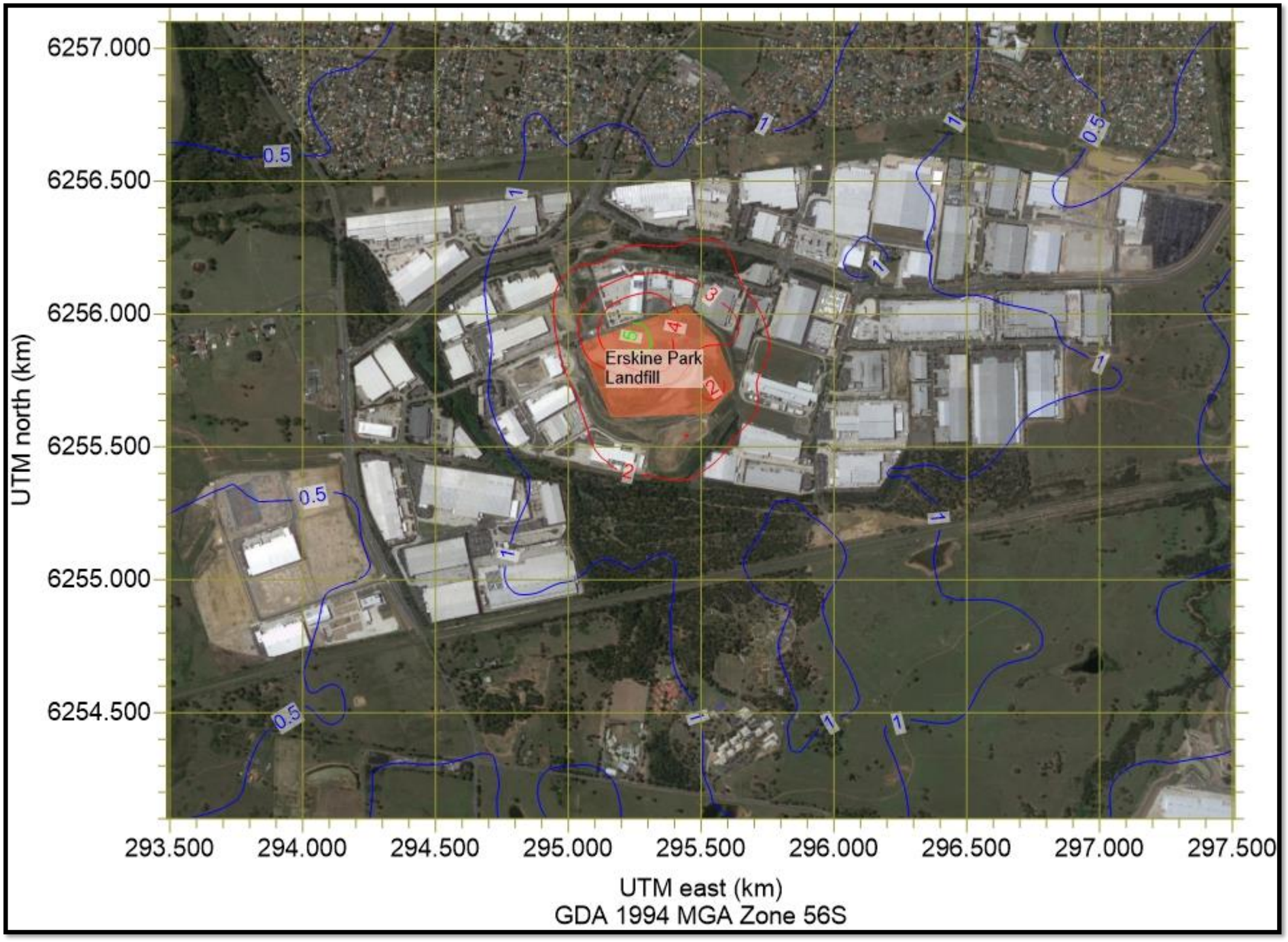

Figure 5.1 – Contour plot showing predicted maximum P/M60 ground-level odour concentrations (ou) due to Erskine Park Landfill operations

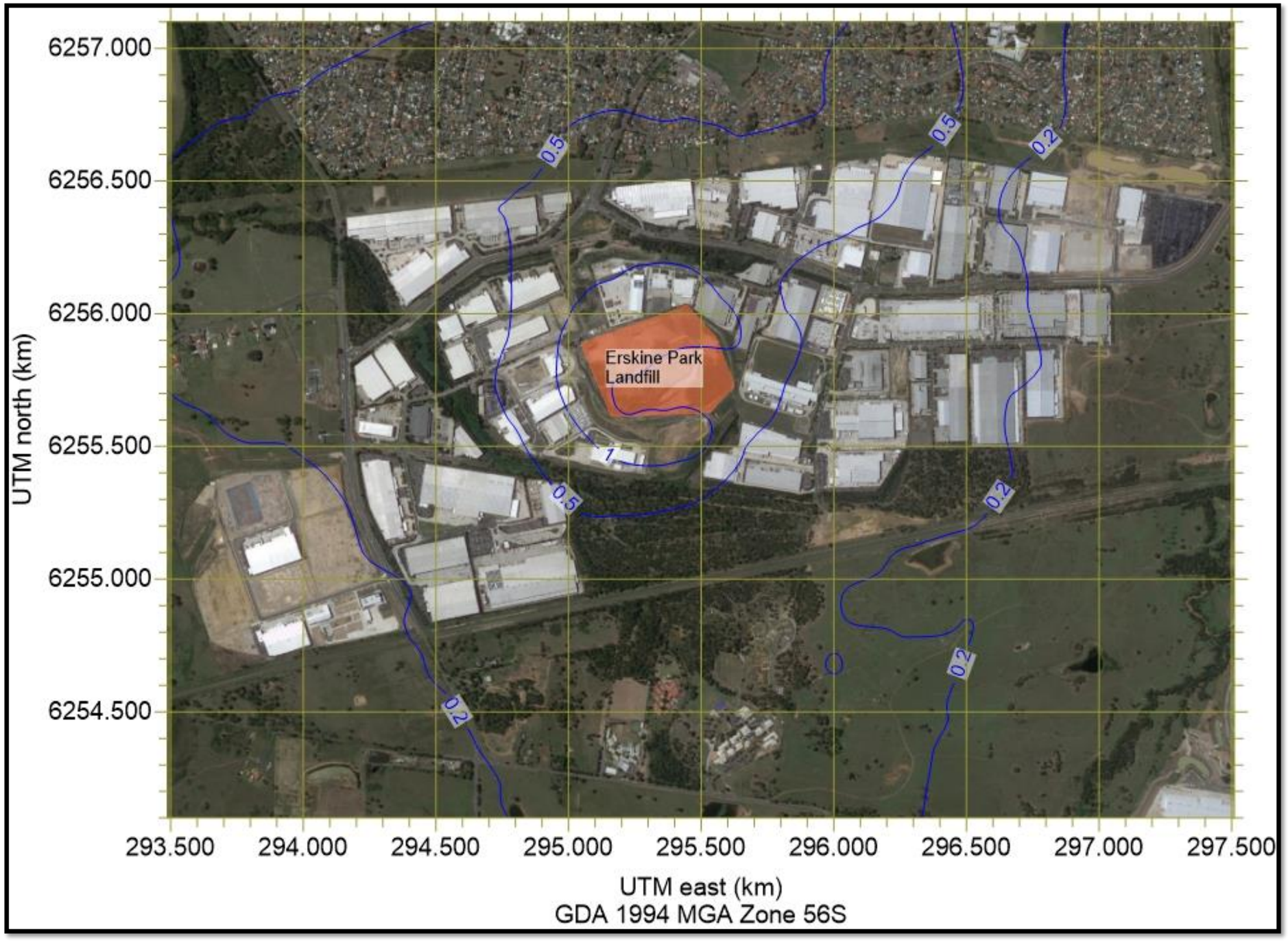

Figure 5.2 – Contour plot showing predicted 99th percentile PM/60 ground-level odour concentrations (ou) due to Erskine Park Landfill operation

5.2 TOTAL SUSPENDED PARTICLES

A contour plot showing the spatial distribution of the predicted annual average concentrations of TSP across the modelling domain is shown in **Figure 5.3**. The results show that the predicted annual average ground-level TSP concentrations under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations comply with the IAC of 90 µg/m³ at all locations within the modelling domain.

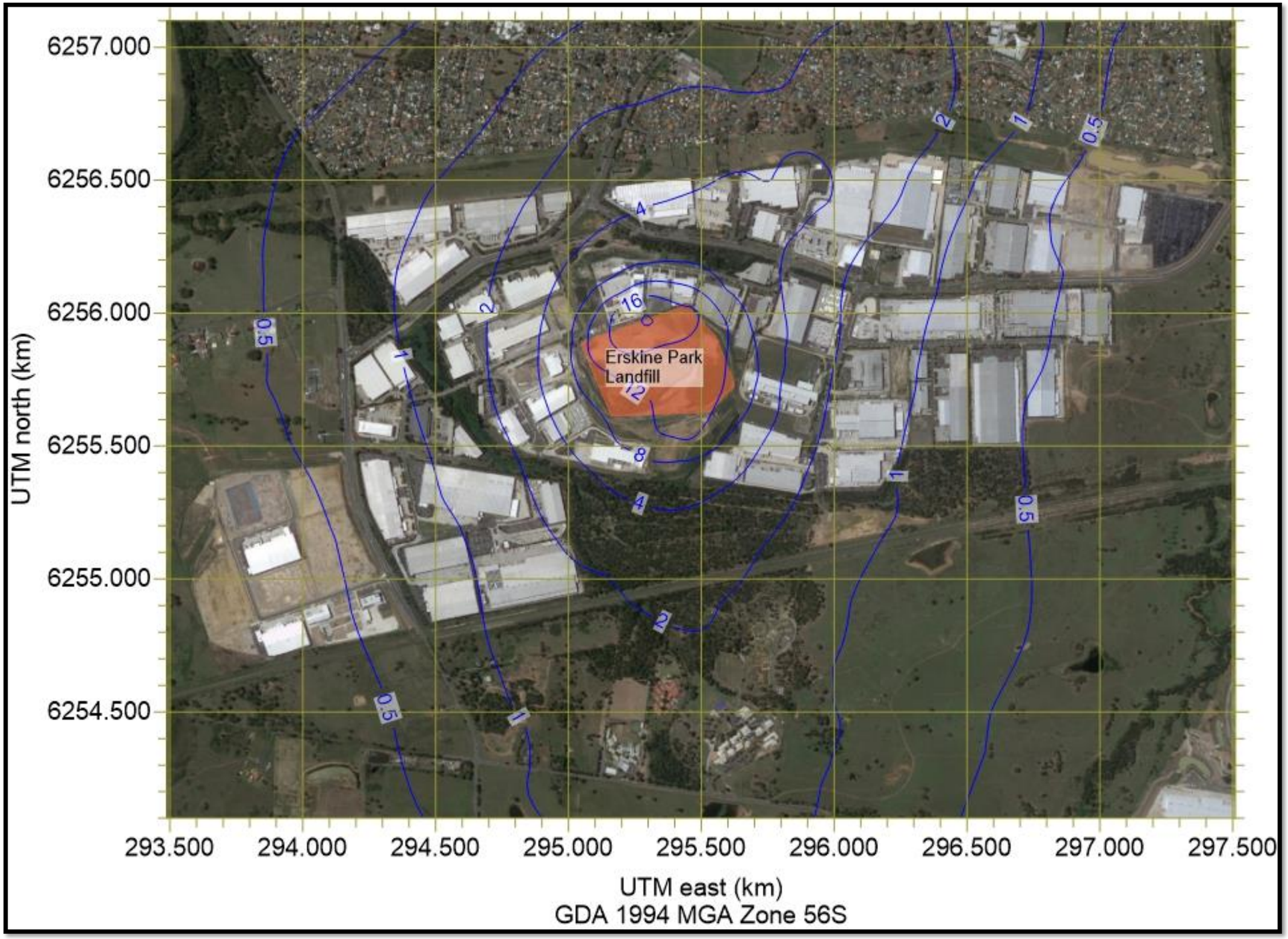

Figure 5.3 – Contour plot showing predicted annual average ground-level TSP concentrations (µg/m³) due to Erskine Park Landfill operation

5.3 PARTICULATE MATTER AS PM_{10}

The contour plots showing the spatial distribution of the predicted maximum 24-hour and annual average concentrations of PM_{10} across the modelling domain are shown in **Figure 5.4** and **Figure 5.5**, respectively.

The results show that:

- The predicted maximum 24-hour ground-level PM_{10} concentrations under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations comply with the IAC of 50 µg/m³ outside of the Erskine Park Landfill boundary. There is a small area of exceedance north of the landfill, but this area is within the Cleanaway Erskine Park Waste Transfer Facility; and

- The predicted annual average ground-level PM_{10} concentrations under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations comply with the IAC of 25 µg/m³ at all locations within the modelling domain.

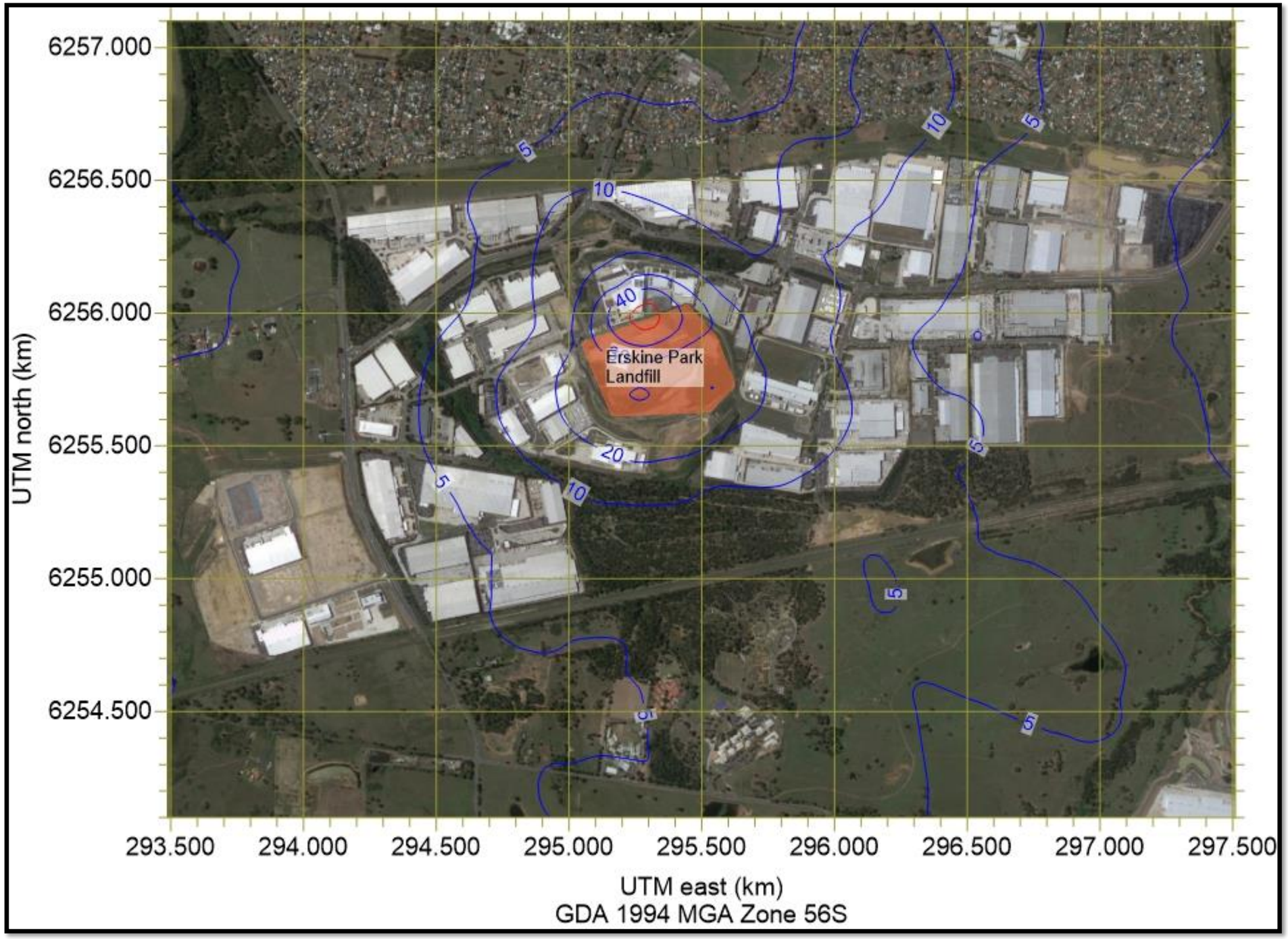

Figure 5.4 – Contour plot showing predicted maximum 24-hour average ground-level PM_{10} concentrations (µg/m³) due to Erskine Park Landfill operations

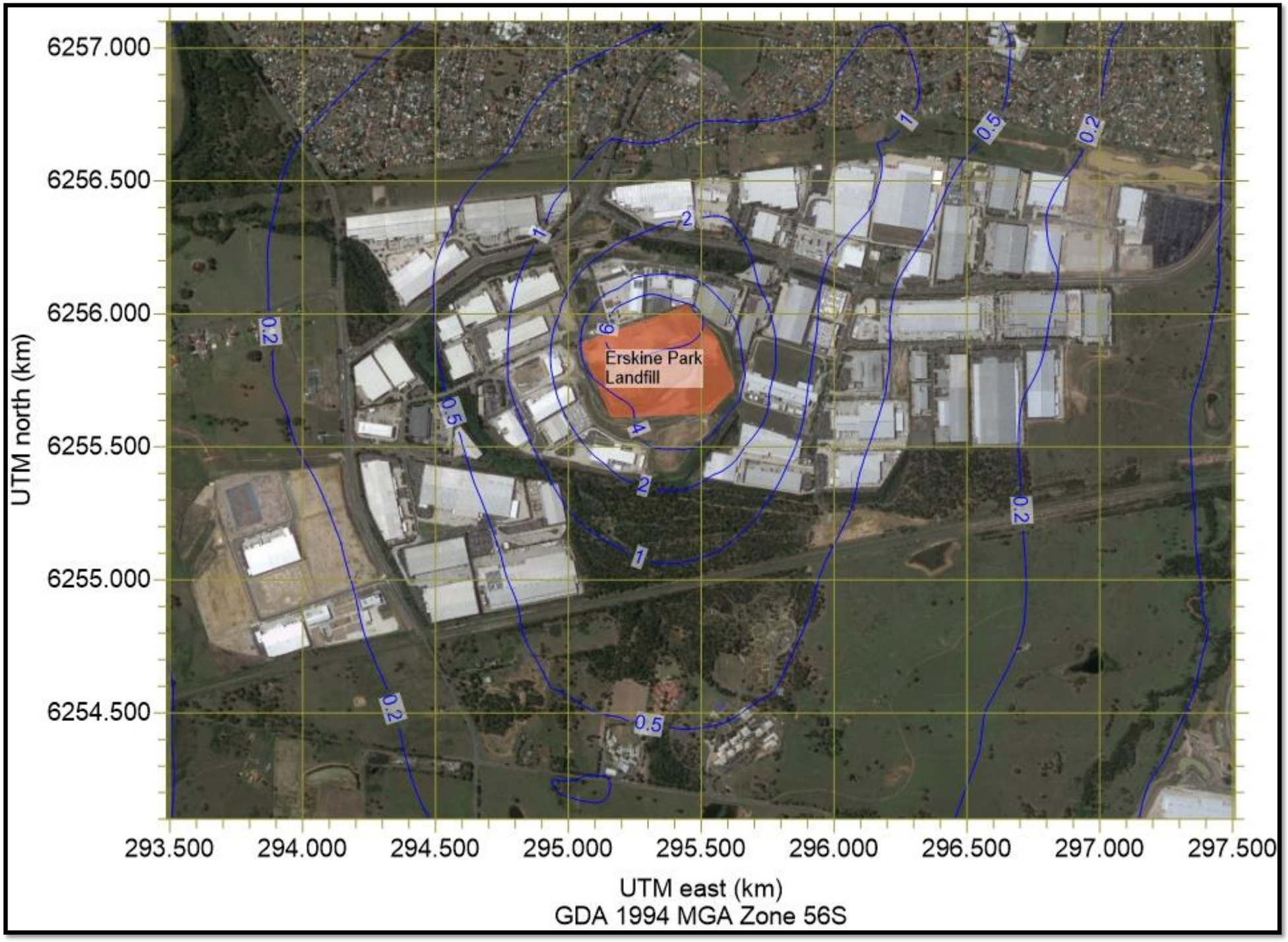

Figure 5.5 – Contour plot showing predicted annual average ground-level PM_{10} concentrations (µg/m³) due to Erskine Park Landfill operations

5.4 PARTICULATE MATTER AS $PM_{2.5}$

The contour plots showing the spatial distribution of the predicted maximum 24-hour and annual average concentrations of $PM_{2.5}$ across the modelling domain are shown in **Figure 5.6** and **Figure 5.7**, respectively.

The results show that:

- The predicted maximum 24-hour ground-level $PM_{2.5}$ concentrations under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations comply with the IAC of 25 µg/m³ outside of the Erskine Park Landfill boundary; and

- The predicted annual average ground-level $PM_{2.5}$ concentrations under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations comply with the IAC of 8 µg/m³ at all locations within the modelling domain.

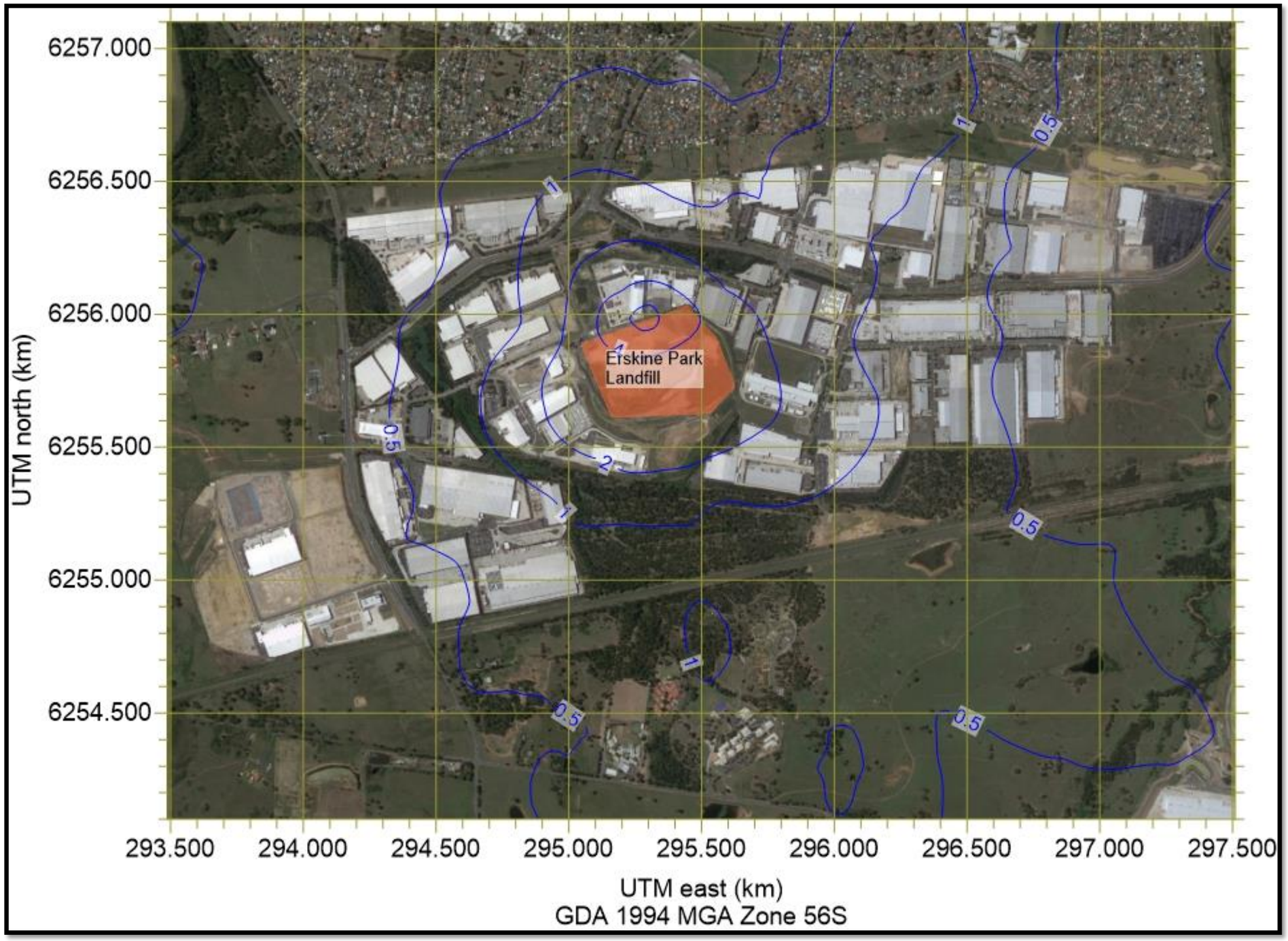

Figure 5.6 – Contour plot showing predicted maximum 24-hour average ground-level $PM_{2.5}$ concentrations (µg/m³) due to Erskine Park Landfill operations

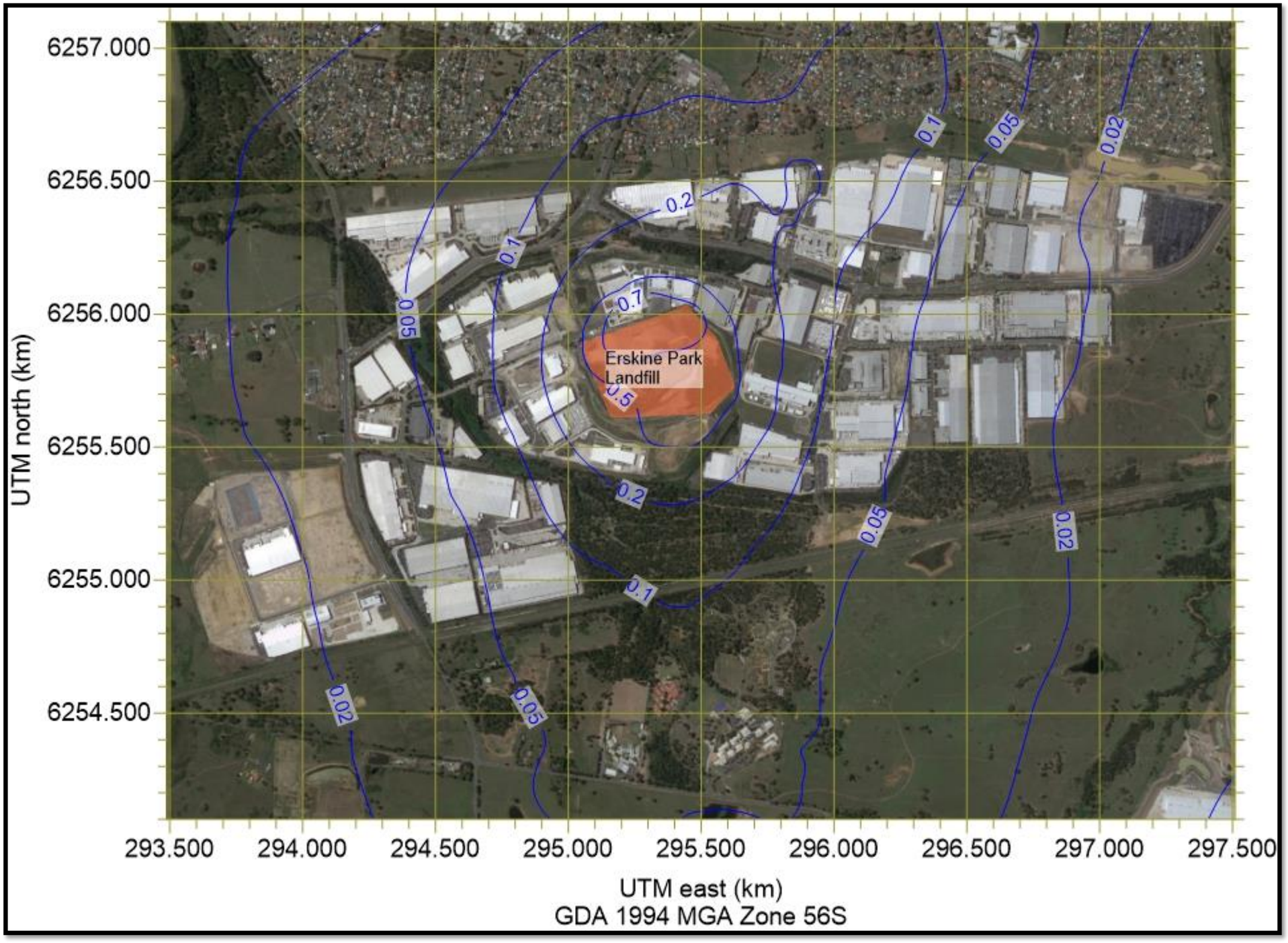

Figure 5.7 – Contour plot showing predicted annual average ground-level $PM_{2.5}$ concentrations (µg/m³) due to Erskine Park Landfill operations

5.5 DUST DEPOSITION RATE

A contour plot showing the spatial distribution of the predicted annual average dust deposition rate across the modelling domain is shown in **Figure 5.8**.

The results show that the predicted annual average dust deposition rate under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations comply with the IAC of 4 g/m²/month at all locations within the modelling domain.

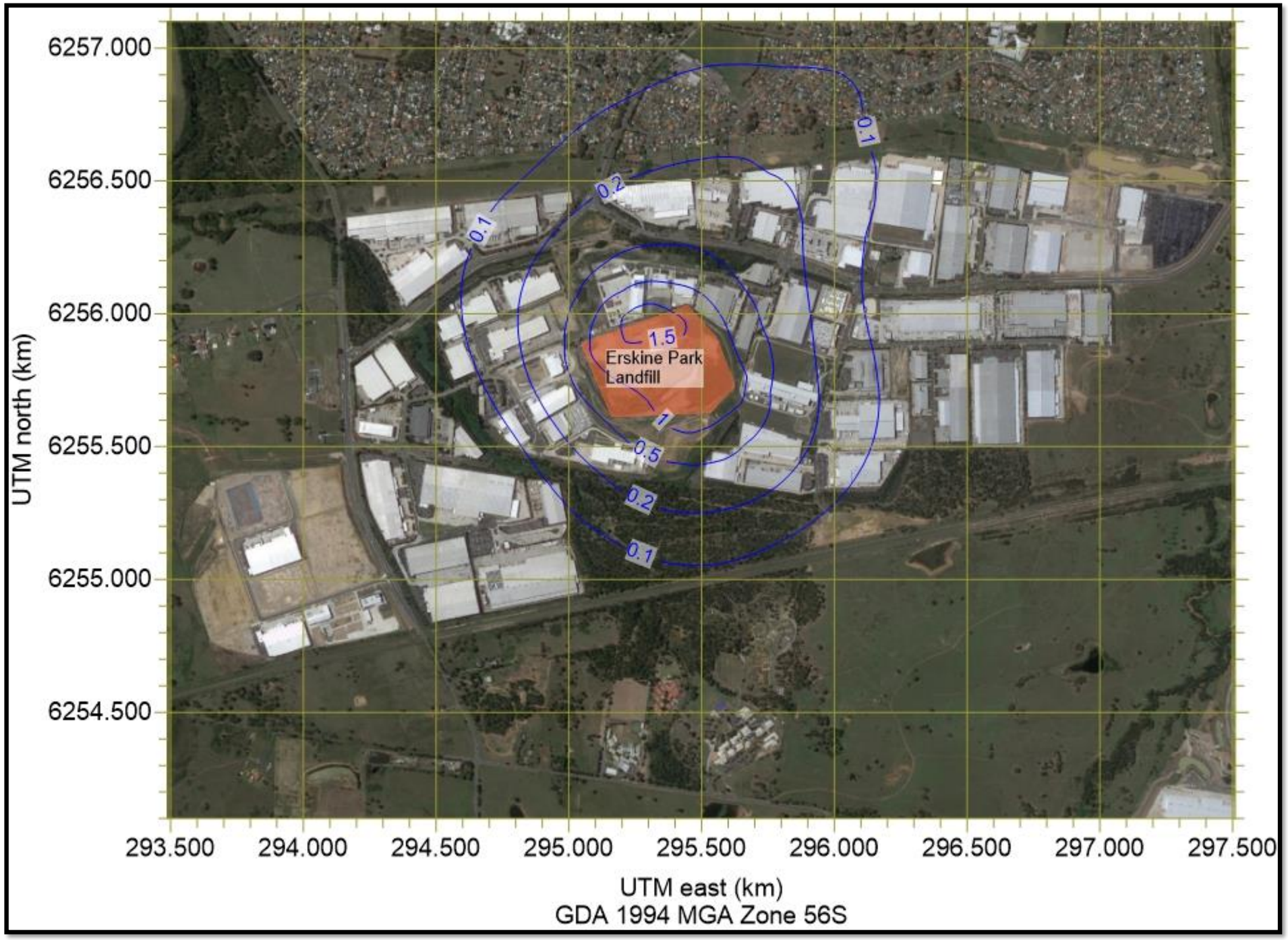

Figure 5.8 – Contour plot showing predicted annual average ground-level TSP concentrations (µg/m³) due to Erskine Park Landfill operations

6 SUMMARY OF AQOIA STUDY AND FINDINGS

The MSE wall proposed to be constructed at the Erskine Park Landfill will have a peak height of 81 m AHD, tapering to zero at both ends, with a total length of 930 m. The MSE wall will be situated along the west, south, and part of the eastern perimeter of the landfill. The construction of the MSE wall will increase the landfill airspace by approximately 450,000 m^3, leading to an extension of 36 months to the landfill operations, with existing capacity estimated to be consumed by December 2021. There are no other proposed changes to operations at the Erskine Park Landfill.

A dispersion modelling study was conducted to determine potential impacts due to the relocation of the landfill surface operations to a more elevated setting compared to the current operations at the Erskine Park Landfill. The AQOIA study incorporated site-specific meteorological data, emissions sources, and geographic representation of receptors in the surrounding environment. The site-specific meteorological data was based on a dataset generated using the TAPM and CALMET meteorological modelling system for the Erskine Park Waste Transfer Station (SLR, 2015 and TOU, 2019), located adjacent to the Erskine Park Landfill.

It is found that there will be no significant changes to the landfill operations from the construction of the MSE wall at the Erskine Park Landfill, except for the increased elevation of the dust sources. Therefore, it is reasonable to retain the estimated dust emissions from landfill activities and assume that they will remain consistent with the current landfill operations (Holmes, 2005 and GHD, 2019). The annual dust emission rates from individual activities are summarised in **Table 3.1**. The particle size distributions (Holmes, 2005) are summarised in **Table 3.2**.

The CALPUFF model was configured in consideration of assessments conducted for current and previous operations of the Erskine Park Landfill (GHD, 2019 and Holmes, 2005). The characterisation of the vertical profile of the landfill surface was adjusted to account for the increase in elevation due to the construction of the MSE wall. The ground-level pollutant concentrations were predicted at identified discrete receptors selected to represent the surrounding environment.

The AQOIA study findings under the construction of the proposed MSE wall scenario for the Erskine Park Landfill operations are as follows:

- The predicted ground-level concentrations of TSP, PM_{10} and $PM_{2.5}$ and dust deposition rates satisfies the relevant IAC in the surrounding environment; and

- The predicted ground-level concentrations of odour have met the impact assessment criteria for dense urban populations in the surrounding environment.

The construction phase of the proposed MSE wall at the Erskine Park Landfill is anticipated to last between 6 months and 12 months. The construction consists of a series of activities, with a definable beginning and end. Therefore, dust emissions will vary substantially over different phases of the construction process. The appropriate

implementation of management measures, such as a dust management plan, will be required to ensure that potential impacts due to construction will be significantly lower than operational impacts.

REFERENCES

- GHD, 2019. *Cleanaway Erskine Park Landfill S4.55 (2) Modification Statement of Environmental Effects*.
- TOU, 2019. *Erskine Park Resource Management Facility – Waste Transfer Station Odour Audit: July 2019*.
- NSW EPA, 2016. *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.
- SLR, 2015. *Erskine Park Waste Transfer Station. Air Quality Impact Assessment and Management*.
- NSW EPA, 2006a. *Technical framework: assessment and management of odour from stationary sources in NSW*.
- NSW EPA, 2006b. *Technical notes: assessment and management of odour from stationary sources in NSW*.
- Holmes Air Sciences, 2005. *Air Quality Impact Assessment: Modification to Final Profile for Erskine Park Landfill*.

REPORT SIGNATURE PAGE

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ENVIROGUARD PRIVATE LIMITED

Mechanically Stabilised Earth (MSE) Wall – Erskine Park Landfill Air Quality & Odour Impact Assessment Study

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Erskine Park, NSW

Appendix

Revision 3

April 2020

APPENDIX A:

ODOUR CONCENTRATION LABORATORY RESULTS REPORT: 5 FEBRUARY 2020

Document Set ID: 9100733
Version: 1, Version Date: 16/04/2020

THE ODOUR UNIT PTY LTD

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NATA
Accreditation Number: 14974

Odour Concentration Measurement Report

The measurement was commissioned by:

Organisation	Cleanaway	Telephone	1300 182 753
Contact	P. Antony	Facsimile	--
Sampling Site	Erskine Park, NSW	Email	paul.antony@cleanaway.com.au
Sampling Method	Isolation Flux Chamber	Sampling Team	TOU

Order details:

Order requested by	P. Antony	Order accepted by	M. Assal
Date of order	12.02.2020	TOU Project #	N2216L
Order number	10774529	Project Manager	M. Assal
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
Identification	The odour sample bags were labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification), sampling date and time, dilution ratio (if dilution was used) and whether further chemical analysis was required.
Method	The odour concentration measurements were performed using dynamic olfactometry according to the Australian/New Zealand Standard: Stationary source emissions – Part 3: '*Determination of odour concentration by dynamic olfactometry* (**AS/NZS4323.3:2001**). The odour perception characteristics of the panel within the presentation series for the samples were analogous to that for butanol calibration. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting 2^{17}. This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained at 22 °C ±3 °C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT V01.
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the AS/NZS4323.3:2001. ODORMAT V01: $r = 0.280$ (October 2019) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the AS/NZS4323.3:2001. ODORMAT V01: $A = 0.076$ (October 2019) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou, which is 4 times the lowest dilution setting.
Traceability	The measurements have been performed using standards for which the traceability to the national standard has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Accredited for compliance with ISO/IEC 17025 - Testing.
This report shall not be reproduced, except in full.

Date: Thursday, 6 February 2020

Panel Roster Number: SYD2020020205_012

A. Schulz
NSW Laboratory Coordinator

A.Schulz
Authorised Signatory

Odour Sample Measurement Results
Panel Roster Number: SYD20200205_012

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	*Specific Odour Emission Rate (ou.m³/m²/s)*
Pit #1	SC 20102	04.02.2020 1308 hrs	05.02.2020 1601 hrs	4	8	--	--	<16	<16	< 0.0097
Pit #2	SC 20103	04.02.2020 1351 hrs	05.02.2020 1629 hrs	4	8	--	--	<16	<16	< 0.0097

Samples Received in Laboratory – From: TOU Date: 5 February 2020 Time: 0900 hrs

Note: The following are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd:

1. The collection of Isolation Flux Hood (**IFH**) samples and the calculation of the Specific Odour Emission Rate (**SOER**).
2. Final results that have been modified by the dilution factors where parties other than The Odour Unit Pty Ltd have performed the dilution of samples.

Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20200205_012	51,400	$20 \leq \chi \leq 80$	724	71	Yes

Comments Odour characters (non-NATA accredited) as determined by odour laboratory panel:

SC 20102 musty
SC 20103 musty

Disclaimer
1. Parties, other than The Odour Unit Pty Ltd, responsible for collecting odour samples have advised that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Ltd for the purpose of odour testing.
2. The collection of odour samples by parties other than The Odour Unit Pty Ltd relinquishes The Odour Unit Pty Ltd from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.
3. Any comments included in, or attachments to, this Report are not covered by the NATA Accreditation issued to The Odour Unit Pty Ltd.
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