

Odour and Air Quality Impact Assessment Report

Document no: IA330200-00-T-V-RPT-00-11
Version: 04

Sydney Water
IN.P0001436

Quakers Hill WRRF Advanced Treatment Upgrade
16 July 2025



Odour and Air Quality Impact Assessment Report

Client name: Sydney Water
Project name: Quakers Hill WRRF Advanced Treatment Upgrade
Client reference: IN.P0001436 **Project no:** IA330200
Document no: IA330200-00-T-V-RPT-00-11 **Project manager:** Erin Vais
Version: 04 **Prepared by:** Luke Spencer
Date: 16 July 2025 **File name:** IA330200-00-T-V-RPT-00-11_04_Odour and Air Quality Impact Assessment - REF

Document status: Final

Document history and status

Version	Date	Description	Author	Checked	Reviewed	Approved
01	31/03/2025	Draft for comment	RH, GH	LS		EV
02	15/05/2025	2 nd draft for comment	RH	LS	SC	SB
03	11/06/2025	Final draft	LS	LS	SC	SB
04	16/07/2025	Final	LS	EV	-	EV

Distribution of copies

Version	Issue approved	Date issued	Issued to	Comments
01	31/03/2025	31/03/2025	Sydney Water	Draft for comment
02	16/05/2025	16/05/2025	Sydney Water	2 nd draft for comment
03	11/06/2025	11/06/2025	Sydney Water	Final draft
04	16/07/2025	16/07/2025	Sydney Water	Final

Jacobs Group (Australia) Pty Ltd

Level 7, 177 Pacific Highway
North Sydney, NSW 2060
PO Box 632
North Sydney, NSW 2059
Australia

T +61 2 9928 2100
F +61 2 9928 2444
www.jacobs.com

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Executive summary

Background

This odour and air quality impact assessment report has been prepared to inform the review of environmental factors for the Quakers Hill Water Resource Recovery Facility (WRRF) Advanced Treatment Upgrade project (the project). The project involves the development of an advanced water treatment plant (AWTP) at Quakers Hill WRRF, an upgrade of the site's existing secondary treatment infrastructure, and a pipeline to transfer brine from Quakers Hill WRRF to the existing Northern Suburbs Ocean Outfall Sewer at Seven Hills.

This report assesses the potential odour and air quality impacts during construction and operation of the project and provides measures and recommendations to minimise these impacts.

Key features of the existing environment

As part of the assessment, key features of the existing environment were identified including surrounding sensitive receptors, local terrain, meteorology, existing odour conditions around Quakers Hill WRRF and other local sources of emissions to air, background air quality and existing traffic conditions along key project routes.

Aerial imagery was used to identify the location of surrounding receptors. Topography around the project was understood using digital elevation data from the United States Geological Survey Shuttle Research Topography Mission. Existing odour conditions at the site were determined from recent assessments (ENSure, 2016 and Stantec, 2019) completed for the site, as well as complaints data from Sydney Water's Complaints Register. Other local sources of emissions to air were identified using information from the Commonwealth Department of Climate Change, Energy, the Environment and Water National Pollutant Inventory (NPI) database and information from the NSW Environment Protection Authority's (EPA's) Environment Protection Licence (EPL) Register. Local meteorology was derived from outputs of Sydney Water's site CALMET model. Ambient air quality data collected at monitors operated by the Department of Planning, Housing and Infrastructure in the surrounding area were reviewed to characterise existing local conditions. Finally, existing traffic conditions along relevant project routes were estimated from a recently completed local traffic assessment. The following conclusions were made in relation to the existing environment:

- For the Quakers Hill WRRF site, the nearest sensitive receptors are located less than 200 metres (m) to the north and south. The nearest receptors were noted as being at around the same elevation as the plant. Around the brine pipeline, a high number of sensitive receptors were identified in close proximity (i.e., within around 20 m); particularly along the two tunnelled components (denoted segments 1 and 4 in this assessment).
- In 2016 Quakers Hill WRRF was determined as being a "high risk odour plant, based on the 2 odour unit (OU) contours which are predicted to extend into residential areas". This conclusion was supported by data from Sydney Water's Complaints Register which documented 13 odour-related complaints for the site in the last 15 years. A more recent assessment (Stantec, 2019) indicated potential improvements at the site, although technical issues with this assessment were noted.
- From a review of the NPI and EPL databases, six nearby existing facilities were identified which reported and/or had regulated emissions to air.
- Prevailing local meteorological conditions around the project comprise of winds blowing from the north, with winds from the south southwest and east northeast also common.
- Background air quality concentrations around the site were recorded as generally meeting the EPA's impact assessment criteria, with the exception of 24-hour averaged particulate matter with equivalent aerodynamic diameter of 10 microns or less (PM₁₀) and finer particulate matter with equivalent

aerodynamic diameter of 2.5 microns or less (PM_{2.5}), which were occasionally measured above these limits. For both pollutants, no exceedances of the 24-hour averaged criteria were recorded in 2024 (i.e., the most recent complete calendar year).

- Two-way peak hour traffic flows along Quakers Road (i.e., the main road connecting Quakers WRRF to the road network) were estimated at around 600 movements per hour.

Assessment of impacts, recommendations and conclusions

Impacts during construction were assessed using the semi-quantitative method developed by the United Kingdom Institute of Air Quality Management. Other potential air quality-related impacts including exhaust emissions from plant and equipment, and odours, fumes and airborne hazards resulting from uncovered contaminated materials and groundwater were assessed qualitatively. The key outcomes of the construction impact assessment were:

- 'High' potential for nuisance dust impacts if left unmitigated along the trenched segments of the brine pipeline from Quakers Hill WRRF to Marayong Park, and from Lynwood Park to International Peace Park) during excavation activities. 'Low' or 'negligible' potential unmitigated nuisance dust impacts were determined around the other components of the project. With the implementation of the recommended controls, it was determined that residual impacts would be negligible, such that air quality at surrounding receptors would not be adversely affected in such a way leading to any significant dust soiling nuisance or health effects.
- Impacts from other emissions to air during construction (exhaust emissions from construction plant and equipment, as well as from additional construction traffic, and odours and airborne hazardous materials arising from uncovered contaminated materials) were considered but not assessed as being likely to result in any impacts. Still, measures to minimise these emissions were recommended.
- Changes in operational odour at sensitive receptors around Quakers Hill WRRF as a result of the project were quantitatively assessed by way of air pollution dispersion modelling. Modelling determined that the 99th percentile, 1-hour averaged ground-level odour concentrations from the upgraded Quakers Hill WRRF site would exceed the EPA's 2 OU impact assessment criterion at nearby representative receptors within approximately 200 to 400 m of the facility. Sensitivity reviews were completed for key odour sources, and in consultation with Sydney Water, the option to redirect emissions from the existing pump station vents via the new biotrickling filter stack was assessed. With this change it was determined that although the 99th percentile, 1-hour averaged 2 OU odour contour was still predicted to extend beyond the site boundary into the surrounding residential areas, its extents were assessed as contracting by up to around 90-130 m. It was estimated that odours from the upgraded plant would not materially differ from existing operations. Recommendations were made to review this and other relevant odour control options, as well as to complete odour sampling of the activated granular sludge tank in order to verify a suitable specific odour emission rate for the asset. It was also recommended that any odour complaints from the site continue to be managed in accordance with Sydney Water's existing management system processes.

The potential for cumulative air quality impacts was also assessed using the guidance presented in 'Cumulative Impact Assessment Guidelines for State Significant Projects', (Department of Planning, Industry and Environment, 2022). Three projects were identified as being potentially relevant, with potential cumulative impacts assessed as being negligible for all of these projects.

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Acronyms and abbreviations

AAJV	Aurecon AECOM Joint Venture
ADWF	Average dry weather flow
AGS	Activated granular sludge
AWTP	Advanced water treatment plant
BTF	Biotrickling filter
CEMP	Construction environmental management plan
CO	Carbon monoxide
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DEC	Former Department of Environment and Conservation (NSW)
DoP	Former Department of Planning (NSW)
DPHI	Department of Planning, Housing and Infrastructure (NSW)
DPIE	Former Department of Planning, Industry and Environment (NSW)
EIS	Environment impact statement
EPA	NSW Environment Protection Authority
EPL	Environment protection licence
ERS	Sydney Water Environmental Reference Standard
GADDC	'Guidance on The Assessment of Dust from Demolition and Construction', (IAQM, 2024)
GLC	Ground level concentration
IAQM	Institute of Air Quality Management (UK)
km	Kilometres
m	Metres
m/s	Metres per second
MBR	Membrane bioreactor
ML/day	Megalitres per day
mg/m ³	Milligrams per cubic metre
µg/m ³	Micrograms per cubic metre

NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPI	National Pollutant Inventory
NSOOS	Northern Suburbs Ocean Outfall Sewer
NSW	New South Wales
OCU	Odour control unit
OU	Odour units
PM ₁₀	Particulate matter with an equivalent aerodynamic diameter equal to or less than 10 microns
PM _{2.5}	Particulate matter with an equivalent aerodynamic diameter equal to or less than 2.5 microns
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
POEO Clean Air Regulation	Protection of the Environment Operations (Clean Air) Regulation 2022
PRW	Purified recycled water
REF	Review of environmental factors
RSQST	'Roadside air quality screening tool version 1.1', (TfNSW, 2023)
SO ₂	Sulphur dioxide
SOER	Specific odour emission rate
SRTM	Shuttle Research Topography Mission
TfNSW	Transport for New South Wales (NSW)
The Approved Methods	'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW' (EPA, 2022)
The project	The Quakers Hill WRRF Advanced Treatment Upgrade project
TOER	Total odour emission rate
TSP	Total solid particulates
USGS	United States Geological Survey
VOCs	Volatile organic compounds
WRRF	Water Resource Recovery Facility

1. Introduction

1.1 Background

This odour and air quality impact assessment report has been prepared to inform the review of environmental factors (REF) for the Quakers Hill Water Resource Recovery Facility (WRRF) Advanced Treatment Upgrade project (the project). The project involves the development of an advanced water treatment plant (AWTP) at Quakers Hill WRRF, an upgrade of the site's existing secondary treatment infrastructure, and a pipeline to transfer brine from Quakers Hill WRRF to the existing Northern Suburbs Ocean Outfall Sewer (NSOOS) at Seven Hills. The location of the project is shown in Figure 1-1. Sydney Water is the proponent of the project.

This report assesses the potential odour and air quality impacts during construction and operation of the project and provides measures and recommendations to minimise these impacts.

1.2 Project overview

Upgrades to Sydney Water's Quakers Hill WRRF are required by 2028 to:

- Service industry growth and housing policies as current treatment capacity at the plant of 28 megalitres per day (ML/day) is expected to be exceeded in late 2028
- Meet environment protection licence (EPL) limits that require reduced nutrient loads to the Hawkesbury-Nepean River (Sackville 2 zone)
- Provide high quality water treatment that enables a future purified recycled water (PRW) scheme and its introduction into Prospect Reservoir.

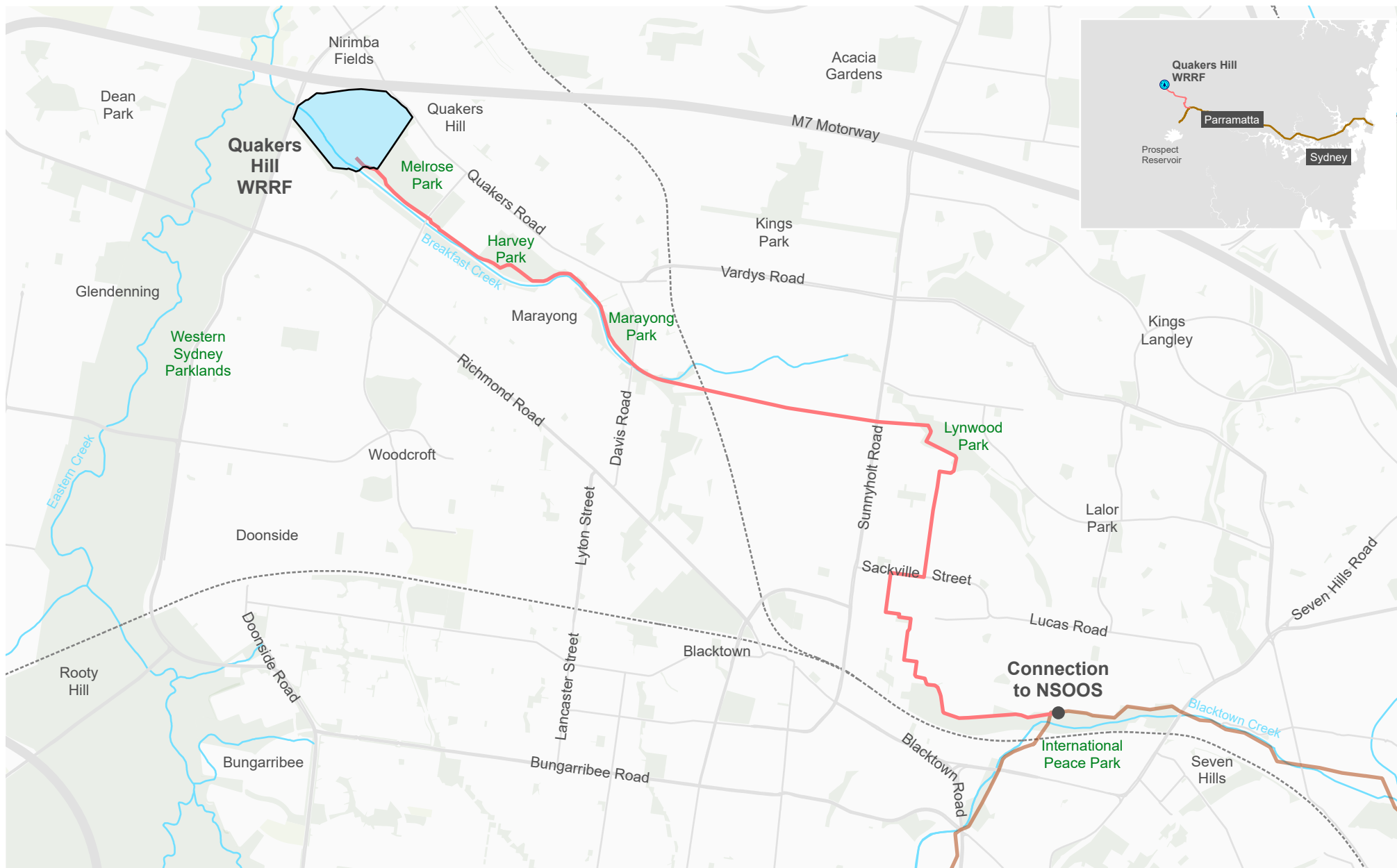
The project is in the Blacktown local government area, in largely urbanised areas with a mix of residential, industrial, and recreational land uses.

The key features of the project include:

- A secondary treatment process upgrade from the current 28 ML/day to 48 ML/day
- A new AWTP, including reverse osmosis, ultrafiltration and stabilisation
- A range of ancillary infrastructure such as new buildings, tanks, pipes, services and chemical storage
- Demolition and restoration of previously decommissioned structures
- A new brine pipeline to transfer the brine generated as a by-product of the reverse osmosis process into the existing wastewater network. The pipeline would:
 - Have flow capacity of up to 12.5 ML/day
 - Be about 8 kilometres (km) long and about 500 millimetres diameter
 - Be installed largely along shared paths, public parkland, and road corridors
 - Be mostly underground and built using open trench and trenchless methods
 - Be connected into Sydney Water's existing NSOOS.

The AWTP is required to treat the wastewater to meet nutrient limits. However, it would also produce high quality water that could be further treated to produce PRW.

Sydney Water is preparing the REF for the project. PRW is not part of the scope of this report. Sydney Water is separately assessing the potential introduction of PRW in an environmental impact statement (EIS).



- Quakers Hill Water Resource Recovery Facility (WRRF)
- Brine pipeline
- NSOOS pipeline
- Parks and open space

Figure 1-1 Overview of the proposed scheme

0 1 km

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2024

Scale: 1:35,000 @ A4
GDA2020 MGA Zone 56



1.3 Purpose of this report

The purpose of this report is to assess the potential air quality impacts associated with the project and to define the mitigation and management measures necessary to mitigate or otherwise effectively manage environmental impacts.

The specific objectives of the impact assessment are to:

- Identify local air quality values and the nature and proximity of potentially sensitive receptors
- Provide an assessment of the likely impact of the project on air quality values to inform approvals under relevant policy and legislation
- Provide recommendations to mitigate or otherwise effectively manage impacts on identified air quality values where appropriate.

1.4 Structure of this report

The report is structured as follows:

- **Introduction** (this section) which provides background details for the project and outlines the purpose and structure of the assessment
- **Project description (Section 2)**, where key details relevant to the assessment are explained
- **Legislation, policy, guidelines and adopted assessment criteria (Section 3)** which lists the legislative, policy, guideline and other documents relevant to the assessment, and establishes the assessment criteria
- **Methodology (Section 4)** where the approach applied to assess potential air quality impacts associated with the project is explained
- **Existing conditions (Section 5)** which identifies key features of the existing environment as relevant to the assessment including background air quality conditions, existing and potential future sources of emissions to air that may lead to cumulative impacts, prevailing local meteorology, details of surrounding sensitive receptors and existing traffic conditions
- **Impact assessment (Section 6)**, where initial and residual air quality impacts during the construction and operation of the project, including potential cumulative impacts from other nearby developments and projects are evaluated
- **Mitigation and management (Section 7)** which describes the measures to mitigate or otherwise effectively manage the potential air quality impacts determined
- **Summary and recommendations (Section 8)** where the objectives, methods, outcomes and recommendations of the assessment are presented.

2. Project description

2.1 Overview of the project

Sydney Water is planning to upgrade the existing wastewater treatment process at the Quakers Hill WRRF and introduce an Advanced Water Treatment Plant (AWTP). Secondary wastewater treatment upgrades will increase the average dry weather flow (ADWF) capacity of the WRRF from the current 28 ML/day to 48 ML/day, helping meet increased service demand due to population and industry growth. The AWTP will treat water to meet stringent nutrient load limits on the site's Environment Protection Licence (EPL). A new pipeline will be constructed from the Quakers Hill WRRF to the Northern Suburbs Ocean Outfall Sewer (NSOOS) at Seven Hills to transport brine produced by the AWTP.

The main components of the project are:

- Modifications to existing infrastructure at Quakers Hill WRRF to enable the following components of the project
- Secondary wastewater treatment process upgrade to increase treatment capacity of the WRRF and provide suitable feedwater for the new AWTP
- AWTP with associated interconnecting pipes, valves and isolation points to treat wastewater to a high quality to achieve EPL compliance
- Brine pipeline with associated valves, chambers, barometric loop and maintenance access points to transport brine to the existing wastewater reticulation system.

2.2 Summary of key project activities

Air quality issues arise when air pollutant emissions from an industry or activity lead to a deterioration in ambient (i.e. outdoor) air quality, including from odours. Details of the construction and operation phases of the project described above were reviewed to identify activities which may impact local air quality.

2.2.1 Construction

During construction, the primary air quality impact is expected to be dust. The term dust refers to particulate matter in, most commonly, the form of total solid particulates (TSP), deposited dust, particulate matter with equivalent aerodynamic diameter of 10 microns or less (PM_{10}), and finer particulate matter with equivalent aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). The Environment Reference Standard (ERS) establishes assessment indicators for PM_{10} and $PM_{2.5}$ with an objective of protecting human health.

Activities with the highest potential to generate dust during construction include:

- Excavation, loading and unloading, haulage, placement and compaction of materials during the construction of temporary and permanent project infrastructure
- Storage of stockpiled materials and temporary disturbed and exposed surfaces that are susceptible to wind erosion.

As well as dust, another key air quality-related risk during construction would be exhaust emissions from the combustion of fossil fuels in construction plant and equipment. The primary pollutants associated with plant exhaust emissions include carbon monoxide (CO), oxides of nitrogen (NO_x) including nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), volatile organic compounds (VOCs) and sulphur dioxide (SO_2) (depending on fuel sulphur content).

Finally, odours and airborne hazardous materials arising from uncovered contaminated materials represent another air quality related risk during construction.

2.2.2 Operations

During operations, the key air quality-related risk would be any change to odours associated with operations of Quakers Hill WRRF. The key project activities that could result in changes to odour emissions from the site include the modifications to existing infrastructure and new infrastructure to be constructed as part of the AWTP. As part of the works, the following existing assets would be modified:

- Primary treatment plant
- Clearwater basin
- Brine tanks
- Brine pumps
- Activated granular sludge (AGS) polymer system
- Coagulant bulk storage
- Hypochlorite bulk storage
- Site services (reclaimed effluent supply, compressed air system, fire water, etc.)
- High voltage power supply
- Supervisory Control and Data Acquisition (SCADA) system
- Switchboards.

The type of modification required depends on the asset. Types of modification include retrofitting of connections, cut-ins, reuse or demolition, or the addition of structures. The scope of the required modifications will be developed and refined as the design of the project progresses and confirmed at detailed design.

Modifications would also involve the demolition and infilling of two previously decommissioned intermittently decanted aerated lagoons, which currently occupy the proposed location of the AWTP.

The secondary wastewater treatment upgrades will involve the construction and operation of the following new assets:

Table 2-1. Quakers Hill WRRF Secondary treatment upgrades, new assets

Wastewater treatment component	Key design details
Bioreactor process unit	A process unit for biological treatment of wastewater. The structure would be about 6 m high, 58 m long and 70 m wide.
Membrane bioreactor (MBR) process unit	The MBR would comprise a concrete water retaining structure about 6 metres high, 29 m long and 26 m wide.
MBR permeate and pumps	Pumps to facilitate the pumping of MBR permeate away from the MBR equipment. The pumps would be raised on an outside plinth and be about 1.5 m high, 26 m long and 11 m wide.
Two-storey building for the MBR and bioreactor switch room and blower room	A two-storey tilt slab / brick building standing about 12 m high, 24 m long and 12 m wide. It would house the MBR and bioreactor switch room on one floor, and a blower room for the reactor on the other.

Wastewater treatment component	Key design details
Waste activated sludge (WAS) / scum pump station	Indoor pumps required to pump excess biological sludge from the bioreactors to the sludge management units. The pumps would be about 4 m high, 7 m long and 5 m wide.
Fine screen feed pump	Pumps located outside at ground level to feed water to the new secondary water treatment system components. The pumps would stand about 2 m high, 12 m long and 12 m wide.
MBR pre-screens process unit	An outside process unit raised on a plinth for the fine screening of feed water to the bioreactor. This process unit would be about 8.5 m high, 20 m long and 25 m wide.
Sludge transfer station tank	The sludge transfer station tank would use an existing pit within the Quakers Hill WRRF. It would be 1 m high, 18 m long and 11 m wide.
Odour control unit (OCU)	The OCU would consist of an 8 m long concrete slab at ground level supporting 2 fans, large fibreglass ductwork, and 4 fibreglass tanks for either biotrickling filter (BTF) or activated carbon odour treatment technologies. The 2 larger BTF tanks would be about 14 m high and 3.4 m in diameter. The smaller activated carbon polishing tanks would be about 3 m in diameter.
OCU stack	A stack to discharge treated air from the OCU. This structure would be about 14 m high and <1 m in diameter.

No changes to emissions to air are expected to result from the new AWTP.

3. Legislation, policy and guidelines

3.1 Overview

There are several statutes and guidelines that apply to the regulation of emissions to air from developments in NSW including:

- NSW Protection of the Environment Operations Act 1997 (POEO Act)
- NSW Protection of the Environment Operations (Clean Air) Regulation 2022 (POEO Clean Air Regulation)
- 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW', (NSW Environment Protection Authority [EPA], 2022) (the Approved Methods)
- 'Technical Framework Assessment and Management of odour from stationary sources in NSW', NSW Department of Environment and Conservation [DEC], 2006)
- 'NSW Best Practice Odour Guideline, Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining', (Department of Planning, [DoP], 2010).

Requirements relevant to the project from each of these documents are outlined below.

3.2 *Protection of the Environment Operations Act 1997*

The POEO Act is the primary piece of legislation for the regulation of potential pollution impacts associated with Scheduled operations or activities in NSW. Scheduled activities are those defined in Schedule 1 of the POEO Act. The site is and will remain a Scheduled activity, operating in accordance with the requirements of EPL No. 1724. EPL 1724 includes the following conditions regarding the management of air quality-related issues at the site:

Table 3-1. EPL 1724 odour and air quality-related conditions

EPL Condition	Requirement
O4.8	Recording and evaluation of odour complaints annually
R5.7	Recording of complaints by category, including those related to 'odours'

These requirements remain applicable.

3.3 *Protection of the Environment Operations (Clean Air) Regulation 2022*

The POEO Clean Air Regulation contains provisions for the regulation of emissions to air from wood heaters, open burning, motor vehicles, fuels and industry. The project does not involve any activities listed Schedule 2 of the POEO Clean Air Regulation. As such the applicability of the POEO Clean Air Regulation to the project is expected to be limited.

3.4 *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*

The Approved Methods outline the approaches to be applied for the modelling and assessment of air pollutants in NSW. Impact assessment criteria for odour are described in the unit of measurement termed, 'odour units' (OU). The Approved Methods describes the number of odour units as 'the concentration of a sample divided by the odour threshold, or the number of dilutions required for the sample to reach the

threshold'. The numerical value expressed is the threshold value equivalent to when 50% of a testing panel correctly detect an odour. A value of 1 OU represents the threshold of detection, and as such values less than 1 OU are below detection. As listed below in Table 3-2, the Approved Methods provides more stringent odour impact assessment criteria based on the extent of the potentially affected population.

Table 3-2. Impact assessment criteria for complex mixtures of odorous pollutants (nose-response-time average, 99th percentile)

Population of affected community	Impact assessment criteria for complex mixtures of odorous air pollutants (OU)
Urban (≥ 2000) and/or schools and hospitals	2.0
~500	3.0
~25	4.0
~30	5.0
~10	6.0
Single rural residence ($\leq \sim 2$)	7.0

Source: EPA (2022)

Section 7.5.2 of the Approved Methods describes how these criteria apply at 'the nearest existing or likely future off-site sensitive receptor'. A sensitive receptor is defined as "a location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area". This definition has also been interpreted as places of near continuous occupation. When site-specific meteorological data is applied in the assessment, these criteria relate to the 99th percentile of peak concentrations.

As described in Section 6.6 of the Approved Methods, the evaluation of odour impacts requires the 'estimation of short or peak concentrations on the time scale of less than one second'. Noting that the temporal resolution of dispersion modelling is generally one hour or more, an emission rate correction is applied in NSW to 'accurately simulate atmospheric dispersion of odours and the instantaneous perception of odours by the human nose'. This correction is known as a peak-to-mean ratio. Values for the peak-to-mean ratio are dependent on the nature of the source, atmospheric stability and the distance downwind. Reference peak-to-mean values from the Approved Methods have been reproduced below in Table 3-3.

The Pasquill-Gifford stability class is a system for categorising atmospheric conditions based on their ability to disperse pollutants. It uses a letter system (A-F) to represent different levels of atmospheric stability, with A being highly unstable (i.e., strong turbulence) and F being stable (i.e., weak turbulence). Atmospheric stability was classified by Pasquill-Gifford stability class below in Table 3-3.

Table 3-3. Reference peak-to-mean values

Source	Pasquill-Gifford stability class	Near-field P/M60	Far-field P/M60
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A to F	6	6
Surface wake-free point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A to F	2.3	2.3
Volume	A to F	2.3	2.3

Source: EPA (2022)

The Approved Methods also provide impact assessment criteria for the key pollutants expected during construction (as identified above in Section 2.2.1). These criteria are reproduced below in Table 3-4.

Table 3-4. Impact assessment criteria for key air pollutants during construction

Substance	Averaging time	Percentile	Criterion
Particulate matter (PM ₁₀)	24-hour	100 th	50 µg/m ³
	Annual	-	25 µg/m ³
Particulate matter (PM _{2.5})	24-hour	100 th	25 µg/m ³
	Annual	-	8 µg/m ³
Particulate matter (TSP)	Annual	-	90 µg/m ³
Deposited dust	Annual (maximum increase)	-	2 g/m ² /month
	Annual (maximum total)	-	4 g/m ² /month
Nitrogen dioxide (NO ₂)	1-hour	100 th	164 µg/m ³
	Annual	-	31 µg/m ³
Carbon monoxide (CO)	15-minute	100 th	100 mg/m ³
	1-hour	100 th	30 mg/m ³
	8-hour	100 th	10 mg/m ³
Sulphur dioxide (SO ₂)	1-hour	100 th	286 µg/m ³
	24-hour	100 th	57 µg/m ³
Benzene	1-hour	99.9 th	29 µg/m ³

The EPA air quality assessment criteria for these pollutants (except benzene which applies to the source contribution) relate to the total concentration of air pollutant in the air (that is, cumulative) and not just the contribution from project-specific sources. Therefore, some consideration of background levels needs to be made when using these criteria to assess the potential impacts. Further discussion of background levels in the study area relevant to the project is provided below in Section 5.6.

3.5 Technical Framework Assessment and Management of odour from stationary sources in NSW

The 'Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW', (DEC, 2006) provides information on how odour matters should be assessed, managed, regulated and enforced. The odour impact assessment criteria above in Table 3-2 from the Approved Methods are adopted from the Technical Framework.

This study uses site-specific input data including local terrain, meteorology, and land use information; as well as literature-derived emission estimates based on the nature of the materials expected to be received at the facility. Potential operational odour impacts from the Quakers Hill WRRF were evaluated using dispersion modelling. As such, the review is considered to constitute a Level 3 assessment, in the context of Section 4 of the Technical Framework. This level of assessment is identified as being suitable for assessing 'site suitability and odour mitigation measures'.

Guidance for avoiding and mitigating odour from Section 5 of the Technical Framework was also considered as applicable.

3.6 'NSW Best Practice Odour Guideline, Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining'

The 'NSW Best Practice Odour Guideline, Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining', (DoP, 2010) provides best practice guidance to protect the amenity of surrounding receptors and land users from sewage treatment activities. The guideline recommends that best practice for existing wastewater treatment plants is to reduce existing odour levels to meet the ambient odour levels in 'Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW', (DEC, 2006) (i.e., that the 99th percentile 1-hour averaged odour concentration does not exceed 2 OU), and otherwise not result in any adverse changes.

3.7 Adopted impacts assessment criteria

For the evaluation of emissions to air during construction, the applicable impact assessment criteria from the Approved Methods (as listed in Table 3-4) were adopted.

Considering the guidance presented above, a 99th percentile one-hour peak-to-mean corrected (i.e. nose-response-time average) ground level concentration odour impact assessment criterion of 2 OU was conservatively adopted for the operational odour review component of the assessment. In achieving this criterion, it is expected that the requirement to avoid offensive odours beyond the boundary of the premises from the POEO Act would also be met.

4. Method

4.1 Overview

This section of the report describes the method that was used to assess the potential impacts of the project. Further details of the approaches applied for each step in the assessment are provided in the following sub-sections.

4.2 Study area

4.2.1 Construction

The study area for the construction impact assessment is the project area with a 500 m buffer applied. This 500 m buffer is consistent with guidance presented in Section 6 of 'Guidance on the assessment of dust from demolition and construction Version 2.1' (GADDC), (United Kingdom Institute of Air Quality Management [IAQM], 2024) which identifies that when there are no sensitive receptors within 500 m the risk of impacts from construction activities would be 'negligible' and that any effects 'would not be significant'.

4.2.2 Operations

The study area applied for the evaluation of changes in odour emissions from Quakers Hill WRRF during operations was the maximum distance from the plant at which predicted ground level odour concentrations fell below 2 OU.

4.3 Existing environment

Key features of the existing environment as relevant to air quality include:

- Surrounding sensitive receptors
- Land use and topography
- Local meteorology
- Sources of odour associated with existing operations at Quakers Hill WRRF, including odour-related complaints history
- Other local sources of emissions to air
- Background air quality
- Existing nearby traffic conditions.

Table 4-1 below describes how each of these aspects of the existing environment around the project were characterised:

Table 4-1. Inputs used to characterise features of existing environment

Feature	Source
Sensitive receptors and land uses	Surrounding land use and nearby sensitive receptors were identified using recent aerial imagery available from MetroMap.
Topography	Elevations at and around the project were determined using 1 second (30 metre) digital elevation data from the Shuttle Research Topography Mission (SRTM) available from the United States Geological Survey (USGS).

Feature	Source
Local meteorology	Determined using outputs from Sydney Water's CALMET model files at the project location.
Existing sources of odour and associated complaints	Odours from the current Quakers Hill WRRF were identified from the report, 'Odour Impact Assessment LSCTP - Quakers Hill WRP', (Stantec, 2019), as well as the earlier study, 'Quakers Hill Water Recycling Plant Odour Modelling Description', (ENSure, 2016). Sydney Water's Complaints Register was reviewed to identify odour-related complaints associated with the site.
Other local sources of emissions to air	National Pollutant Inventory (NPI) Facilities Dataset for 2022-23 reporting year, downloaded as .kmz file format (https://data.gov.au/dataset/ds-dga-043f58e0-a188-4458-b61c-04e5b540aea4/details) and imported into GIS; and data from the EPA's EPL Register.
Background air quality	Background air quality conditions around the project were determined from monitoring data collected at the nearby stations operated by Department of Planning, Housing and Infrastructure (DPHI) at Prospect and Rouse Hill.
Existing traffic conditions	Estimated using information from a recent assessment completed (available at: https://www.blacktown.nsw.gov.au/files/assets/public/v/1/planning-neighbour-notifications/da-20-01732/traffic-impact-statement-8-quakers-road-quakers-hill_pan-30440.pdf)

4.4 Impact assessment methodology

4.4.1 Construction

As identified above in Section 2.2.1, during construction, dust is expected to be the key air quality-related risk. Potential dust-related impacts were assessed using the methodology documented in the GADDC (IAQM, 2024). This method was selected based on its comprehensive methodology which recommends robust mitigation and management measures aligned to the assessed levels of potential impacts.

The assessment procedure involves four steps of assessment, with the intended outcome of developing suitable mitigation measures to avoid any potential nuisance and human health impacts from dust generated during the four primary activities. These steps are presented in Figure 4-1 and involve:

- **Step 1**, a screening review to establish a study area for and identify nearby human and ecological receptors which have the potential to be impacted by the intended works
- **Step 2**, an evaluation of the potential magnitude (Step 2A) and sensitivity of the surrounding receiving environment to dust impacts (Step 2B). Step 2A and 2B were combined in Step 2C to estimate the potential for dust impacts if no mitigation measures were applied. Step 2 was completed for different work areas across the project so that changes in potential impacts could be identified and assessed across the entire project
- **Step 3**, the development of mitigation for each work location, commensurate to the level of potential impacts determined in Step 2
- **Step 4**, an evaluation of any residual dust-related potential impacts following the application of the control measures developed during Step 3 to verify that a suitable level of mitigation has been developed to reduce residual impacts to the extent practicable.

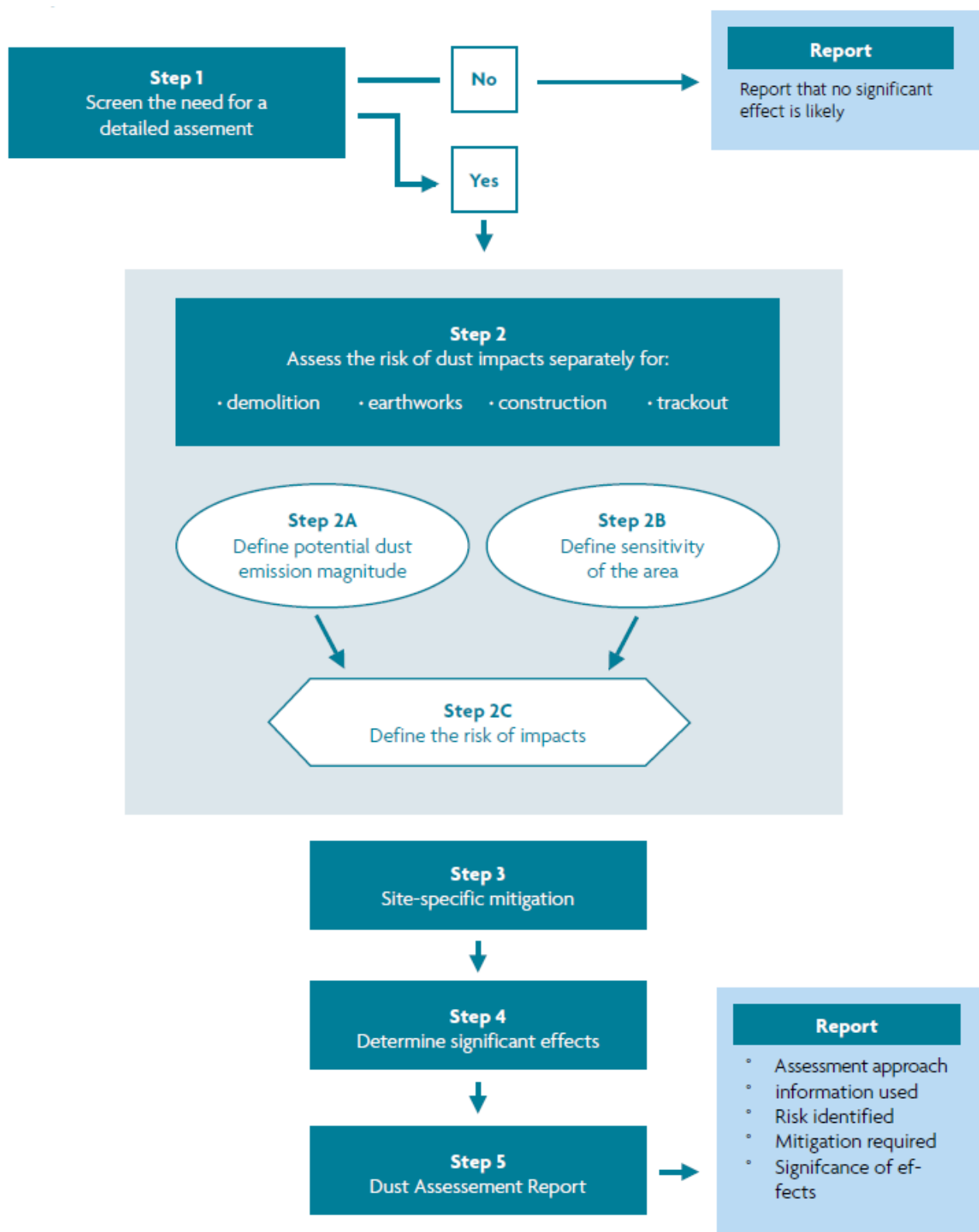


Figure 4-1. Dust impact assessment procedure (Source: IAQM, 2024)

The other air quality risks identified during construction (e.g., exhaust emissions from construction plant and equipment and odours and airborne hazardous materials arising from uncovered contaminated materials) were assessed qualitatively, with suitable mitigation and management measures developed as required.

Changes in roadside air quality at receptors along key traffic routes during construction was also considered as part of the assessment. These changes were evaluated using the 'Roadside air quality screening tool version 1.1' (RSAQST), (November 2023) developed by Transport for New South Wales (TfNSW).

The outcomes of the construction impact assessment are presented in Section 6.1.

4.4.2 Operations

Potential changes in odour concentrations resulting from the secondary upgrades at Quakers Hill WRRF were quantitatively assessed using dispersion modelling. This section describes how the modelling was undertaken, including details of the odour emissions inventory applied.

4.4.2.1 Assessment overview

The non-steady state "puff" model known as CALPUFF (Version 7) was used to simulate odour emissions and potential changes in odour impacts from at Quakers Hill WRRF. The existing site dispersion model (from Stantec, 2019) was reviewed and updated to reflect the secondary treatment upgrades. Details of the changes made to reflect the planned secondary upgrades are detailed below in Section 4.4.2.2. The CALMET meteorological input files for 2013, 2014 and 2015 developed by the Aurecon AECOM Joint Venture (AAJV) supplied by Sydney Water were applied in the model. Figure 4-2 provides an overview of the modelling processes applied.

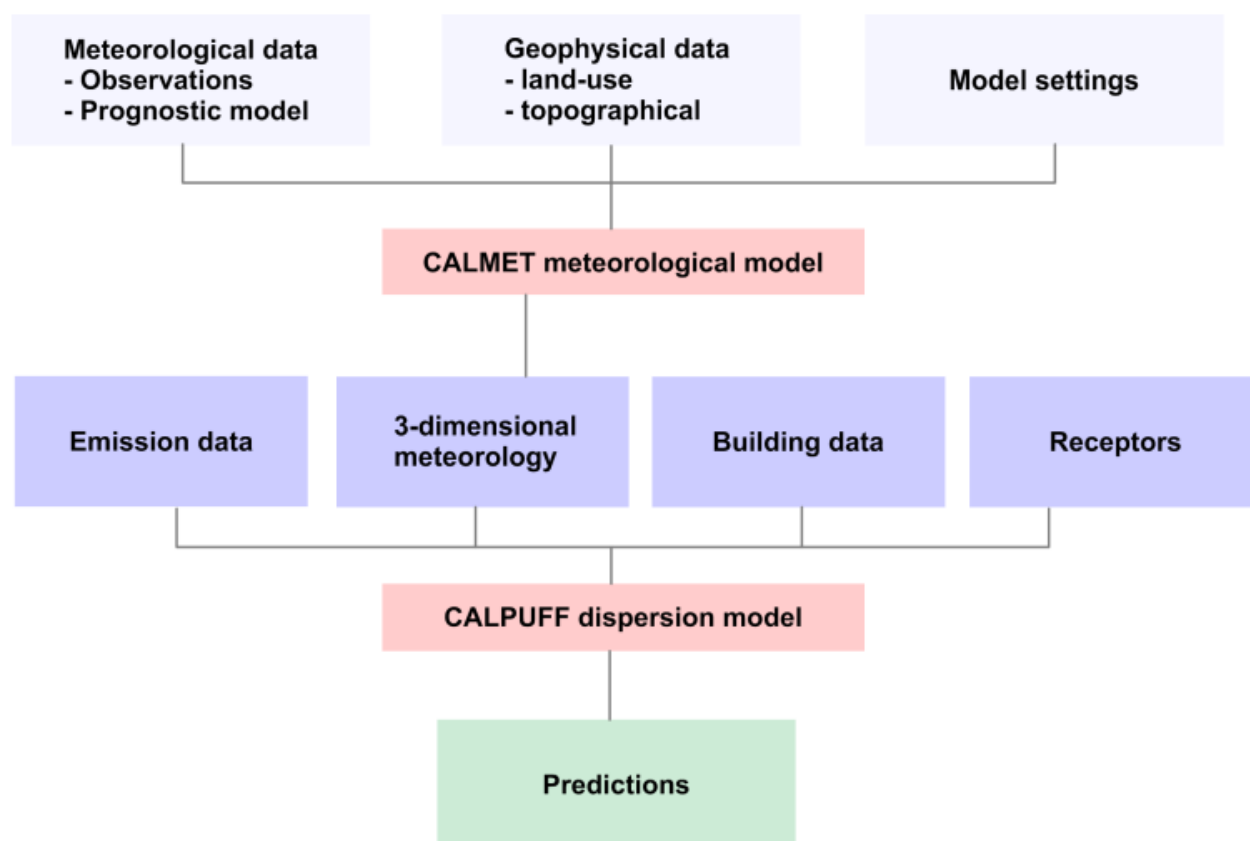


Figure 4-2. Overview of CALPUFF model (Source: ENSure, 2016)

Predictions from the modelling were evaluated by comparing the results at surrounding sensitive receptors with the 2 OU impact assessment criterion established above in Section 3.7. Results were also evaluated by comparing against predictions from the previous odour studies at the site (i.e., Stantec, 2019, and ENSure, 2016). Based on these outcomes, recommendations for mitigation were made as appropriate.

4.4.2.2 Emissions inventory

Odour emissions are required by the dispersion model (see Figure 4-2) for all identified odour sources. An odour emissions inventory identifies and characterises the type and intensity of odour emissions from sources across a site. The odour sources considered in the inventory are displayed below in Figure 4-3, with the odour emissions inventory applied for Quakers Hill WRRF listed below in Table 4-2 (source parameters and odour concentrations) and Table 4-3 (peak-to-mean factors, initial horizontal and vertical spreading and source co-ordinates). The sources in the rows coloured 'green' are existing, with new sources associated with the project shown in 'blue'.

The inventory was developed using information from previous odour dispersion models developed for the site, with emission factors for new sources developed using guidance from Sydney Water's Odour Emissions Database. Consistent with the Approved Methods, the odour emissions data have been multiplied by "peak-to-mean" factors to convert the model's one hour averaging time to a nose-response averaging time (which is in the order of one second).

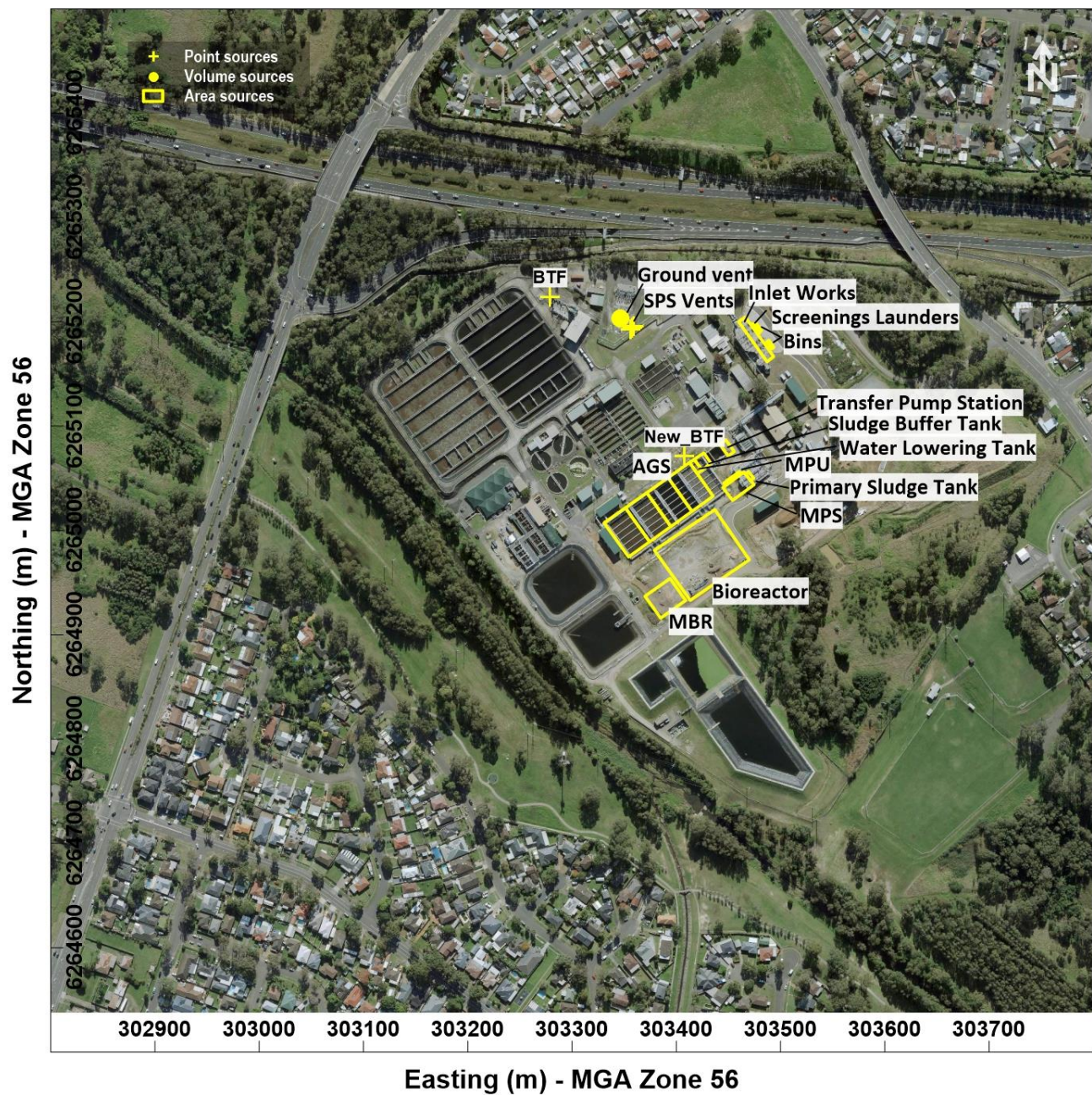


Figure 4-3. Quakers Hill WRRF operational odour sources

Table 4-2. Odour emissions inventory, part 1

Source ID	Source details	Source type	Area (m²)	Height (m)	Stack tip diameter (m)	Base elevation (m)	Exit temp. (K)	Exit velocity (m/s)	Air flow (m³/s)	Odour conc. (OU)	Specific odour emission rate (SOER) (OU.m³/m²/s)	Total odour emission rate (TOER) (OU.m³/s)	Notes
BTF	BTF stack	Point	-	14.00	0.750	28	291	14.260	6.300	2,000	-	12600	From model updated by Stantec (2019).
New_BTF	New BTF	Point	-	14.00	0.620	26	291	14.997	4.528	500	-	2264	500 OU per ACP.
SPSV1	SPS1174 VSH03	Point	-	9.00	0.300	25	291	1.179	0.083	1,0000	-	833	From model updated by Stantec (2019).
SPSV2	SPS1174 VSH02	Point	-	9.00	0.300	25	291	1.179	0.083	10,000	-	833	From model updated by Stantec (2019).
SPSV3	SPS1174 VSH01	Point	-	9.00	0.300	25	291	1.179	0.083	10,000	-	833	From model updated by Stantec (2019).
BIORCTR	Bioreactor	Area	4060	7.00	-	25	-	-	-	754	0.500	2030	Used for USC. SOER = 0.5 is default value from SWC Odour Emissions Database for bioreactors.
MBR	MBR	Area	754	7.00	-	25	-	-	-	754	0.500	377	Used for USC. SOER = 0.5 is default value from SWC Odour Emissions Database for short sludge age plant. Entire area (754 m²) of MBR tank has been used.
IWS	Inlet Works Structure	Area	381	6.00	-	28	-	-	-	603	0.400	152	From model updated by Stantec (2019).
SL	Screenings Launderers	Area	18	4.00	-	28	-	-	-	1,206	0.800	14	From model updated by Stantec (2019).
SB	Screenings Bins	Area	20	2.00	-	28	-	-	-	75	0.050	1	From model updated by Stantec (2019).
GB	Grit Bins	Area	20	2.00	-	28	-	-	-	75	0.050	1	From model updated by Stantec (2019).
MPU	Mechanical Primary Units	Area	56	3.00	-	30	-	-	-	1,206	0.800	45	From model updated by Stantec (2019).
MPS	Mechanical Primary Structure	Area	387	3.00	-	30	-	-	-	603	0.400	155	From model updated by Stantec (2019).
PST	Primary Sludge Tank	Area	31	2.00	-	30	-	-	-	377	0.250	8	From model updated by Stantec (2019).
AGS1	AGS 1	Area	1000	1.00	-	30	-	-	-	452	0.300	300	From model updated by Stantec (2019).
AGS2	AGS 2	Area	1000	1.00	-	29	-	-	-	452	0.300	300	From model updated by Stantec (2019).
AGS3	AGS 3	Area	1000	1.00	-	29	-	-	-	452	0.300	300	From model updated by Stantec (2019).
AGS4	AGS 4	Area	1000	1.00	-	29	-	-	-	4,524	3.000	3000	From model updated by Stantec (2019), noting a higher SOER was applied to account for expected increases during filling
WLT	Water Lowering Tank	Area	72	1.00	-	29	-	-	-	2,262	1.500	107	From model updated by Stantec (2019).
SBT	Sludge Buffer Tank	Area	134	1.00	-	29	-	-	-	452	0.300	40	From model updated by Stantec (2019).
TPS	Transfer Pump Station	Area	98	4.50	-	30	-	-	-	181	0.120	12	From model updated by Stantec (2019).
SPSGNDV1	SPS1174 Ground Vent 1	Volume	-	1.00	-	25	-	-	0.035	10,000	-	346	Vent blows horizontally. Velocity assumed to be 1 m/s.

Existing source (Stantec, 2019)

New source

Table 4-3. Odour emissions inventory, part 2

Source ID	Source details	Peak-to-mean factors						Source dimensions and locations									
		A	B	C	D	E	F	Horiz. Spread (m)	Vert. spread (m)	x1 (m)	y1 (m)	x2 (m)	y2 (m)	x3 (m)	y3 (m)	x4 (m)	y4 (m)
BTF	BTF stack	2.3	2.3	2.3	2.3	2.3	2.3	-	-	303,279	6,265,224	-	-	-	-	-	-
New_BTF	New BTF	2.3	2.3	2.3	2.3	2.3	2.3	-	-	303,408	6,265,071	-	-	-	-	-	-
SPSV1	SPS1174 VSH03	2.3	2.3	2.3	2.3	2.3	2.3	-	-	303,356	6,265,193	-	-	-	-	-	-
SPSV2	SPS1174 VSH02	2.3	2.3	2.3	2.3	2.3	2.3	-	-	303,357	6,265,194	-	-	-	-	-	-
SPSV3	SPS1174 VSH01	2.3	2.3	2.3	2.3	2.3	2.3	-	-	303,359	6,265,195	-	-	-	-	-	-
BIORCTR	Bioreactor	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,413	6,264,933	303,379	6,264,981	303,437	6,265,020	303,470	6,264,972
MBR	MBR	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,385	6,264,916	303,370	6,264,937	303,394	6,264,954	303,409	6,264,933
IWS	Inlet Works Structure	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,487	6,265,162	303,460	6,265,200	303,466	6,265,205	303,493	6,265,167
SL	Screenings Launderers	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,479	6,265,189	303,472	6,265,198	303,473	6,265,198	303,480	6,265,189
SB	Screenings Bins	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,480	6,265,190	303,475	6,265,197	303,477	6,265,199	303,482	6,265,192
GB	Grit Bins	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,492	6,265,174	303,487	6,265,181	303,489	6,265,182	303,494	6,265,176
MPU	Mechanical Primary Units	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,447	6,265,043	303,446	6,265,045	303,461	6,265,057	303,462	6,265,054
MPS	Mechanical Primary Structure	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,454	6,265,029	303,445	6,265,041	303,465	6,265,056	303,475	6,265,044
PST	Primary Sludge Tank	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,471	6,265,048	303,466	6,265,054	303,469	6,265,056	303,474	6,265,050
AGS1	AGS 1	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,354	6,264,975	303,331	6,265,007	303,351	6,265,022	303,375	6,264,989
AGS2	AGS 2	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,375	6,264,989	303,351	6,265,022	303,372	6,265,036	303,395	6,265,004
AGS3	AGS 3	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,395	6,265,004	303,372	6,265,036	303,392	6,265,051	303,415	6,265,018
AGS4	AGS 4	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,415	6,265,018	303,392	6,265,051	303,413	6,265,065	303,435	6,265,033
WLT	Water Lowering Tank	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,420	6,265,055	303,413	6,265,065	303,417	6,265,068	303,425	6,265,058
SBT	Sludge Buffer Tank	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303,425	6,265,058	303,417	6,265,068	303,426	6,265,074	303,433	6,265,065
TPS	Transfer Pump Station	2.3	2.3	2.3	2.3	1.9	1.9	-	1.00	303450	6265071	303442	6265083	303447	6265087	303456	6265076
SPSGNDV1	SPS1174 Ground Vent 1	2.3	2.3	2.3	2.3	2.3	2.3	0.50	0.50	303,346	6,265,203	-	-	-	-	-	-

Existing source (Stantec, 2019)
New source

4.4.3 Cumulative impacts

A cumulative impact assessment considers the impacts of a project together with the impacts of other relevant projects that may interact spatially and temporally to change the level of impact. Cumulative air quality impacts may arise from the interaction of construction and operational activities of the project, and other developments, activities, land uses and projects in the area, both current and future. When considered in isolation, specific project impacts may be considered minor. These minor impacts may, however, be more substantial, when the impacts of multiple projects on the same receptors are considered.

Projects with the potential to result in cumulative air quality-related impacts along with the project were identified and evaluated in accordance with the 'Cumulative Impact Assessment Guidelines for State Significant Projects', (Department of Planning, Industry and Environment [DPIE], 2022). This aspect of the assessment is presented in Section 6.3.

5. Existing conditions

5.1 Overview

Aspects of the existing environment as relevant to the assessment are described in this Section including surrounding land uses and sensitive receivers, topography, local climate and meteorology, existing odour conditions (including history of complaints around Quakers Hill WRRF), other local sources of emissions to air, background air quality conditions, and local traffic.

5.2 Sensitive receptors

5.2.1 Quakers Hill WRRF

As Figure 5-1 shows, the nearest residential sensitive receptors in relation to Quakers Hill WRRF are located as follows:

- About 150 m to the north along Riley Place, Quakers Road and Whittier Street, Quakers Hill
- About 200 m to the east along Quakers Road and Melrose Avenue, Quakers Hill
- About 120 m to the south on Jasmine Avenue, Ebony Crescent, Canna Place, Caper Place, Aster Place and Aloe Street, Quakers Hill
- Further to the west, about 950 m away along Symonds Road, Dean Park.

As displayed, the nearest non-residential receptors around Quakers Hill WRRF include:

- Quakers Hill Public School (denoted as 'NR1') located about 300 m east
- Childcare centre ('NR2') and medical centre ('NR3') along Falmouth Road, Quakers Hill about 500 m to the southeast
- Willian Dean Public School (shown as 'NR4') 1.5 km to the west.

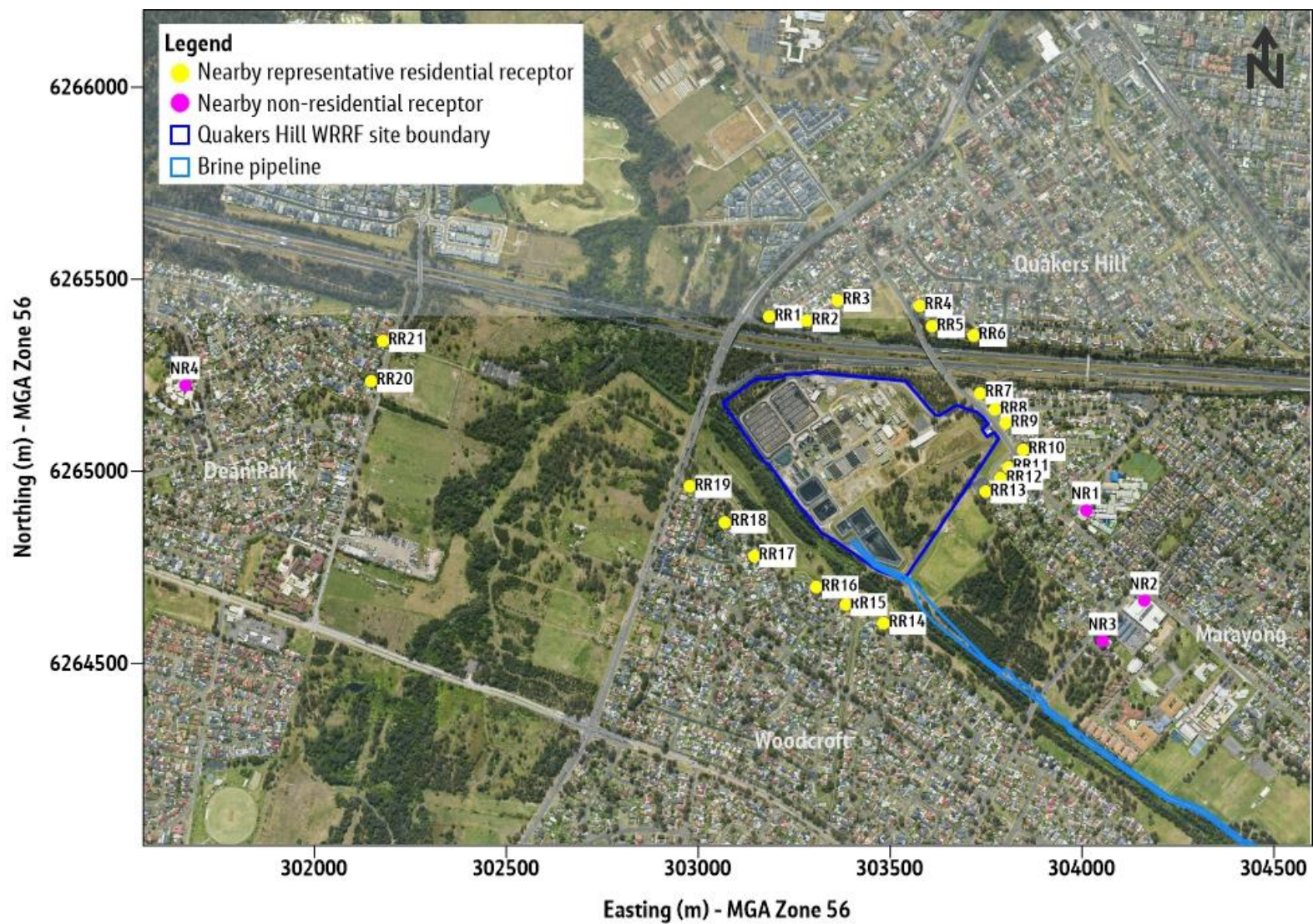


Figure 5-1. Quakers Hill WRRF surrounding sensitive receptors

Table 5-1 lists the details of the representative receptor locations established around Quakers Hill WRRF displayed in Figure 5-1.

Table 5-1. Representative receptor details

Receptor ID	Type	Easting (m) (UTM MGA56)	Northing (m) (UTM MGA56)	Elevation (m)
RR1	Residential	303185	6265402	25
RR2	Residential	303282	6265392	24
RR3	Residential	303363	6265445	27
RR4	Residential	303576	6265432	32
RR5	Residential	303608	6265377	31
RR6	Residential	303718	6265354	31
RR7	Residential	303734	6265204	33
RR8	Residential	303773	6265160	36
RR9	Residential	303801	6265126	37
RR10	Residential	303847	6265056	41
RR11	Residential	303806	6265010	41
RR12	Residential	303789	6264981	41
RR13	Residential	303747	6264946	40
RR14	Residential	303484	6264605	25
RR15	Residential	303383	6264653	25
RR16	Residential	303307	6264699	25
RR17	Residential	303144	6264780	24
RR18	Residential	303071	6264868	24
RR19	Residential	302977	6264960	24
RR20	Residential	302149	6265236	25
RR21	Residential	302179	6265340	26
NR1	Educational	304011	6264899	40
NR2	Childcare	304163	6264664	32
NR3	Medical	304055	6264559	28
NR4	Educational	301664	6265225	38

5.2.2 Brine pipeline

The brine pipeline component of the project is displayed below in Figure 5-2.

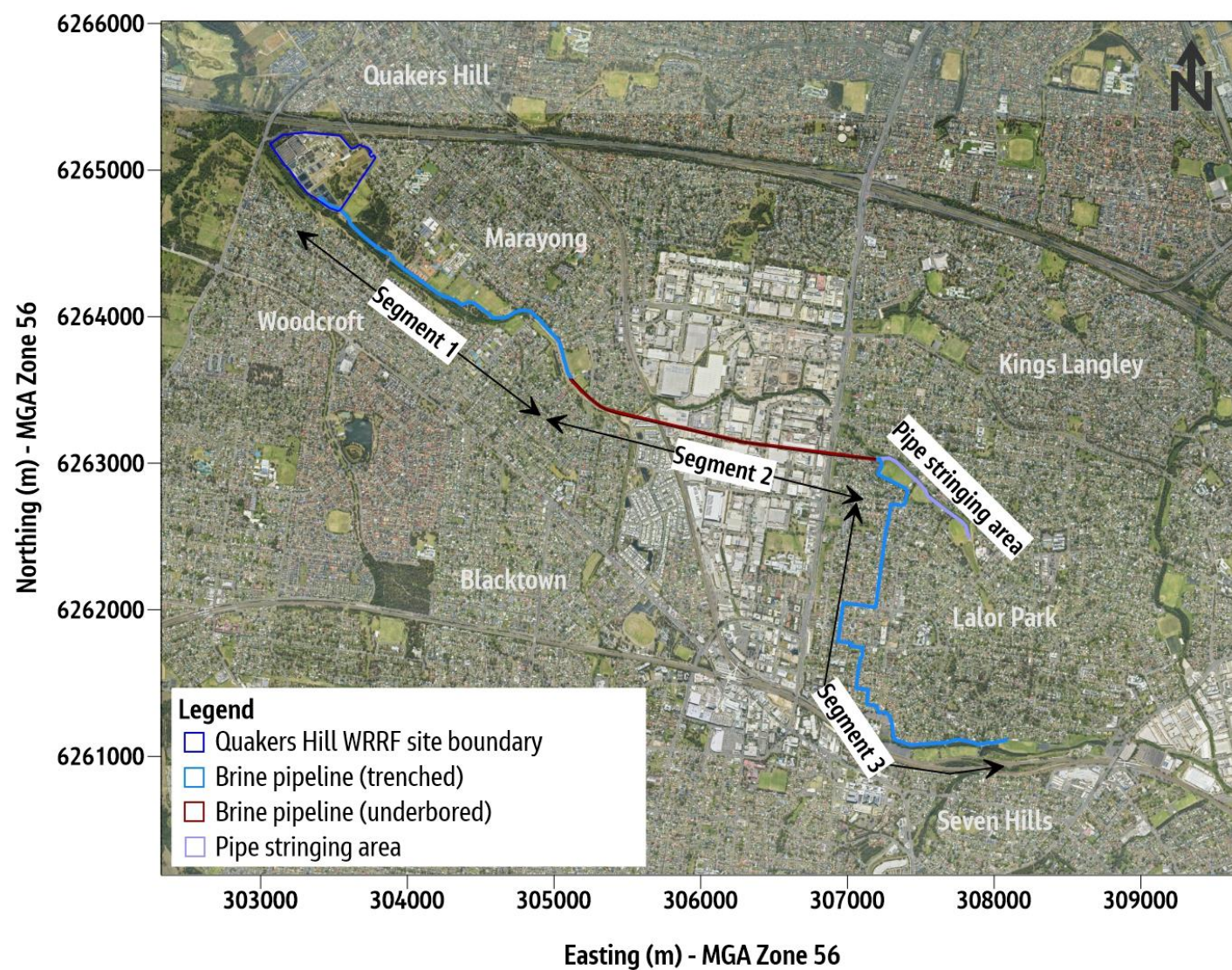


Figure 5-2. Brine pipeline and surrounds

Air quality impacts associated with the construction of the brine pipeline were assessed based on the following geographically separate segments:

- **Segment 1:** 2.3 km long between Quakers Hill WRRF and the western underboring site. This section of the pipeline which generally follows Breakfast Creek would generally be constructed by trenching. Several intermediate temporary construction compounds would be established along this segment of the brine pipeline
- **Segment 2:** 2.2 km section of pipeline from Marayong Park to Lynwood Park. This segment of the brine pipeline would be underbored. An intermediate shaft and temporary construction compound to support pipeline construction would also be established at Gate Road, Blacktown
- **Segment 3:** 3.3 km segment from Lynwood Park to the NSOOS connection at International Peace Park. This section would be constructed by trenching, and generally follows the Mort Street reserve, until Cardiff Street, Lalor Park where the pipeline would continue within street reserves until reaching Blacktown Creek. Several intermediate temporary construction compounds would also be established along this segment of the brine pipeline
- **Segment 4:** 1.1 km segment from Allen Road, Kings Langley through Lynwood Park to near the intersection of Wheeler Street and Blaxland Street, Kings Langley that would be used to support pipeline stringing.

The sensitivity of the receiving environment was identified as varying across the different segments of the brine pipeline. With reference to the distance and sensitivity categories from the GADDC (refer to details below in Section 6.1.1.3), it was identified that:

- 10 to 100 'high' sensitivity receptors were identified within 20 m of segment 1 construction activities
- 1 to 10 'high' sensitivity receptors were identified around 20 to 50 m of the launch and receival locations for segment 2. Less than 10 'medium' sensitivity receptors were also identified within 20 m of the Gate Road, Blacktown intermediate shaft and temporary construction compound
- More than 100 'high' sensitivity receptors were identified within 20 m of segment 3 construction activities
- 10 to 100 'high' sensitivity receptors were identified within 20 m of segment 4 construction activities.

5.3 Topography

Topography features can also affect meteorology at a local scale. This is particularly important for the operational odour assessment at Quakers Hill WRRF. Ground level elevations around the site are shown below in Figure 5-3.

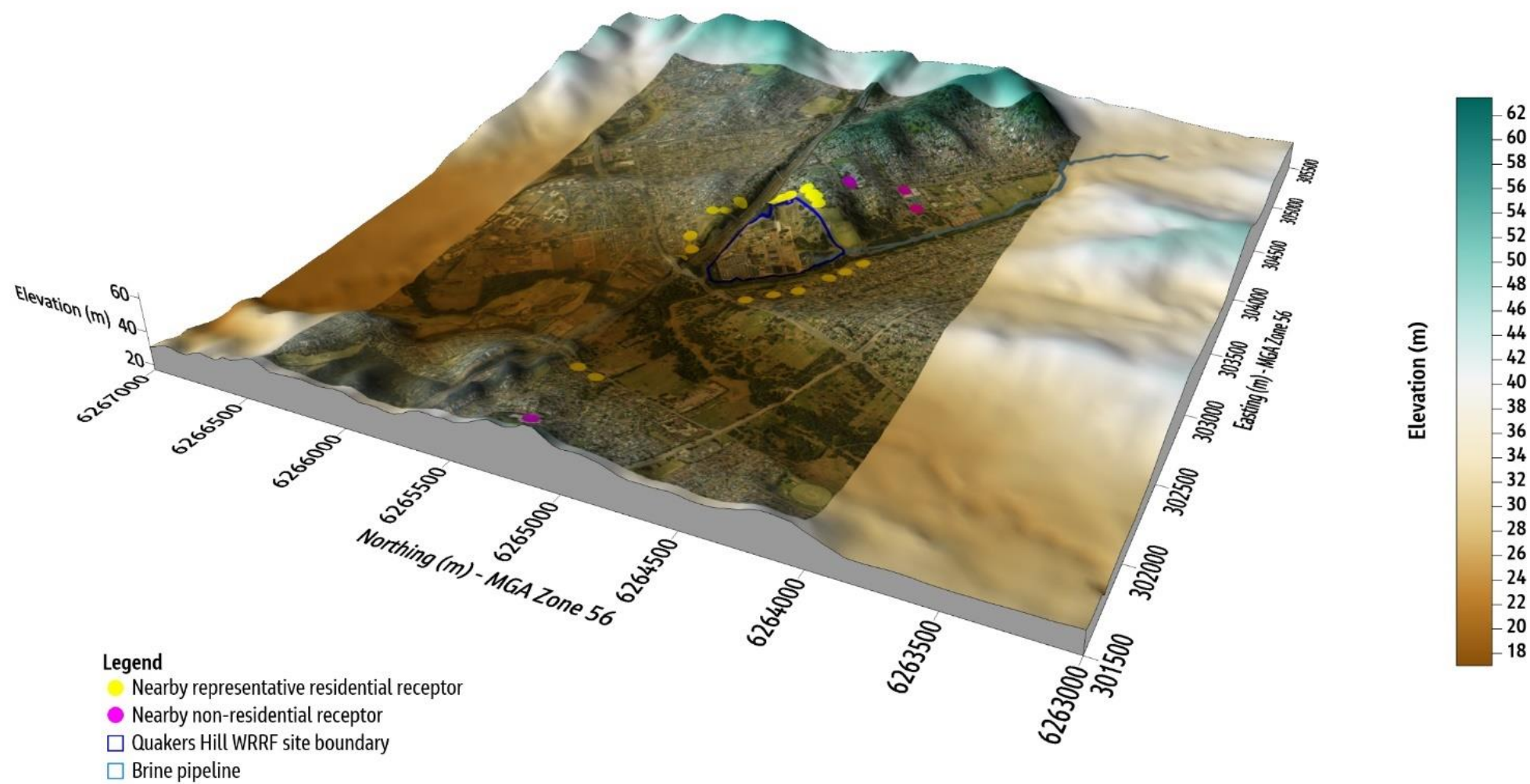


Figure 5-3. Schematic of topography around Quakers Hill WRRF

As shown, terrain around Quakers Hill WRRF is mostly flat with limited significant terrain features. The identified surrounding representative receptors are located at elevations of around 20 to 40 m, which is generally similar to the site where elevations are around 25 to 30 m.

5.4 Meteorology

Meteorological conditions are important for determining the direction and rate at which emissions from a source would disperse. The key meteorological requirements of air dispersion models are, typically, hourly records of wind speed, wind direction, temperature and atmospheric stability. For air quality assessments, a minimum of one year of hourly data is commonly required, which means that almost all possible meteorological conditions, including seasonal variations, are considered in the model simulations.

Sydney Water has pre-developed CALMET inputs for use of odour modelling assessments for their sites. Annual and seasonal wind roses from CALMET at Quakers Hill WRRF are reproduced below in Figure 5-4.

As Figure 5-4 shows, prevailing local winds are predominantly from the north in autumn, winter and spring, with winds blowing from east northeast most common in summer. Calms (i.e., periods where wind speeds are less than 0.5 m/s) typically occurred around four percent of the time during all seasons. The highest percentage was determined in winter (five percent of the time).



Figure 5-4. 2013-2015 Annual and seasonal wind roses for Quakers Hill WRRF (Source: ENSure, 2016)

5.5 Existing odour conditions from Quakers Hill WRRF

Consistent with the requirements of EPL 1724, Sydney Water maintains a Complaints Register. The number of complaints recorded in the register as related to odour from Quakers Hill WRRF for the period from 2010 to present (1 February 2025) are summarised below in Table 5-2.

Table 5-2. History of odour-related complaints related to Quakers Hill WRRF 2010 to January 2025

Year	No. odour-related complaints	Year	No. odour-related complaints
2010	2	2018	0
2011	4	2019	0
2012	2	2020	0
2013	0	2021	1
2014	0	2022	0
2015	0	2023	1
2016	0	2024	1
2017	0	2025*	0*

Source: Sydney Water (2025)

* As at 1 February 2025

As Table 5-2 shows, there is a history of odour-related complaints for Quakers Hill WRRF. The recent complaints in 2021, 2023 and 2024 were recorded for locations around 500 to 2000m to the west and southwest of Quakers Hill WRRF. The register is consistent with the outcomes of the ENSure, 2016 assessment which identified the site as being a "high risk odour plant, based on the 2 OU contours which are predicted to extend into residential areas". The outcomes of this assessment are reproduced below in Figure 5-5, noting that this assessment considered a different configuration (i.e., included different sources) to the present and proposed site arrangements.

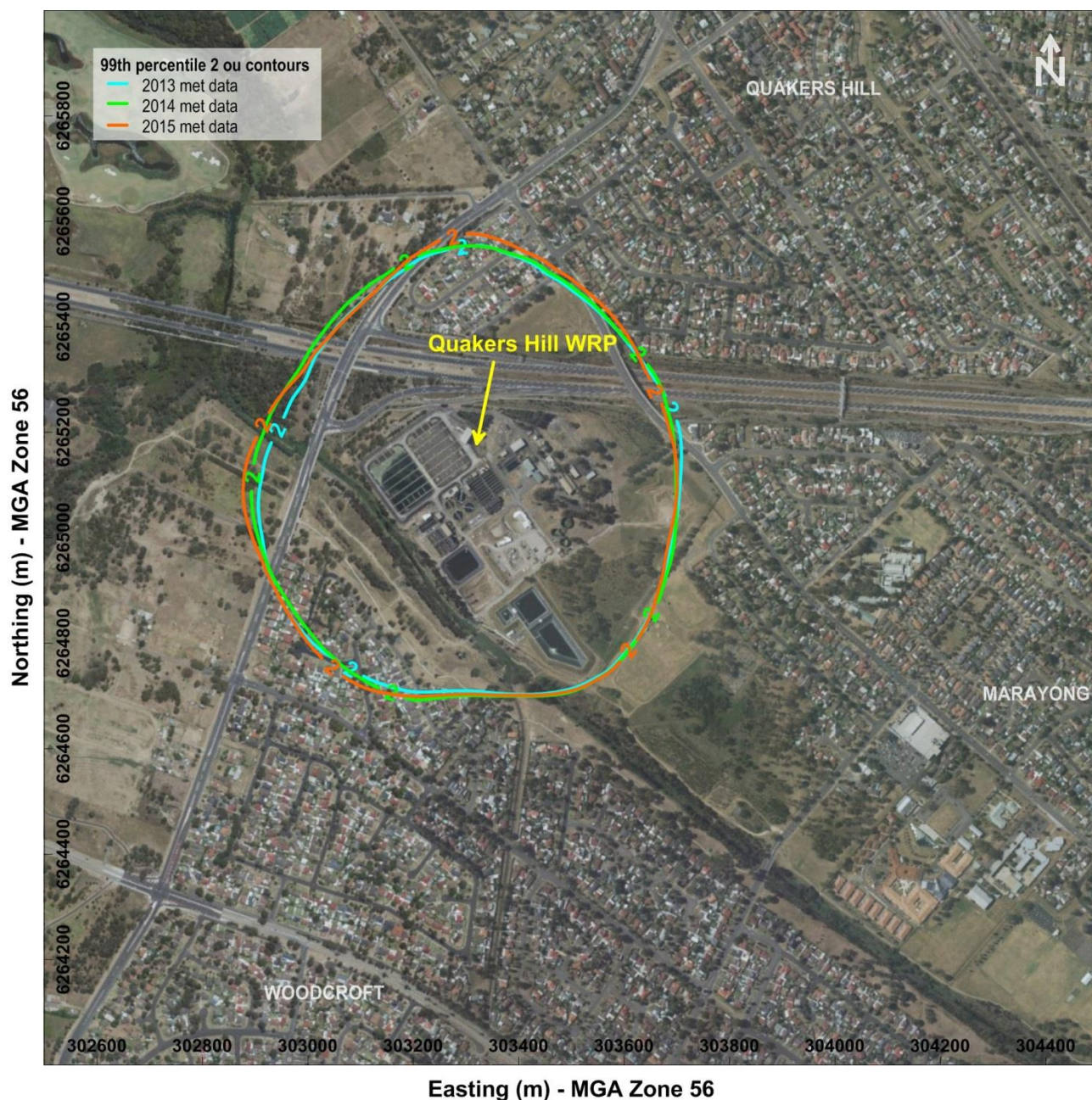


Figure 5-5. Assessment outcomes from ENSure, 2016 Quakers Hill WRRF odour impact assessment

More recent odour assessment for the site was undertaken by Stantec in 2019. The outcomes of this assessment are shown below in Figure 5-6. This assessment indicated that the 99th percentile 1-hour averaged 2 OU concentration contour may only encroach on the nearest sensitive receptors to the north of the site, not the wider area as indicated by the ENSure, 2016 assessment. However, technical issues were noted in the modelling undertaken for this assessment (namely that peak-to-mean factors were not applied to the source emission rates which are required by the Approved Methods). The implication of this is that there is no reliable baseline existing model available for the site.



Figure 5-6. Assessment outcomes from Stantec, 2019 Quakers Hill WRRF odour impact assessment

5.6 Other local sources of emissions to air

From a review of facilities that triggered applicable thresholds and reported to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW's) NPI database in 2022/23 and the EPA's EPL register, the following five other existing nearby sources of emissions to air were identified within approximately 3 km of the project:

Table 5-3. Other existing local sources of emissions to air from the NPI database (Source: Commonwealth DCCEEW, 2024 and EPA, 2025)

Facility	Registered business name	Suburb	NPI reported emissions to air (2022/23)
VIP Seven Hills	VIP STEEL PACKAGING PTY LTD	Seven Hills	CO, NO _x , PM ₁₀ , PM _{2.5} , PAHs, SO ₂ , Toluene, VOCs
Snack Brands Australia Blacktown^	SNACK BRANDS INDUSTRIES PTY LTD & SNACK BRANDS FOODS PTY LTD	Blacktown	CO, NO _x , PM ₁₀ , PM _{2.5} , Heavy metals, SO ₂ , VOCs
IXOM Kings Park	IXOM OPERATIONS PTY LTD	Kings Park	Ethanol, VOCs

Facility	Registered business name	Suburb	NPI reported emissions to air (2022/23)
Pacmetal Services	NCI HOLDINGS PTY LTD	Glendenning	CO, NO _x , PM ₁₀ , PM _{2.5} , PAHs, SO ₂ , Toluene, Xylenes, VOCs
VIP Seven Hills	VIP STEEL PACKAGING PTY LTD	Seven Hills	CO, NO _x , PM ₁₀ , PM _{2.5} , PAHs, SO ₂ , Toluene, VOCs

^ Also regulated by EPL No. 21243

5.7 Background air quality

As noted in **Section 3.4**, the EPA's impact assessment criteria for CO, NO₂, SO₂, PM₁₀ and PM_{2.5} relate to the total concentration of the pollutant in the air. Therefore, background levels also need to be considered when using these criteria to assess the potential impacts. DPHI operates a statewide network of air quality and meteorological monitoring stations. Details of the nearest, most relevant stations in relation to the project are provided below in Table 5-4.

Table 5-4. Nearby DPHI stations

Station	Easting (m) (UTM MGA56)	Northing (m) (UTM MGA56)	Approx. distance (km) and direction from the project	Parameters measured
Prospect, DPHI	306899	6258702	6 km northeast	PM ₁₀ , PM _{2.5} , NO/NO ₂ /NO _x , SO ₂ , and CO
Rouse Hill, DPHI	305674	6271047	7 km southeast	PM ₁₀ , PM _{2.5} , NO/NO ₂ /NO _x , SO ₂ , and CO

Data collected at these stations for the last five calendar years (2020 to 2024) are shown below in Table 5-5 to Table 5-9 for CO, NO₂, SO₂, PM₁₀ and PM_{2.5} respectively. Values exceeding the relevant EPA impact assessment criteria are denoted in blue, underlined text.

Table 5-5. Measured background air quality, carbon monoxide (CO)

Year	Carbon monoxide (CO) (mg/m ³), maximum 1-hour averaged		Carbon monoxide (CO) (mg/m ³), maximum 8-hour rolling average	
	DPHI Rouse Hill	DPHI Prospect	DPHI Rouse Hill	DPHI Prospect
2020	3	3	2	2
2021	2	2	2	1
2022	1	2	1	1
2023	1	2	1	1
2024	2	2	2	1
Impact assess. criteria	30		10	

Table 5-6. Measured background air quality, nitrogen dioxide (NO₂)

Year	Nitrogen dioxide (NO ₂) (µg/m ³), maximum 1-hour averaged		Nitrogen dioxide (NO ₂) (µg/m ³), annually averaged	
	DPHI Rouse Hill	DPHI Prospect	DPHI Rouse Hill	DPHI Prospect
2020	70	88	10	14
2021	70	88	10	14
2022	68	86	10	12
2023	74	101	10	16
2024	84	86	12	18
Impact assess. criteria	164		31	

Table 5-7. Measured background air quality, sulfur dioxide (SO₂)

Year	Sulphur dioxide (SO ₂) (µg/m ³), maximum 1-hour averaged		Sulphur dioxide (SO ₂) (µg/m ³), maximum 24-hour averaged	
	DPHI Rouse Hill	DPHI Prospect	DPHI Rouse Hill	DPHI Prospect
2020	54	51	14	11
2021	51	43	9	9
2022	60	49	9	9
2023	74	69	17	11
2024	129	60	14	11
Impact assess. criteria	215		57	

Table 5-8. Measured background air quality, particulate matter as PM₁₀

Year	Particulate matter as PM ₁₀ (µg/m ³), maximum 24-hour averaged, number of days above criteria		Particulate matter as PM ₁₀ (µg/m ³), annually averaged	
	DPHI Rouse Hill	DPHI Prospect	DPHI Rouse Hill	DPHI Prospect
2020	<u>220, 10</u>	<u>246, 10</u>	18.3	20.2
2021	<u>52, 1</u>	45, 0	15.0	17.2
2022	24, 0	29, 0	11.8	13.4
2023	49, 0	44, 0	15.4	16.8
2024	39, 0	44, 0	16.0	17.4
Impact assess. criteria	50, 0		25	

Table 5-9. Measured background air quality, particulate matter as PM_{2.5}

Year	Particulate matter as PM _{2.5} (µg/m ³), maximum 24-hour averaged, number of days above criteria		Particulate matter as PM _{2.5} (µg/m ³), annually averaged	
	DPHI Rouse Hill	DPHI Prospect	DPHI Rouse Hill	DPHI Prospect
2020	61, 10	71, 13	7.1	8.6
2021	41, 4	37, 2	5.9	6.9
2022	15, 0	18, 0	4.6	5.3
2023	33, 5	30, 2	6.7	7.4
2024	19, 0	20, 0	6.3	7.3
Impact assess. criteria	25		8	

As these tables show:

- Measured CO, NO₂ and SO₂ concentrations from 2020 to 2024 were all well below the EPA's impact assessment criteria
- 24-hour averaged PM₁₀ concentrations were measured as occasionally exceeding the EPA's impact assessment criterion (50 µg/m³) in 2020 and 2021. Concentrations since 2022 were below this criterion. Results in 2020 were affected by the unprecedented bushfire season in Eastern Australia
- Annually averaged PM₁₀ concentrations measured in 2020 to 2024 remained below the 25 µg/m³ impact assessment criterion
- Local 24-hour averaged PM_{2.5} concentrations were measured as occasionally exceeding the EPA's impact assessment criterion (25 µg/m³). Most recent measured concentrations in 2024 were below this criterion. Again, results in 2020 were affected by the Eastern Australia bushfires
- Annually averaged PM_{2.5} concentrations were measured below the 8 µg/m³ impact assessment criterion, except at the Rouse Hill station in 2020.

5.8 Existing traffic conditions

Additional traffic would be generated during the construction and operational phases of the project. Existing traffic flows were collected along key roads that would be used as part of the project. Total peak hour traffic flows are summarised below in Table 5-10.

Table 5-10. Existing traffic conditions

Road	Peak hourly traffic	
	Southbound/Eastbound	Northbound/Westbound
Quakers Road, Quakers Hill	683	575

6. Impact assessment

6.1 Construction

6.1.1 Dust

6.1.1.1 Overview

As described above in Section 4.4.1, the risk-based assessment approach detailed in the GADDC (IAQM, 2024) was applied to evaluate potential dust impacts during construction. The GADDC approach classifies the risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts into four categories: 'negligible', 'low', 'medium', and 'high' risk. This impact outcome is determined by combining the assessment outcomes for the following two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large; and
- the sensitivity of the area to dust impacts, which is defined as low, medium or high sensitivity.

The method accounts for different risk of impacts occurring during different stages of construction with impact ratings determined for 'demolition', 'earthworks', 'construction' and 'trackout' stages of construction. In this context 'construction' refers to building of the project once all ground preparation and earthworks are complete, and 'trackout' refers to transport-related handling of construction materials, including waste.

The following sub-sections detail the process and outcomes of the assessment.

6.1.1.2 Step 2A: Potential dust emission magnitude

GADDC (IAQM, 2024) provides the following guidance for classifying the magnitude of potential dust emissions from a project:

Table 6-1. GADDC Dust emission magnitude classifications (Source: IAQM, 2024)

Construction Activity	Dust emission magnitude classification		
	'Large'	'Medium'	'Small'
Demolition	Total building volume >75,000 m ³ , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level	Total building volume 12,000 m ³ – 75,000 m ³ , potentially dusty construction material, demolition activities 6-12 m above ground level	Total building volume <12,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months
Earthworks	Total site area >110,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height	Total site area 18,000 m ² – 110,000 m ² , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m - 6m in height	Total site area <18,000 m ² , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height

Construction Activity	Dust emission magnitude classification		
	'Large'	'Medium'	'Small'
Construction	Total building volume >75,000 m ³ , on site concrete batching, sandblasting	Total building volume 12,000 m ³ – 75,000 m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching	Total building volume <12,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	>50 heavy vehicle (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m	20-50 heavy vehicle (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m	<20 heavy vehicle (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

Using this guidance and available construction, dust emission magnitude classifications for the project were determined as detailed below in Table 6-2.

Table 6-2. Estimated dust emission magnitude classifications, construction

Construction element	Activity	Potential dust emission magnitude classification	Basis
Quakers Hill WRRF	Demolition	Small	No large-scale demolition (less than 4,000 m ³) is planned to facilitate the new treatment infrastructure and upgrades.
	Earthworks	Medium	Total construction area is of the order of 18,000 m ² – 110,000 m ² whereby around 110,000 m ³ of material is to be handled.
	Construction	Small	Based on scale of new structures being constructed from material with low potential for dust release.
	Trackout	Small	Based on the expected volumes of traffic to be generated and on-site tracks being paved.
Segment 1 (Quakers WRRF to Marayong Park)	Demolition	Medium	Need to disturb existing paved areas (but no buildings or structures) to construct new pipeline along large portions of the route.
	Earthworks	Large	Open trenching and backfilling along entire length of segment. Overall, will involve significant excavation, soil management and handling.
	Construction	Small	Based on scale of new structures being constructed from material with low potential for dust release.
	Trackout	Medium	Based on the need for some unpaved access routes to be used during construction, and the expected volumes of associated traffic.
Segment 2 (Marayong Park to Lynwood Park)	Demolition	Small	Limited disturbance of existing paved areas (and no buildings or structures) required at launch/retrieval and intermediate sites.
	Earthworks	Small	Limited excavations and earthworks required at launch/retrieval and intermediate sites
	Construction	Small	Based on scale of new structures being constructed from material with low potential for dust release.

Construction element	Activity	Potential dust emission magnitude classification	Basis
	Trackout	Small	Based on the expected volumes of traffic to be generated, with surrounding traffic routes being paved.
Segment 3 (Lynwood Park to International Peace Park)	Demolition	Medium	Need to disturb existing paved areas (but no buildings or structures) to construct new pipeline along large portions of the route.
	Earthworks	Large	Open trenching and backfilling along entire length of segment. Overall, will involve significant excavation, soil management and handling.
	Construction	Small	Based on scale of new structures being constructed from material with low potential for dust release.
	Trackout	Medium	Based on the need for some unpaved access routes to be used during construction, and the expected volumes of associated traffic.
Segment 4 (Lynwood Park pipe stringing area)	Demolition	None	No material paved areas, buildings or structures
	Earthworks	Small	Based on the nature of activities associated with this work location.
	Construction	Small	Based on the nature of activities associated with this work location.
	Trackout	Medium	Based on the need for some unpaved access routes to be used during construction, and the expected volumes of associated traffic.

6.1.1.3 Step 2B: Sensitivity of the receiving area

The assessment methodology takes account of a number of factors in determining the sensitivity of the receiving area. These include:

- The specific sensitivities of receptors in the area
- The proximity and number of those receptors
- Local background air quality conditions characterised based on PM10 concentrations
- “site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust” (IAQM, 2024).

The method considers how sensitive surrounding receiver areas may be to the effects of dust soiling and human health impacts. Guidance on how the sensitivity of the receiving environment to these different dust effects were classified is provided below in Table 6-3.

Table 6-3. GADDC Dust receptor sensitivity classifications (Source: IAQM, 2024)

Receiver sensitivity	Classification receptor sensitivity		
	‘High’	‘Medium’	‘Low’
Sensitivity to dust soiling	High – Surrounding land where: ▪ Users can reasonably expect enjoyment of a high level of amenity	Medium – Surrounding land where: ▪ Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home	Low – Surrounding land where: ▪ The enjoyment of amenity would not reasonably be expected ▪ Property would not reasonably be expected to be diminished

Receiver sensitivity	Classification receptor sensitivity		
	'High'	'Medium'	'Low'
	- The appearance, aesthetics or value of a property would be diminished by soiling - The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car show rooms.	- The appearance, aesthetics or value of a property could be diminished by soiling - The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Indicative examples include parks and places of worship.	in appearance, aesthetics or value by soiling There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short-term car parks and roads.
Sensitivity to human health impacts	High: Locations where members of the public are exposed over a time period relevant to the air quality criteria for PM₁₀. Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purpose of this assessment.	Medium: Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality criteria for PM₁₀. Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by relevant Health and Safety legislation.	Low: Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets.

Table 6-4 and Table 6-5 below detail the guidance applied from the GADDC to determine the sensitivity of these receptors to for dust soiling and human health impacts.

Table 6-4. Method for determining sensitivity of receiving area to dust soiling effects (Source: IAQM, 2024)

Receiver sensitivity	Approximate number of receivers	Distance of receivers from the source (m)			
		Less than 20	20 to 50	50 to 100	100 to 250
High	More than 100	High	High	Medium	Low
	10 to 100	High	Medium	Low	Low
	1 to 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Table 6-5. Method for determining sensitivity of receiving area to human health impacts (Source: IAQM, 2024)

Receiver sensitivity	Average PM ₁₀ concentration [#] for NSW	Approximate number of receivers	Distance of receptors from the source (m)			
			< 20	20 to 50	50 to 100	100 to 250
High	>20µg/m ³	More than 100	High	High	High	Medium
		10 to 100	High	High	Medium	Low
		1 to 10	High	Medium	Low	Low
	17.5-20 µg/m ³	More than 100	High	High	Medium	Low
		10 to 100	High	Medium	Low	Low
		1 to 10	High	Medium	Low	Low
	15-17.5 µg/m ³	More than 100	High	Medium	Low	Low
		10 to 100	High	Medium	Low	Low
		1 to 10	Medium	Low	Low	Low
	<15 µg/m ³	More than 100	Medium	Low	Low	Low
		10 to 100	Low	Low	Low	Low
		1 to 10	Low	Low	Low	Low
Medium	>20µg/m ³	More than 10	High	Medium	Low	Low
		1 to 10	Medium	Low	Low	Low
	17.5-20 µg/m ³	More than 10	Medium	Low	Low	Low
		1 to 10	Low	Low	Low	Low
	15-17.5 µg/m ³	More than 10	Low	Low	Low	Low
		1 to 10	Low	Low	Low	Low
	<15 µg/m ³	More than 10	Low	Low	Low	Low
		1 to 10	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low

[#] Scaled for project according to the ratio of NSW and UK annual average PM₁₀ standards (25 µg/m³ and 40 µg/m³ respectively)

The proximity of surrounding sensitive receptors as relevant to Table 6-4 and Table 6-5 was identified above in Section 5.2. Regarding the existing air quality around the sensitive receptors for Table 6-5, from the background air quality review completed in Section 5.7, the five year annually averaged PM₁₀ concentrations at DPHI's stations at Rouse Hill and Prospect were determined to be 15.3 and 17.0 µg/m³ respectively. As such, the process for a '15-17.5 µg/m³' background concentration was applied as listed in Table 6-5.

The dust soiling and human health) sensitivity classifications below in Table 6-6 were developed from application of the method outlined above with consideration to the nature, density and proximity of sensitive receivers around different aspects of the project.

Table 6-6. Results for sensitivity to dust soiling and human health effects, construction

Construction element	Highest receiver sensitivity	Sensitivity to dust soiling impacts	Sensitivity to human health
Quakers Hill WRRF	High	Low	Low
Segment 1 (Quakers WRRF to Marayong Park)	High	High	High
Segment 2 (Marayong Park to Lynwood Park)	High	Medium	Low
Segment 3 (Lynwood Park to International Peace Park)	High	High	High
Segment 4 (Lynwood Park pipe stringing area)	High	High	High

6.1.1.4 Step 2C: Unmitigated impacts

Potential dust emission magnitude ratings determined in Table 6-3 and the surrounding area sensitivity classifications determined in Table 6-6 were combined using the guidance below in Table 6-7 to determine the potential for dust impacts with no mitigation applied. Using this approach, the highest unmitigated level of potential impact determined for each dust-related effect (i.e. dust soiling and human health impacts) are summarised in Table 6-7.

Table 6-7. Method for determining unmitigated dust impacts (Source: IAQM, 2024)

Sensitivity of area	Dust emission potential		
	Large	Medium	Small
Demolition			
High	High potential impacts	Medium potential impacts	Medium potential impacts
Medium	High potential impacts	Medium potential impacts	Low potential impacts
Low	Medium potential impacts	Low potential impacts	Negligible potential impacts
Earthworks			
High	High potential impacts	Medium potential impacts	Low potential impacts
Medium	Medium potential impacts	Medium potential impacts	Low potential impacts
Low	Low potential impacts	Low potential impacts	Negligible potential impacts
Construction			
High	High potential impacts	Medium potential impacts	Low potential impacts
Medium	Medium potential impacts	Medium potential impacts	Low potential impacts
Low	Low potential impacts	Low potential impacts	Negligible potential impacts
Trackout			
High	High potential impacts	Medium potential impacts	Low potential impacts
Medium	Medium potential impacts	Medium potential impacts	Negligible potential impacts
Low	Low potential impacts	Low potential impacts	Negligible potential impacts

Table 6-8. Unmitigated project construction dust impact ratings

Construction element	Activity	Dust soiling impacts	Human health impacts
Quakers Hill WRRF	Demolition	Negligible potential impacts	Negligible potential impacts
	Earthworks	Low potential impacts	Low potential impacts
	Construction	Negligible potential impacts	Negligible potential impacts
	Trackout	Negligible potential impacts	Negligible potential impacts
Segment 1 (Quakers WRRF to Marayong Park)	Demolition	Medium potential impacts	Medium potential impacts
	Earthworks	High potential impacts	High potential impacts
	Construction	Low potential impacts	Low potential impacts
	Trackout	Medium potential impacts	Medium potential impacts
Segment 2 (Marayong Park to Lynwood Park)	Demolition	Low potential impacts	Negligible potential impacts
	Earthworks	Low potential impacts	Negligible potential impacts
	Construction	Low potential impacts	Negligible potential impacts
	Trackout	Negligible potential impacts	Negligible potential impacts
Segment 3 (Lynwood Park to International Peace Park)	Demolition	Medium potential impacts	Medium potential impacts
	Earthworks	High potential impacts	High potential impacts
	Construction	Low potential impacts	Low potential impacts
	Trackout	Medium potential impacts	Medium potential impacts
Segment 4 (Lynwood Park pipe stringing area)	Demolition	Negligible potential impacts	Negligible potential impacts
	Earthworks	Low potential impacts	Low potential impacts
	Construction	Low potential impacts	Low potential impacts
	Trackout	Medium potential impacts	Medium potential impacts

6.1.1.5 Steps 3 and 4: Mitigation and residual impacts

As Table 6-8 shows, the highest unmitigated potential dust impact rating was 'high' for earthworks along assessment segments 1 and 3. The GADDC recommends specific measures based on the highest determined potential impact rating determined. With the application of these measures (provided below in Section 7.1), it is expected that residual impacts would be able to be reduced to the extent that they could be effectively managed (i.e. residual impacts would be negligible).

6.1.2 Other emissions to air during construction, plant and equipment exhaust emissions and uncovered contaminated materials

In addition to amenity and nuisance impacts from dust, other air quality related risks identified during construction included exhaust emissions construction plant and equipment, and odours and airborne hazardous materials arising from uncovered contaminated materials.

Based on the relatively minor nature of potential exhaust emissions from construction plant and equipment, and the separation distances to surrounding sensitive receptors, impacts from these emissions are not expected. Measures to ensure that construction plant and equipment are maintained in a proper and efficient manner are included below in Section 7.1.

Regarding odours and airborne hazardous materials arising from uncovered contaminated materials, uncovered contaminated materials or groundwater will be carefully managed to minimise, so far as reasonably practicable, impacts on amenity and human health. Controls to address these matters have also been included in Section 7.1.

6.1.3 Emissions from construction traffic

During construction, approximately 100 light and 78 heavy additional daily movements to and from Quakers Hill WRRF may be generated. Conservatively assuming all of this traffic occurred during the peak hour and applying the existing conditions listed above in Section 5.8, TfNSW' RSAQST was used to predict the following changes to roadside air quality for receptors along Quakers Road:

Table 6-9. Review of changes in roadside air quality resulting from additional traffic during construction

Distance from roadway (m)	PM ₁₀ (µg/m ³)				PM _{2.5} (µg/m ³)				NO ₂ (µg/m ³)	
	24-hour		Annual		24-hour		Annual		Annual	
	Existing	During construction	Existing	During construction	Existing	During construction	Existing	During construction	Existing	During construction
Quakers Road, Quakers Hill										
20	41.1	41.3	16.4	16.5	19.7	19.8	6.6	6.6	14.1	14.2
50	39.6	39.6	16.2	16.3	19.3	19.4	6.4	6.5	13.1	13.2
100	39.3	39.4	16.1	16.2	19.2	19.2	6.4	6.4	12.7	12.8
Impact assessment criterion	50		25		25		8		31	

Table 6-9 shows that changes in roadside air quality at receptors along Quakers Hill Road resulting from the additional traffic expected to be generated during the construction phase of the project would be negligible compared to estimated existing conditions and would not result in concentrations exceeding the applicable EPA impact assessment criteria.

The same outcome is expected for receptors along construction traffic routes associated with the brine pipeline, noting that the roads used would generally vary through construction (except at temporary compound locations).

6.2 Operations

Odour results for the operational assessment for the upgraded Quakers Hill WRRF are displayed below in Figure 6-1 with results at the representative receptors displayed on Figure 5-1 listed below in Table 6-10. The 2 OU and 4 OU contours are displayed on Figure 6-1, with the different colours showing the results for the three different meteorological years considered as part of the assessment (blue for 2013, green for 2014 and orange for 2015). The 2 OU contour is displayed, being the applicable impact assessment criterion from the Approved Methods. Additionally, the 4 OU contour is shown, being the highest predicted concentration at any of the surrounding representative receptors.

Table 6-10. Predicted ground level odour concentrations, upgraded Quakers Hill WRRF

Sensitive receptor	Predicted odour conc. (OU), 99 th percentile			Impact assessment criterion (OU), 99 th percentile	Sensitive receptor	Predicted odour conc. (OU) 99 th percentile			Impact assessment criterion (OU), 99 th percentile
	2013	2014	2015			2013	2014	2015	
RR1	2.8	3.1	2.9	2	RR14	2.8	3.0	2.9	2
RR2	3.6	4.0	3.8	2	RR15	3.1	3.3	3.2	2
RR3	3.6	3.8	4.0	2	RR16	2.2	2.3	2.2	2
RR4	2.4	2.6	2.8	2	RR17	3.1	3.0	3.0	2
RR5	2.5	2.7	2.8	2	RR18	2.6	2.6	2.6	2
RR6	2.1	2.2	2.1	2	RR19	2.1	2.2	2.2	2
RR7	2.6	2.5	2.4	2	RR20	0.5	0.5	0.5	2
RR8	2.5	2.4	2.2	2	RR21	0.5	0.5	0.5	2
RR9	2.3	2.1	2.1	2	NR1	2.9	3.0	2.9	2
RR10	2.0	1.9	1.8	2	NR2	1.0	1.0	0.9	2
RR11	2.3	2.2	2.1	2	NR3	1.1	1.2	1.0	2
RR12	2.4	2.3	2.3	2	NR4	0.3	0.3	0.4	2
RR13	2.7	2.6	2.5	2					

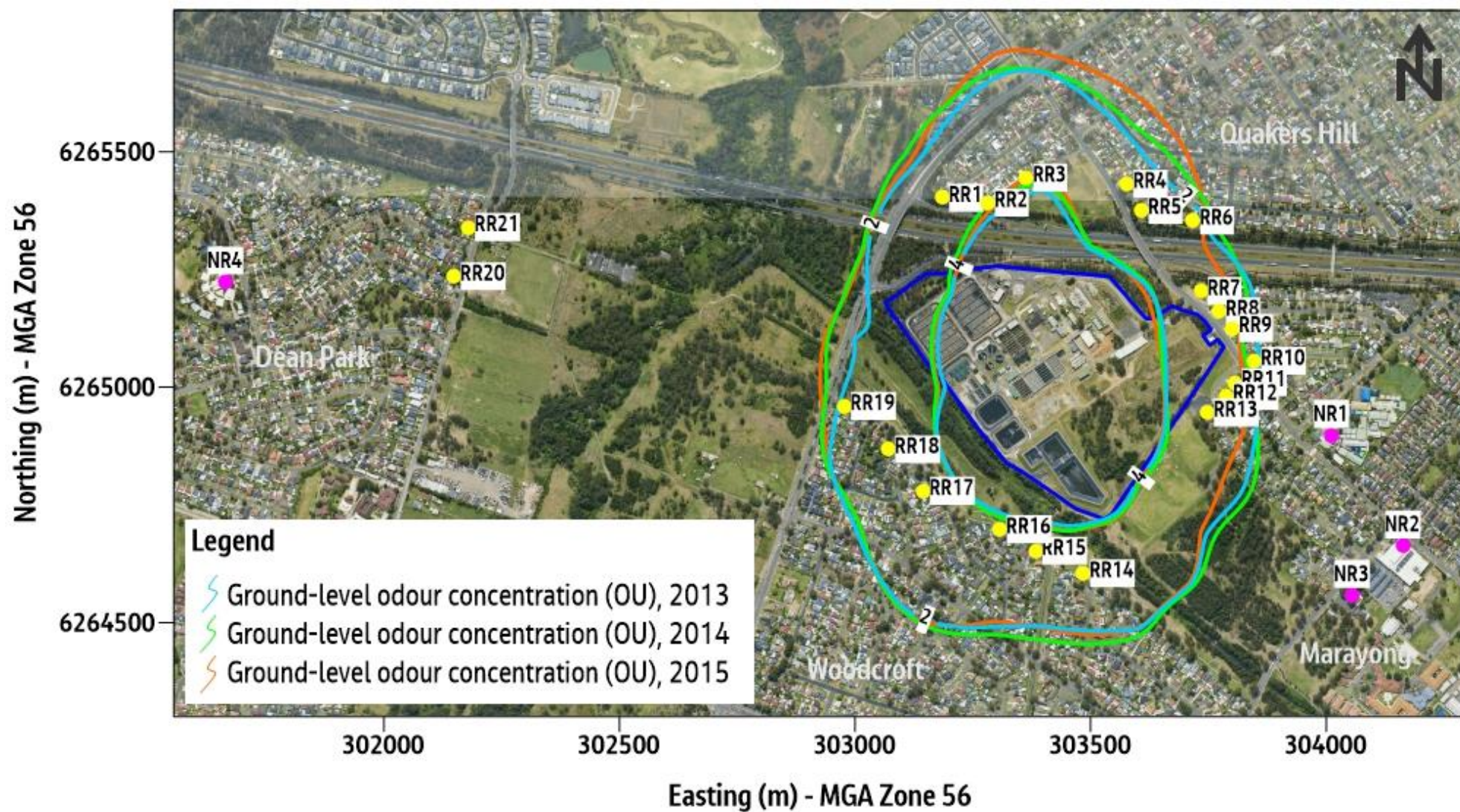


Figure 6-1. 99th percentile odour results, upgraded Quakers Hill WRRF

As Figure 6-1 and Table 6-10 show, resulting 99th percentile, 1-hour averaged ground-level odour concentrations from the upgraded Quakers Hill WRRF site were predicted to exceed the EPA's 2 OU impact assessment at most of the nearby representative receptors. As noted above, this is consistent with the outcomes of the ENSure, 2016 assessment as well as the history of complaints recorded at the site (refer to Table 5-2).

Sensitivity reviews were completed to understand how outcomes could vary if different inputs were considered for key sources to those detailed in Table 4-2 and Table 4-3. Two key sources contributing to the overall TOER applied were the existing BTF stack and the AGS tank receiving primary effluent. For the existing BTF stack, the unadjusted odour emission rate (i.e., prior to application of peak-to-mean factors) applied in the Stantec, 2019 assessment, as well as what was applied in the results above was 12,600 OU.m³/s. For the ENSure, 2016 assessment, a lower value of 4,300 OU.m³/s was applied.

The flow rate, and other key parameters applied between the ENSure, 2016 and Stantec, 2019 assessments were comparable, except the in-stack concentrations (677 OU and 2000 OU respectively) which primarily resulted in this change in TOER. The inputs applied in the ENSure, 2016 assessment were based on sampling of the asset completed in 2014. The Stantec, 2019 assessment referred to changes in inputs resulting from the associated Concept Design Report, although the basis for the change isn't fully documented. A sensitivity run was completed to review the effects of configuring the existing BTF stack as modelled in the ENSure, 2016 assessment.

For the second sensitivity run, the SOER for the AGS tank receiving primary effluent (i.e. AGS4) was reduced from 3.0 to 0.3 (OU.m³/m²/s). This was made based on a review of emissions modelled from similar processes at another European site which indicated that odours from AGS were highest during aeration and had used a "conservative" SOER of 0.2 OU.m³/m²/s, which is comparable with the 0.3 OU.m³/m²/s that had been applied for the other three AGS sources in the Stantec, 2019 assessment.

The results from this review for the 2014 meteorological year are summarised below in Table 6-11.

Table 6-11. Predicted ground level odour concentrations, upgraded Quakers Hill WRRF sensitivity review

Sensitive receptor	Predicted odour conc. (OU), 99 th percentile			Impact assessment criterion (OU), 99 th percentile	Sensitive receptor	Predicted odour conc. (OU) 99 th percentile			Impact assessment criterion (OU), 99 th percentile
	2014 (original)	2014, BTF check	2014, AGS4 check			2014 (original)	2014, BTF check	2014, AGS4 check	
RR1	3.1	2.9	2.3	2	RR14	3.0	2.9	2.1	2
RR2	4.0	3.8	2.9	2	RR15	3.3	3.2	2.4	2
RR3	3.8	4.0	2.8	2	RR16	2.3	2.2	1.5	2
RR4	2.6	2.8	1.9	2	RR17	3.0	3.0	2.1	2
RR5	2.7	2.8	1.9	2	RR18	2.6	2.6	1.8	2
RR6	2.2	2.1	1.5	2	RR19	2.2	2.2	1.5	2
RR7	2.5	2.4	1.8	2	RR20	0.5	0.5	0.4	2
RR8	2.4	2.2	1.6	2	RR21	0.5	0.5	0.4	2
RR9	2.1	2.1	1.5	2	NR1	3.0	2.9	2.3	2
RR10	1.9	1.8	1.4	2	NR2	1.0	0.9	0.7	2
RR11	2.2	2.1	1.6	2	NR3	1.2	1.0	0.8	2
RR12	2.3	2.3	1.6	2	NR4	0.3	0.4	0.3	2
RR13	2.6	2.6	1.9	2					

As Table 6-11 shows, updates to the emissions for the BTF stack had a negligible effect to the assessment outcomes. However, reducing the SOER for AGS4 resulted in predicted 99th percentile 1-hour averaged (peak-to-mean corrected) ground level odour concentrations reducing below the EPA's 2 OU impact assessment criterion at 12 of the representative sensitive receptors (i.e., the total number of exceeding representative sensitive receptors in Table 6-11 reduce from 19 to seven).

6.3 Cumulative impacts

Potential cumulative air quality impacts were evaluated with reference to the guidance presented in 'Cumulative Impact Assessment Guidelines for State Significant Projects', (DPIE, 2022). Using this approach, the following projects were identified as being potentially relevant to air quality on the basis of their general proximity to the project and thus their potential to cause cumulative air quality impacts at the same receptors (if both are not effectively managed); their projected timings such that they may overlap with the project; and the nature of their key emissions being similar to the project which could lead to cumulative effects:

- Honeman Close Data Centre
- August Street Warehouse and Distribution Centre
- Davis Road Data Centre (Cundall)

Further details of each of these projects, including a review of their potential to result in cumulative air quality impacts along with the project are presented in Table 6-12.

Table 6-12. Relevant future projects with the potential for cumulative air quality impacts

Project	Details and cumulative impacts review
Honeman Close Data Centre (SSD-58601963)	Details: Proposed development comprises of the construction and operation of a data centre with ancillary office, supporting infrastructure and services, including back-up generators and diesel fuel storage, car parking, and landscaping, that is the subject of Development Consent at Lot 100 DP1293137, otherwise known as 6 Honeman Close, Huntingwood. This location is approximately 7.3 km to the southeast of Quakers Hill WRRF. Impact review: An Air Quality Impact Assessment (Northstar, 2023) was prepared to support the EIS for the development. The key outcomes of the assessment included: ▪ 'Medium' or lower unmitigated and 'negligible' mitigated risk of nuisance dust impacts at the most sensitive receptors located within 500m of construction activities (as determined using the same methodology from the IAQM applied in this assessment). ▪ For operations, the assessment considered several typical, realistic scenarios involving the use of the on-site back-up generators, as well as a 'justified worst case' scenario requiring the use of all on-site emergency generators in the circumstance of a catastrophic grid energy supply failure. Changes in concentrations during these operations only exceeded the EPA's impact assessment criteria at receptors in close proximity to the development (i.e., within approximately 400m). Based on these outcomes it is considered unlikely that cumulative impacts would arise from the Honeman Close Data Centre project, and the project.
August Street Warehouse and Distribution Centre (SSD-36138263)	Details: Proposed development involves the construction and operation of a warehouse and distribution centre comprising of four warehouse buildings including one multi-level building with a total gross floor area of 134,565 m², maximum height of 34.84 m, car parking, intersection and access works. The proposed development is located at Lots 218-219 in DP457024, Lot 2151 in DP135859, Lot 2 in DP516449, Lot 163 in DP8716, Lots 168-188 in DP8716, Lot 216 in DP8716, Lot 4 in DP585492, Lot 1 in DP119616, Lots 4-6 in DP226294, Lot 1 in DP 835264, Lots 50-52 in DP1144623, Lot 7 in DP803359, Lot 4 in DP583442, Lot 2 in DP1263824, Lots 6-10 in DP801210; Lot 1 in DP1300050; and Lot 164 in DP8716, Augusta Street, Blacktown. This location is approximately 7.3 km to the southeast of Quakers Hill WRRF. Impact review: An Air Quality Impact Assessment (SLR, 2023) was prepared to support the EIS for the development. The key outcomes of the assessment included: ▪ 'Low' unmitigated and 'negligible' mitigated risk of nuisance dust impacts at the most sensitive receptors located within 500m of construction activities (as determined using the same methodology from the IAQM applied in this assessment). ▪ Exhaust emissions from traffic movements at development was identified as representing the key air quality-related risk during operations. The assessment determined that changes in air quality resulting operational traffic at the site would be minimal, and negligible at distances of around 100m or more. Based on these outcomes it is considered unlikely that cumulative impacts from arise from the August Street Warehouse and Distribution Centre project, and the project.

Project	Details and cumulative impacts review
Davis Road Data Centre (Cundall) (SSD-59416728)	Details: Positioned at 3 Davis Road, Wetherill Park, the proposal encompasses the construction and operation of 2 x data centre buildings, a tape storage building, a high voltage substation and associated infrastructure. The facility would have an overall power consumption of 180 megawatts (MW). This location is approximately 11.6 km to the southeast of Quakers Hill WRRF. Impact review: An Air Quality Impact Assessment (Cundall Johnston & Partners, 2024) was prepared to support the EIS for the development. The key outcomes of the assessment included: ▪ 'High' or lower unmitigated and 'negligible' mitigated risk of nuisance dust impacts at the most sensitive receptors located within 500m of construction activities (as determined using the same methodology from the IAQM applied in this assessment). ▪ For operations, the assessment considered a typical and a worst-case scenario involving the use of the on-site back-up generators. Changes in concentrations during these operations only exceeded the EPA's impact assessment criteria at receptors in close proximity to the development (i.e., within approximately 400m). Based on these outcomes it is considered unlikely that cumulative impacts from arise from the Davis Road Data Centre (Cundall) project, and the project.

As summarised in Table 6-12, it was determined that there would be negligible potential for cumulative air quality impacts from the project, and the Honeman Close Data Centre, August Street Warehouse and Distribution Centre and Davis Road Data Centre (Cundall) projects.

7. Mitigation and management

7.1 Construction

Based on the outcomes of the construction assessment presented in Section 6.1, mitigation and management measures were developed for the project. These are listed below in Table 7-1, and were developed with reference to the GADDC, as well as Sydney Water's 'EMS0019.07 Environmental Management Measures' (2023).

Table 7-1. Construction odour and air quality management measures

Measure ID	Impact	Measure	Timing
AQ1	Reduce exhaust emissions from construction plant, vehicles and equipment	Maintain equipment in good working order, comply with the POEO Clean Air Regulation, have appropriate exhaust pollution controls, and meet Australian Standards for exhaust emissions.	During construction
AQ2		Switch off vehicles/machinery when not in use.	
AQ3	Minimise and manage dust generation during construction	Implement measures to prevent offsite dust impacts, for example: - Water exposed areas (using non-potable water source where possible such as water from excavation pits). - Cover exposed areas with tarpaulins or geotextile fabric. - Modify or cease work in windy conditions. - Modify site layout (place stockpiles away from sensitive receivers). - Vegetate exposed areas using appropriate seeding.	
AQ4	Minimise emissions (including odours) from any construction waste	Cover all transported waste.	
AQ5	Avoids emissions to air, including particulate matter associated with these types of activities	No burning of trimmed and cleared vegetation	
AQ6	Dust generated from traffic traveling along unsealed roads is less at lower speeds.	Implement appropriate site speed limits along any unsealed access routes	
AQ7	Minimise odours from any contaminated or hazardous materials	Apply odour suppressing agents to materials as necessary to minimise related impacts should any contaminated or hazardous materials be uncovered during the works	

Measure ID	Impact	Measure	Timing
AQ8	Minimising all emissions to air during construction	As part of the project construction environmental management plan (CEMP), develop an air quality management plan and implement measures to minimise air quality impacts during construction, with the objective of no unacceptable adverse changes in air quality at surrounding sensitive receptors. The CEMP must: ▪ Identify the main sources of dust and airborne pollutants, and the location of sensitive land uses. ▪ Set out how when and by whom the project will control the emission of dust, exhaust emissions, fumes, odour and other pollution into the atmosphere during construction in accordance with relevant statutes, policies and guidelines, ▪ Outline processes for reviewing and updating the plan and implemented controls in response to project changes, changes to conditions, monitoring results or enquiries/complaints.	

7.2 Operations

The operational odour assessment (**Section 6.2**) determined that without controls, the 99th percentile, 1-hour averaged (peak-to-mean corrected) ground level concentrations from Quakers Hill WRRF would continue to exceed the EPA's 2 OU impact assessment criterion at some nearby sensitive receptors, as was determined for the site in the ENSure 2016 assessment.

Following discussions with Sydney Water, it was identified that emissions from the pump station vents (i.e., sources SPSV1, SPSV2, SPSV3 and SPSGNDV1 as listed in Table 4-2 and Table 4-3) may be able to be redirected via ducting through the new BTF stack.

The predicted results with the application of this control measure are displayed below in Figure 7-1 and summarised in Table 7-2.

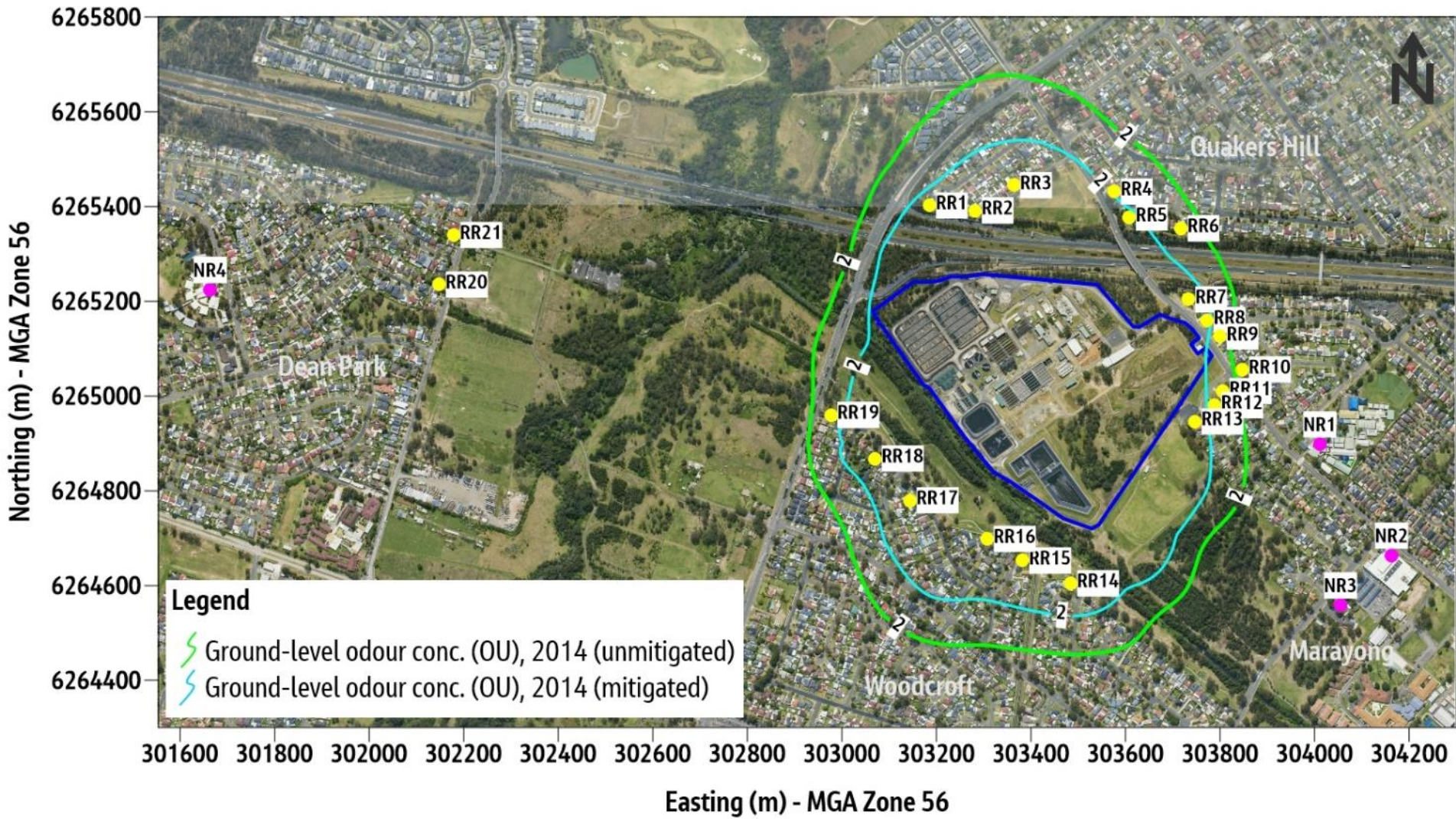


Figure 7-1. Comparison of mitigated and unmitigated results (2014 meteorology)

Table 7-2. Change in predicted odour with pump station vents redirected through new BFT OCU

Sensitive receptor	Predicted odour conc. (OU), 99 th percentile (2014 meteorology)			Impact assessment criterion (OU), 99 th percentile	Sensitive receptor	Predicted odour conc. (OU) 99 th percentile (2014 meteorology)			Impact assessment criterion (OU), 99 th percentile
	Unmitigated	Mitigated	Change			Unmitigated	Mitigated	Change	
RR1	3.1	2.2	-0.9	2	RR14	3.0	2.5	-0.5	2
RR2	4.0	2.6	-1.4	2	RR15	3.3	2.8	-0.5	2
RR3	3.8	2.6	-1.2	2	RR16	2.3	1.9	-0.4	2
RR4	2.6	1.9	-0.7	2	RR17	3.0	2.5	-0.5	2
RR5	2.7	2.1	-0.6	2	RR18	2.6	2.2	-0.4	2
RR6	2.2	1.8	-0.4	2	RR19	2.2	1.8	-0.4	2
RR7	2.5	2.2	-0.3	2	RR20	0.5	0.4	-0.1	2
RR8	2.4	2.1	-0.3	2	RR21	0.5	0.4	-0.1	2
RR9	2.1	1.8	-0.3	2	NR1	3.0	2.4	-0.6	2
RR10	1.9	1.6	-0.3	2	NR2	1.0	0.8	-0.2	2
RR11	2.2	1.8	-0.4	2	NR3	1.2	0.9	-0.3	2
RR12	2.3	1.9	-0.4	2	NR4	0.3	0.3	0	2
RR13	2.6	2.2	-0.4	2					

As Figure 7-1 and Table 7-2 show, the assessment found that redirecting emissions from the existing pump station vents via the new BTF stack could result in some improvement in resulting odour concentrations at receptors around the plant. Although the 99th percentile, 1-hour averaged 2 OU odour contour still extends beyond the site boundary into the surrounding residential areas, with this change, its extents contract by up to around 90-130 meters, particularly to the north and south (i.e., the directions of prevailing local winds and areas that were identified as being most-affected by the plant). Noting the issues with the assessment undertaken for the existing site, it was only possible to undertake an indicative review of the relative change with the upgrades, compared to current operations. The documented TOER for the existing site was 19,535 OU.m³/s (Stantec, 2019). Applying the same sensitivity adjustment to AGS4 as above in Section 6.2, this reduces to 16,835 OU.m³/s. With the mitigations and sensitivity updates outlined above, the estimated TOER for the upgraded site was 19,006 OU.m³/s. This increase (around 13%) is primarily the result of the new Bioreactor and second BFT stack. Importantly however it is noted that contributions from primary treatment sources remain unchanged. Considering this, it is not expected that odours from the upgraded plant would change materially compared to existing operations.

Based on the outcomes of the sensitivity review above, odour sampling of the AGS is recommended in order to verify suitable SOER for the asset.

Any odour complaints should continue to be managed in accordance with Sydney Water's existing management system processes.

8. Summary and recommendations

This report has provided an assessment of potential changes in air quality associated with the planned Secondary wastewater treatment upgrades at Quakers Hill WRRF and new brine pipeline. In summary, the assessment involved identifying the key air quality issues, characterising the existing environment, quantifying emissions to air and assessing the potential impact of the project on nearby sensitive receptors within the surrounding study area. The assessment was carried out in general accordance with the Approved Methods (2022), as well as Sydney Water's procedures.

As part of the assessment, key features of the existing environment were identified including surrounding sensitive receptors, local terrain, meteorology, existing odour conditions around Quakers Hill WRRF, other local sources of emissions to air, background air quality and existing traffic conditions along key project roads. Aerial imagery was used to identify the location of surrounding receptors. Topographic and meteorological conditions around the project were characterised using information from Sydney Water's site CALMET meteorological model. Existing odour conditions around Quakers Hill WRRF were determined from previous studies, as well as using information from Sydney Water's Complaints Register. Other sources of local emissions to air were identified using information from the Commonwealth NPI and EPA EPL databases. Background air quality conditions at receptors around the project was estimated using data from nearby ambient air quality monitoring stations operate by DPHI. Finally, existing traffic conditions along key roads were estimated from a recent nearby traffic study (Thompson Stanbury Associates, 2020).

The following conclusions were made in relation to the existing environment:

- There nearest sensitive receptors to Quakers Hill WRRF are located around 120–200 m away, to the north, south and east of the site
- A high number of sensitive receptors are located in close proximity (i.e., within around 20 m) of the brine pipeline (and associated temporary construction areas); particularly along the two trenched components (denoted segments 1 and 3 in this assessment)
- Prevailing local meteorological conditions are winds blowing from the north, with winds from the south southwest and east northeast also common
- Previous studies (ENSure, 2016) identified the site as being a “high risk odour plant, based on the 2 OU contours which are predicted to extend into residential areas”. This was supported by the consistent receipt of odour-related complaints up to the present recorded in Sydney Water's Complaints Register
- Other existing nearby sources of emissions to air were identified, which generally comprised of industry. Key emissions to air from these industries included CO, NOx, PM10, PM2.5, Heavy metals, SO2 and total and speciated VOCs
- Background air quality concentrations around the site were recorded as generally meeting the NSW EPA's impact assessment criteria, with the exception of 24-hour averaged PM10 and PM2.5, which were occasionally measured above these limits. For both pollutants, no exceedances of the 24-hour averaged criteria were recorded in 2024 (i.e., the most recent complete calendar year)
- Two-way peak hour traffic flows along Quakers Road (i.e., the main road connecting Quakers WRRF to the road network) were estimated at around 600 movements per hour.

Impacts during construction were assessed using the semi-quantitative method developed by the UK IAQM. Other potential air quality-related impacts including exhaust emissions from plant and equipment, and odours, fumes and airborne hazards resulting from uncovered contaminated materials and groundwater were assessed qualitatively. The key outcomes of the construction impact assessment were:

- 'High' potential for nuisance dust impacts if let unmitigated along the trenched segments of the brine pipeline from Quakers Hill WRRF to Marayong Park, and from Lynwood Park to International Peace Park during excavation activities. 'Low' or 'negligible' potential unmitigated nuisance dust impacts were determined around the other components of the project. With the implementation of the recommended

controls (detailed in Section 7.1), it was determined that residual impacts would be negligible, such that air quality at surrounding receptors would not be adversely affected in such a way leading to any significant dust soiling nuisance or health effects

- Impacts from other emissions to air during construction (exhaust emissions from construction plant and equipment, as well as from additional construction traffic, and odours and airborne hazardous materials arising from uncovered contaminated materials) were considered but not assessed as being likely to result in any impacts. Still, measures to minimise these emissions were recommended in Section 7.1.

Changes in operational odour at sensitive receptors around Quakers Hill WRRF as a result of the project were quantitatively assessed by way of air pollution dispersion modelling. Modelling determined that the 99th percentile, 1-hour averaged ground-level odour concentrations from the upgraded Quakers Hill WRRF site would exceed the EPA's 2 OU impact assessment criterion at nearby representative receptors within approximately 200 to 400 m of the facility. Sensitivity reviews were completed for key odour sources, and in consultation with Sydney Water, the option to redirect emissions from the existing pump station vents via the new BTF stack was assessed. With this change it was determined that although the 99th percentile, 1-hour averaged 2 OU odour contour was still predicted to extend beyond the site boundary into the surrounding residential areas, its extents were assessed as contracting by up to around 90-130 m. It was estimated that odours from the upgraded plant would not materially differ from existing operations.

Recommendations were made to review this and other relevant odour control options, as well as to complete odour sampling of the AGS in order to verify a suitable SOER for the asset. It was also recommended that any odour complaints from the site continue to be managed in accordance with Sydney Water's existing management system processes.

The potential for cumulative air quality impacts was also assessed using the guidance presented in 'Cumulative Impact Assessment Guidelines for State Significant Projects', (DPIE, 2022). Three projects were identified as being potentially relevant, with potential cumulative impacts assessed as being negligible for all of these projects.

9. References

- Cundall Johnston & Partners, 2024. 'Project Blue Tongue Air Quality Impact Assessment'
- ENSure, 2016. 'Quakers Hill Water Recycling Plant Odour Model Description – December 2016'
- Jacobs, 2025. 'Quakers Hill Water Resource Recovery Facility and Prospect Reservoir Odour and Air Quality Impact Assessment'
- Northstar, 2023. 'Proposed Datacentre, 6 Honeman Close, Huntingwood Air Quality Impact Assessment'
- NSW Department of Environment and Conservation, 2006. 'Technical Framework Assessment and Management of odour from stationary sources in NSW'
- NSW Department of Planning, 2010. 'NSW Best Practice Odour Guideline, Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining'
- NSW Department of Planning, Industry and Environment, 2022. 'Cumulative Impact Assessment Guidelines for State Significant Projects'
- NSW Environment Protection Authority, 'Approved Methods for the Modelling and Assessment of Air Pollutants in NSW'
- SLR, 2023. 'Augusta Street Warehouse and Distribution Centre Air Quality Impact Assessment'
- Stantec, 2019. 'Odour Impact Assessment LCSTP – Quakers Hill WRP'
- Sydney Water, 2023. 'EMS0019.07 Environmental Management Measures'
- Sydney Water, 2025. 'Complaints Register'
- Thompson Stanbury Associates, 2020. 'Traffic Impact Statement, Lot 83 DP1199935 Quakers Road, Quakers Hill (Proposed Residential Development)'
- Transport for New South Wales, 2023. 'Roadside air quality screening tool version 1.1'
- United Kingdom Institute of Air Quality Management, 2024. 'Guidance on the assessment of dust from demolition and construction Version 2.1'

Appendix A. CALPUFF input file

CALPUFF.INP 7.0 Groups Of,0g added; new emission scaling

Quakers Hill - All sources

Sydney Water

----- Run title (3 lines) -----

MODEL: Version TNG

SOFTWARE: CALApps v2.0197 (Beta) - September 22, 2014

CALPUFF MODEL CONTROL FILE

INPUT GROUP: 0 -- Input and Output File Names

Default Name	Type	File Name
--------------	------	-----------

CALMET.DAT	input	* METDAT = *
------------	-------	--------------

or

ISCMET.DAT	input	* ISCDAT = *
------------	-------	--------------

or

PLMMET.DAT	input	* PLMDAT = *
------------	-------	--------------

or

PROFILE.DAT	input	* PRFDAT = *
-------------	-------	--------------

SURFACE.DAT	input	* SFCDAT = *
-------------	-------	--------------

RESTARTB.DAT	input	* RSTARTB= *
--------------	-------	--------------

CALPUFF.LST	output	! PUFLST = PUFF2014v2.lst !
-------------	--------	-----------------------------

CONC.DAT	output	! CONDAT = PUFF2014v2.con !
----------	--------	-----------------------------

DFLX.DAT	output	* DFDAT = *
----------	--------	-------------

WFLX.DAT	output	* WFDAT = *
----------	--------	-------------

Odour and Air Quality Impact Assessment Report

VISB.DAT output * VISDAT = *

TK2D.DAT output * T2DDAT = *

RHO2D.DAT output * RHODAT = *

RESTARTE.DAT output * RSTARTE= *

Other Files

OZONE.DAT input * OZDAT = *

VD.DAT input * VDDAT = *

CHEM.DAT input * CHEMDAT= *

AUX input ! AUXEXT = AUX!

(Extension added to METDAT filename(s) for files
with auxiliary 2D and 3D data)

H2O2.DAT input * H2O2DAT= *

NH3Z.DAT input * NH3ZDAT= *

HILL.DAT input * HILDAT= *

HILLRCT.DAT input * RCTDAT= *

COASTLN.DAT input * CSTDAT= *

FLUXBDY.DAT input * BDYDAT= *

BCON.DAT input * BCNDAT= *

DEBUG.DAT output * DEBUG = *

MASSFLX.DAT output * FLXDAT= *

MASSBAL.DAT output * BALDAT= *

FOG.DAT output * FOGDAT= *

RISE.DAT output * RISDAT= *

PFTRAK.DAT output * TRKDAT= *

All file names will be converted to lower case if LCFILES = T

Otherwise, if LCFILES = F, file names will be converted to UPPER CASE

 T = lower case ! LCFILES = T !

 F = UPPER CASE

NOTE: (1) file/path names can be up to 132 characters in length

Provision for multiple CALMET Domains and files

Number of CALMET.DAT Domains (NMETDOM)

Default: 1 ! NMETDOM = 1 !

Number of CALMET.DAT files (NMETDAT)

(Total for ALL Domains)

Default: 1 ! NMETDAT = 12 !

Variable point/area/volume/flare emissions input files

Number of POINT source files (PTEMARB.DAT)

with time-varying data (NPTDAT)

Default: 0 ! NPTDAT = 0 !

Number of BUOYANT AREA source files (BAEMARB.DAT)

with time-varying data (NARDAT)

Default: 0 ! NARDAT = 0 !

Number of VOLUME source files (VOLEMARB.DAT)

with time-varying data (NVOLDAT)

Default: 0 ! NVOLDAT = 0 !

Number of FLARE source files (FLEMARB.DAT)

with time-varying data (NFLDAT)

Default: 0 ! NFLDAT = 0 !

Number of ROAD source files (RDEMARB.DAT)

with time-varying data (NRDDAT)

Default: 0 ! NRDDAT = 0 !

Number of BUOYANT LINE source files (LNEMARB.DAT)

with time-varying data (NLNDAT)

Default: 0 ! NLNDAT = 0 !

Note: Only 1 BUOYANT LINE source file is allowed

!END!

Subgroup (0a)

Provide a name for each CALMET domain if NMETDOM > 1

Enter NMETDOM lines.

a,b

Default Name	Domain Name
-----	-----
none	* DOMAIN1= * *END*
none	* DOMAIN2= * *END*
none	* DOMAIN3= * *END*

The following CALMET.DAT filenames are processed in sequence

if NMETDAT > 1

Enter NMETDAT lines, 1 line for each file name.

a,c,d

Default Name	Type	File Name
-----	----	-----
none	input	! METDAT1 = Met1401.dat ! !END!
none	input	! METDAT1 = Met1402.dat ! !END!
none	input	! METDAT1 = Met1403.dat ! !END!
none	input	! METDAT1 = Met1404.dat ! !END!
none	input	! METDAT1 = Met1405.dat ! !END!
none	input	! METDAT1 = Met1406.dat ! !END!
none	input	! METDAT1 = Met1407.dat ! !END!
none	input	! METDAT1 = Met1408.dat ! !END!

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none input !METDAT1 = Met1409.dat! !END!

none input !METDAT1 = Met1410.dat! !END!

none input !METDAT1 = Met1411.dat! !END!

none input !METDAT1 = Met1412.dat! !END!

a

The name for each CALMET domain and each CALMET.DAT file is treated as a separate input subgroup and therefore must end with an input group terminator.

b

Use DOMAIN1= to assign the name for the outermost CALMET domain.
Use DOMAIN2= to assign the name for the next inner CALMET domain.
Use DOMAIN3= to assign the name for the next inner CALMET domain, etc.

| When inner domains with equal resolution (grid-cell size) |
| overlap, the data from the FIRST such domain in the list will |
| be used if all other criteria for choosing the controlling |
grid domain are inconclusive.

c

Use METDAT1= to assign the file names for the outermost CALMET domain.
Use METDAT2= to assign the file names for the next inner CALMET domain.
Use METDAT3= to assign the file names for the next inner CALMET domain, etc.

d

The filenames for each domain must be provided in sequential order

Subgroup (0b) - PTEMARB.DAT files

POINT Source File Names

The following PTEMARB.DAT filenames are processed if NPTDAT>0

A total of NPTDAT lines is expected with one file name assigned per line

Each line is treated as an input group and must terminate with END

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(surrounded by delimiters)

(Each file contains emissions parameters for the entire period modeled
for 1 or more sources)

Default Name	Type	File Name
-----	----	-----
none	input	* PTDAT= * *END*

Subgroup (0c) - BAEMARB.DAT files

BUOYANT AREA Source File Names

The following BAEMARB.DAT filenames are processed if NARDAT>0

A total of NARDAT lines is expected with one file name assigned per line

Each line is treated as an input group and must terminate with END

(surrounded by delimiters)

(Each file contains emissions parameters for the entire period modeled
for 1 or more sources)

Default Name	Type	File Name
-----	----	-----
none	input	* ARDAT= * *END*

Subgroup (0d) - VOLEMARB.DAT files

VOLUME Source File Names

The following VOLEMARB.DAT filenames are processed if NVOLDAT>0

A total of NVOLDAT lines is expected with one file name assigned per line

Each line is treated as an input group and must terminate with END

(surrounded by delimiters)

(Each file contains emissions parameters for the entire period modeled

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for 1 or more sources)

Default Name	Type	File Name
--------------	------	-----------

-----	----	-----
-------	------	-------

none	input	* VOLDAT= * *END*
------	-------	-------------------

Subgroup (0e) - FLEMARB.DAT files

FLARE Source File Names

The following FLEMARB.DAT filenames are processed if NFLDAT>0

A total of NFLDAT lines is expected with one file name assigned per line

Each line is treated as an input group and must terminate with END

(surrounded by delimiters)

(Each file contains emissions parameters for the entire period modeled

for 1 or more sources)

Default Name	Type	File Name
--------------	------	-----------

-----	----	-----
-------	------	-------

none	input	* FLDAT= * *END*
------	-------	------------------

Subgroup (0f) - RDEMARB.DAT files

ROAD Source File Names

The following RDEMARB.DAT filenames are processed if NRDDAT>0

A total of NRDDAT lines is expected with one file name assigned per line

Each line is treated as an input group and must terminate with END

(surrounded by delimiters)

(Each file contains emissions parameters for the entire period modeled

for 1 or more sources)

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Default Name	Type	File Name
--------------	------	-----------

-----	----	-----
-------	------	-------

none	input	* RDDAT= * *END*
------	-------	------------------

Subgroup (0g) - LNEARB.DAT file

BUOYANT LINE Source File Name (not more than 1)

The following LNEARB.DAT filename is processed if NLNDAT>0

The assignment is treated as an input group and must terminate with END

(surrounded by delimiters)

Default Name	Type	File Name
--------------	------	-----------

-----	----	-----
-------	------	-------

LNEARB.DAT	input	* LNDAT= * *END*
------------	-------	------------------

INPUT GROUP: 1 -- General run control parameters

Option to run all periods found

in the met. file (METRUN) Default: 0 !METRUN = 0!

METRUN = 0 - Run period explicitly defined below

METRUN = 1 - Run all periods in met. file

Starting date: Year (IBYR) -- No default !IBYR = 2014!

Month (IBMO) -- No default !IBMO = 1!

Day (IBDY) -- No default !IBDY = 1!

Starting time: Hour (IBHR) -- No default !IBHR = 0!

Minute (IBMIN) -- No default !IBMIN = 0!

Second (IBSEC) -- No default !IBSEC = 0!

Ending date: Year (IEYR) -- No default !IEYR = 2015 !

Month (IEMO) -- No default !IEMO = 1 !

Day (IEDY) -- No default !IEDY = 1 !

Ending time: Hour (IEHR) -- No default !IEHR = 0 !

Minute (IEMIN) -- No default !IEMIN = 0 !

Second (IESEC) -- No default !IESEC = 0 !

(These are only used if METRUN = 0)

Base time zone: (ABTZ) -- No default !ABTZ = UTC+1000 !

(character*8)

The modeling domain may span multiple time zones. ABTZ defines the base time zone used for the entire simulation. This must match the base time zone of the meteorological data.

Examples:

Greenwich Mean Time (GMT) = UTC+0000

EST = UTC-0500

CST = UTC-0600

MST = UTC-0700

PST = UTC-0800

Los Angeles, USA = UTC-0800

New York, USA = UTC-0500

Santiago, Chile = UTC-0400

UK = UTC+0000

Western Europe = UTC+0100

Rome, Italy = UTC+0100

Cape Town, S.Africa = UTC+0200

Sydney, Australia = UTC+1000

Length of modeling time-step (seconds)

Equal to update period in the primary

meteorological data files, or an

integer fraction of it (1/2, 1/3 ...)

Must be no larger than 1 hour

(NSECDT) Default:3600 !NSECDT = 3600 !

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Units: seconds

Number of chemical species (NSPEC)

Default: 5 ! NSPEC = 1 !

Number of chemical species

to be emitted (NSE) Default: 3 ! NSE = 1 !

Flag to stop run after

SETUP phase (ITEST) Default: 2 ! ITEST = 2 !

(Used to allow checking

of the model inputs, files, etc.)

ITEST = 1 - STOPS program after SETUP phase

ITEST = 2 - Continues with execution of program

after SETUP

Restart Configuration:

Control flag (MRESTART) Default: 0 ! MRESTART = 0 !

0 = Do not read or write a restart file

1 = Read a restart file at the beginning of
the run

2 = Write a restart file during run

3 = Read a restart file at beginning of run
and write a restart file during run

Number of periods in Restart

output cycle (NRESPD) Default: 0 ! NRESPD = 0 !

0 = File written only at last period

>0 = File updated every NRESPD periods

Meteorological Data Format (METFM)

Default: 1 ! METFM = 1 !

METFM = 1 - CALMET binary file (CALMET.MET)

METFM = 2 - ISC ASCII file (ISCMET.MET)

METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)

METFM = 4 - CTDM plus tower file (PROFILE.DAT) and

surface parameters file (SURFACE.DAT)

METFM = 5 - AERMET tower file (PROFILE.DAT) and

surface parameters file (SURFACE.DAT)

Meteorological Profile Data Format (MPRFFM)

(used only for METFM = 1, 2, 3)

Default: 1 ! MPRFFM = 1 !

MPRFFM = 1 - CTDM plus tower file (PROFILE.DAT)

MPRFFM = 2 - AERMET tower file (PROFILE.DAT)

Sigma-y is adjusted by the factor $(AVET/PGTIME)^{0.2}$ to either

decrease it if the averaging time selected is less than the base

averaging time, or increase it if the averaging time is greater.

The base averaging time is denoted as PGTIME due to historical

reasons as this adjustment was originally applied to the PG sigma

option. It is now applied to all dispersion options.

The factor is applied to the ambient turbulence sigma-v (m/s) and

does not alter buoyancy enhancement or far-field Heffter growth.

Averaging Time (minutes) (AVET)

Default: 60.0 ! AVET = 60. !

Base Averaging Time (minutes) (PGTIME)

Default: 60.0 ! PGTIME = 60. !

Output units for binary concentration and flux files

written in Dataset v2.2 or later formats

(IOUTU) Default: 1 ! IOUTU = 2 !

1 = mass - g/m3 (conc) or g/m2/s (dep)

2 = odour - odour_units (conc)

3 = radiation - Bq/m3 (conc) or Bq/m2/s (dep)

!END!

INPUT GROUP: 2 -- Technical options

Vertical distribution used in the

near field (MGAUSS) Default: 1 ! MGAUSS = 1 !

0 = uniform

1 = Gaussian

Terrain adjustment method

(MCTADJ) Default: 3 ! MCTADJ = 3 !

0 = no adjustment

1 = ISC-type of terrain adjustment

2 = simple, CALPUFF-type of terrain
adjustment

3 = partial plume path adjustment

Subgrid-scale complex terrain

flag (MCTSG) Default: 0 ! MCTSG = 0 !

0 = not modeled

1 = modeled

Near-field puffs modeled as

elongated slugs? (MSLUG) Default: 0 ! MSLUG = 0 !

0 = no

1 = yes (slug model used)

Transitional plume rise modeled?

(MTRANS) Default: 1 ! MTRANS = 1 !

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0 = no (i.e., final rise only)

1 = yes (i.e., transitional rise computed)

Stack tip downwash? (MTIP) Default: 1 ! MTIP = 1 !

0 = no (i.e., no stack tip downwash)

1 = yes (i.e., use stack tip downwash)

Method used to compute plume rise for

point sources not subject to building

downwash? (MRISE) Default: 1 ! MRISE = 1 !

1 = Briggs plume rise

2 = Numerical plume rise

Apply stack-tip downwash to FLARE sources?

(MTIP_FL) Default: 0 ! MTIP_FL = 0 !

0 = no (no stack-tip downwash)

1 = yes (apply stack-tip downwash)

Plume rise module for FLARE sources

(MRISE_FL) Default: 2 ! MRISE_FL = 2 !

1 = Briggs module

2 = Numerical rise module

Method used to simulate building

downwash? (MBDW) Default: 1 ! MBDW = 2 !

1 = ISC method

2 = PRIME method

Vertical wind shear modeled above

stack top (modified Briggs plume rise)?

(MSHEAR) Default: 0 ! MSHEAR = 0 !

0 = no (i.e., vertical wind shear not modeled)

1 = yes (i.e., vertical wind shear modeled)

Puff splitting allowed? (MSPLIT) Default: 0 ! MSPLIT = 0 !

0 = no (i.e., puffs not split)

1 = yes (i.e., puffs are split)

Chemical mechanism flag (MCHEM) Default: 1 ! MCHM = 0 !

0 = chemical transformation not
modeled

1 = transformation rates computed
internally (MESOPUFF II scheme)

2 = user-specified transformation
rates used

3 = transformation rates computed
internally (RIVAD/ARM3 scheme)

4 = secondary organic aerosol formation
computed (MESOPUFF II scheme for OH)

5 = user-specified half-life with or
without transfer to child species

6 = transformation rates computed
internally (Updated RIVAD scheme with
ISORROPIA equilibrium)

7 = transformation rates computed
internally (Updated RIVAD scheme with
ISORROPIA equilibrium and CalTech SOA)

Aqueous phase transformation flag (MAQCHEM)

(Used only if MCHM = 6, or 7) Default: 0 ! MAQCHEM = 0 !

0 = aqueous phase transformation
not modeled

1 = transformation rates and wet
scavenging coefficients adjusted
for in-cloud aqueous phase reactions
(adapted from RADM cloud model
implementation in CMAQ/SCICHEM)

Liquid Water Content flag (MLWC)

(Used only if MAQCHEM = 1) Default: 1 ! MLWC = 1 !

0 = water content estimated from cloud cover
and presence of precipitation

1 = gridded cloud water data read from CALMET

water content output files (filenames are
the CALMET.DAT names PLUS the extension
AUXEXT provided in Input Group 0)

Wet removal modeled ? (MWET) Default: 1 ! MWET = 0 !

0 = no

1 = yes

Dry deposition modeled ? (MDRY) Default: 1 ! MDRY = 0 !

0 = no

1 = yes

(dry deposition method specified
for each species in Input Group 3)

Gravitational settling (plume tilt)

modeled ? (MTILT) Default: 0 ! MTILT = 0 !

0 = no

1 = yes

(puff center falls at the gravitational
settling velocity for 1 particle species)

Restrictions:

- MDRY = 1
- NSPEC = 1 (must be particle species as well)
- sg = 0 GEOMETRIC STANDARD DEVIATION in Group 8 is
set to zero for a single particle diameter

Method used to compute dispersion

coefficients (MDISP) Default: 3 ! MDISP = 2 !

1 = dispersion coefficients computed from measured values

of turbulence, sigma v, sigma w

2 = dispersion coefficients from internally calculated

sigma v, sigma w using micrometeorological variables

(u^* , w^* , L , etc.)

3 = PG dispersion coefficients for RURAL areas (computed using the ISCST multi-segment approximation) and MP coefficients in urban areas

4 = same as 3 except PG coefficients computed using the MESOPUFF II eqns.

5 = CTDM sigmas used for stable and neutral conditions.

For unstable conditions, sigmas are computed as in

MDISP = 3, described above. MDISP = 5 assumes that measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)

(Used only if MDISP = 1 or 5) Default: 3 ! MTURBVW = 3 !

1 = use sigma-v or sigma-theta measurements

from PROFILE.DAT to compute sigma-y

(valid for METFM = 1, 2, 3, 4, 5)

2 = use sigma-w measurements

from PROFILE.DAT to compute sigma-z

(valid for METFM = 1, 2, 3, 4, 5)

3 = use both sigma-(v/theta) and sigma-w

from PROFILE.DAT to compute sigma-y and sigma-z

(valid for METFM = 1, 2, 3, 4, 5)

4 = use sigma-theta measurements

from PLMMET.DAT to compute sigma-y

(valid only if METFM = 3)

Back-up method used to compute dispersion

when measured turbulence data are

missing (MDISP2) Default: 3 ! MDISP2 = 3 !

(used only if MDISP = 1 or 5)

2 = dispersion coefficients from internally calculated

sigma v, sigma w using micrometeorological variables

(u^* , w^* , L , etc.)

3 = PG dispersion coefficients for RURAL areas (computed using

the ISCST multi-segment approximation) and MP coefficients in

urban areas

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4 = same as 3 except PG coefficients computed using
the MESOPUFF II eqns.

[DIAGNOSTIC FEATURE]

Method used for Lagrangian timescale for Sigma-y

(used only if MDISP=1,2 or MDISP2=1,2)

(MTAULY) Default: 0 ! MTAULY = 0 !

0 = Draxler default 617.284 (s)

1 = Computed as Lag. Length / (.75 q) -- after SCIPUFF

10 < Direct user input (s) -- e.g., 306.9

[DIAGNOSTIC FEATURE]

Method used for Advective-Decay timescale for Turbulence

(used only if MDISP=2 or MDISP2=2)

(MTAUADV) Default: 0 ! MTAUADV = 0 !

0 = No turbulence advection

1 = Computed (OPTION NOT IMPLEMENTED)

10 < Direct user input (s) -- e.g., 800

Method used to compute turbulence sigma-v &

sigma-w using micrometeorological variables

(Used only if MDISP = 2 or MDISP2 = 2)

(MCTURB) Default: 1 ! MCTURB = 1 !

1 = Standard CALPUFF subroutines

2 = AERMOD subroutines

PG sigma-y,z adj. for roughness? Default: 0 ! MROUGH = 0 !

(MROUGH)

0 = no

1 = yes

Partial plume penetration of Default: 1 ! MPARTL = 1 !

elevated inversion modeled for

point sources?

(MPARTL)

0 = no

1 = yes

Partial plume penetration of Default: 1 ! MPARTLBA = 1 !

elevated inversion modeled for

buoyant area sources?

(MPARTLBA)

0 = no

1 = yes

Strength of temperature inversion Default: 0 ! MTINV = 0 !

provided in PROFILE.DAT extended records?

(MTINV)

0 = no (computed from measured/default gradients)

1 = yes

PDF used for dispersion under convective conditions?

Default: 0 ! MPDF = 1 !

(MPDF)

0 = no

1 = yes

Sub-Grid TIBL module used for shore line?

Default: 0 ! MSGTIBL = 0 !

(MSGTIBL)

0 = no

1 = yes

Boundary conditions (concentration) modeled?

Default: 0 ! MBCON = 0 !

(MBCON)

0 = no

1 = yes, using formatted BCON.DAT file

2 = yes, using unformatted CONC.DAT file

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Note: MBCON > 0 requires that the last species modeled

be 'BCON'. Mass is placed in species BCON when generating boundary condition puffs so that clean air entering the modeling domain can be simulated in the same way as polluted air. Specify zero emission of species BCON for all regular sources.

Individual source contributions saved?

Default: 0 ! MSOURCE = 0 !

(MSOURCE)

0 = no

1 = yes

Analyses of fogging and icing impacts due to emissions from arrays of mechanically-forced cooling towers can be performed using CALPUFF in conjunction with a cooling tower emissions processor (CTEMISS) and its associated postprocessors. Hourly emissions of water vapor and temperature from each cooling tower cell are computed for the current cell configuration and ambient conditions by CTEMISS. CALPUFF models the dispersion of these emissions and provides cloud information in a specialized format for further analysis. Output to FOG.DAT is provided in either 'plume mode' or 'receptor mode' format.

Configure for FOG Model output?

Default: 0 ! MFOG = 0 !

(MFOG)

0 = no

1 = yes - report results in PLUME Mode format

2 = yes - report results in RECEPTOR Mode format

Test options specified to see if they conform to regulatory

values? (MREG) Default: 1 ! MREG = 0 !

0 = NO checks are made

1 = Technical options must conform to USEPA

Long Range Transport (LRT) guidance

METFM 1 or 2

AVET 60. (min)

PGTIME 60. (min)

MGAUSS 1

MCTADJ 3

MTRANS 1

MTIP 1

MRISE 1

MCHEM 1 or 3 (if modeling SO_x, NO_x)

MWET 1

MDRY 1

MDISP 2 or 3

MPDF 0 if MDISP=3

1 if MDISP=2

MROUGH 0

MPARTL 1

MPARTLBA 0

SYTDEP 550. (m)

MHFTSZ 0

SVMIN 0.5 (m/s)

!END!

INPUT GROUP: 3a, 3b -- Species list

Subgroup (3a)

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The following species are modeled:

! CSPEC = ODOR ! !END!

	Dry	OUTPUT GROUP		
SPECIES	MODELED	EMITTED	DEPOSITED	NUMBER
NAME	(0=NO, 1=YES)	(0=NO, 1=YES)	(0=NO,	(0=NONE,
(Limit: 12		1=COMPUTED-GAS	1=1st CGRUP,	
Characters		2=COMPUTED-PARTICLE	2=2nd CGRUP,	
in length)		3=USER-SPECIFIED)	3= etc.)	

! ODOR = 1, 1, 0, 0 !

!END!

Note: The last species in (3a) must be 'BCON' when using the boundary condition option (MBCON > 0). Species BCON should typically be modeled as inert (no chem transformation or removal).

Subgroup (3b)

The following names are used for Species-Groups in which results for certain species are combined (added) prior to output. The CGRUP name will be used as the species name in output files. Use this feature to model specific particle-size distributions by treating each size-range as a separate species. Order must be consistent with 3(a) above.

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INPUT GROUP: 4 -- Map Projection and Grid control parameters

Projection for all (X,Y):

Map projection

(PMAP) Default: UTM ! PMAP = UTM !

UTM : Universal Transverse Mercator

TTM : Tangential Transverse Mercator

LCC : Lambert Conformal Conic

PS : Polar Stereographic

EM : Equatorial Mercator

LAZA : Lambert Azimuthal Equal Area

False Easting and Northing (km) at the projection origin

(Used only if PMAP= TTM, LCC, or LAZA)

(FEAST) Default=0.0 ! FEAST = 0.000 !

(FNORTH) Default=0.0 ! FNORTH = 0.000 !

UTM zone (1 to 60)

(Used only if PMAP=UTM)

(IUTMZN) No Default ! IUTMZN = 56 !

Hemisphere for UTM projection?

(Used only if PMAP=UTM)

(UTMHEM) Default: N ! UTMHEM = S !

N : Northern hemisphere projection

S : Southern hemisphere projection

Latitude and Longitude (decimal degrees) of projection origin

(Used only if PMAP= TTM, LCC, PS, EM, or LAZA)

(RLATO) No Default ! RLATO = 33S !

(RLON0) No Default ! RLON0 = 151E !

TTM : RLON0 identifies central (true N/S) meridian of projection

RLAT0 selected for convenience

LCC : RLON0 identifies central (true N/S) meridian of projection

RLAT0 selected for convenience

PS : RLON0 identifies central (grid N/S) meridian of projection

RLAT0 selected for convenience

EM : RLON0 identifies central meridian of projection

RLAT0 is REPLACED by 0.0N (Equator)

LAZA: RLON0 identifies longitude of tangent-point of mapping plane

RLAT0 identifies latitude of tangent-point of mapping plane

Matching parallel(s) of latitude (decimal degrees) for projection

(Used only if PMAP= LCC or PS)

(XLAT1) No Default ! XLAT1 = 0N !

(XLAT2) No Default ! XLAT2 = 0N !

LCC : Projection cone slices through Earth's surface at XLAT1 and XLAT2

PS : Projection plane slices through Earth at XLAT1

(XLAT2 is not used)

Note: Latitudes and longitudes should be positive, and include a

letter N,S,E, or W indicating north or south latitude, and

east or west longitude. For example,

35.9 N Latitude = 35.9N

118.7 E Longitude = 118.7E

Datum-region

The Datum-Region for the coordinates is identified by a character

string. Many mapping products currently available use the model of the

Earth known as the World Geodetic System 1984 (WGS-84). Other local

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models may be in use, and their selection in CALMET will make its output consistent with local mapping products. The list of Datum-Regions with official transformation parameters is provided by the National Imagery and Mapping Agency (NIMA).

NIMA Datum - Regions(Examples)

WGS-84 WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
NAS-C NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
NAR-C NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
NWS-84 NWS 6370KM Radius, Sphere
ESR-S ESRI REFERENCE 6371KM Radius, Sphere

Datum-region for output coordinates

(DATUM) Default: WGS-84 ! DATUM = WGS-84 !

METEOROLOGICAL Grid (outermost if nested CALMET grids are used):

Rectangular grid defined for projection PMAP,
with X the Easting and Y the Northing coordinate

No. X grid cells (NX) No default ! NX = 101 !

No. Y grid cells (NY) No default ! NY = 101 !

No. vertical layers (NZ) No default ! NZ = 12 !

Grid spacing (DGRIDKM) No default ! DGRIDKM = 0.2 !

Units: km

Cell face heights

(ZFACE(nz+1)) No defaults

Units: m

! ZFACE = 0,20,40,60,100,140,180,260,500,800,1500,2200,3000 !

Reference Coordinates

of SOUTHWEST corner of

grid cell(1, 1):

X coordinate (XORIGKM) No default ! XORIGKM = 293.840 !

Y coordinate (YORIGKM) No default ! YORIGKM = 6255.940 !

Units: km

COMPUTATIONAL Grid:

The computational grid is identical to or a subset of the MET. grid.

The lower left (LL) corner of the computational grid is at grid point (IBCOMP, JBCOMP) of the MET. grid. The upper right (UR) corner of the computational grid is at grid point (IECOMP, JECOMP) of the MET. grid. The grid spacing of the computational grid is the same as the MET. grid.

X index of LL corner (IBCOMP) No default ! IBCOMP = 20 !

(1 <= IBCOMP <= NX)

Y index of LL corner (JBCOMP) No default ! JBCOMP = 20 !

(1 <= JBCOMP <= NY)

X index of UR corner (IECOMP) No default ! IECOMP = 81 !

(1 <= IECOMP <= NX)

Y index of UR corner (JECOMP) No default ! JECOMP = 81 !

(1 <= JECOMP <= NY)

SAMPLING Grid (GRIDDED RECEPTORS):

The lower left (LL) corner of the sampling grid is at grid point (IBSAMP, JBSAMP) of the MET. grid. The upper right (UR) corner of the sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid. The sampling grid must be identical to or a subset of the computational

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grid. It may be a nested grid inside the computational grid.

The grid spacing of the sampling grid is DGRIDKM/MESH DN.

Logical flag indicating if gridded

receptors are used (LSAMP) Default: T ! LSAMP = T !

(T=yes, F=no)

X index of LL corner (IBSAMP) No default ! IBSAMP = 20 !

(IBCOMP <= IBSAMP <= IECOMP)

Y index of LL corner (JBSAMP) No default ! JBSAMP = 20 !

(JBCOMP <= JBSAMP <= JECOMP)

X index of UR corner (IESAMP) No default ! IESAMP = 81 !

(IBCOMP <= IESAMP <= IECOMP)

Y index of UR corner (JESAMP) No default ! JESAMP = 81 !

(JBCOMP <= JESAMP <= JECOMP)

Nesting factor of the sampling

grid (MESH DN) Default: 1 ! MESH DN = 2 !

(MESH DN is an integer >= 1)

!END!

INPUT GROUP: 5 -- Output Options

	*	*
FILE	DEFAULT VALUE	VALUE THIS RUN
----	-----	-----

Concentrations (ICON) 1 ! ICON = 1 !

Dry Fluxes (IDRY) 1 ! IDRY = 0 !

Wet Fluxes (IWET) 1 ! IWET = 0 !

2D Temperature (IT2D) 0 ! IT2D = 0 !

2D Density (IRHO) 0 ! IRHO = 0 !

Relative Humidity (IVIS) 1 ! IVIS = 0 !

(relative humidity file is

required for visibility

analysis)

Use data compression option in output file?

(LCOMPRS) Default: T ! LCOMPRS = T !

*

0 = Do not create file, 1 = create file

QA PLOT FILE OUTPUT OPTION:

Create a standard series of output files (e.g.

locations of sources, receptors, grids ...)

suitable for plotting?

(IQAPLOT) Default: 1 ! IQAPLOT = 1 !

0 = no

1 = yes

DIAGNOSTIC PUFF-TRACKING OUTPUT OPTION:

Puff locations and properties reported to

PFTRAK.DAT file for postprocessing?

(IPFTRAK) Default: 0 ! IPFTRAK = 0 !

0 = no

1 = yes, update puff output at end of each timestep

2 = yes, update puff output at end of each sampling step

DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

Mass flux across specified boundaries

for selected species reported?

(IMFLX) Default: 0 ! IMFLX = 0 !

0 = no

1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
are specified in Input Group 0)

Mass balance for each species

reported?

(IMBAL) Default: 0 ! IMBAL = 0 !

0 = no

1 = yes (MASSBAL.DAT filename is
specified in Input Group 0)

NUMERICAL RISE OUTPUT OPTION:

Create a file with plume properties for each rise

increment, for each model timestep?

This applies to sources modeled with numerical rise
and is limited to ONE source in the run.

(INRISE) Default: 0 ! INRISE = 0 !

0 = no

1 = yes (RISE.DAT filename is
specified in Input Group 0)

LINE PRINTER OUTPUT OPTIONS:

Print concentrations (ICPRT) Default: 0 ! ICPRT = 0 !

Print dry fluxes (IDPRT) Default: 0 ! IDPRT = 0 !

Print wet fluxes (IWPRT) Default: 0 ! IWPRT = 0 !

(0 = Do not print, 1 = Print)

Concentration print interval

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(ICFRQ) in timesteps Default: 1 ! ICFRQ = 96 !

Dry flux print interval

(IDFRQ) in timesteps Default: 1 ! IDFRQ = 96 !

Wet flux print interval

(IWFRQ) in timesteps Default: 1 ! IWFRQ = 1 !

Units for Line Printer Output

(IPRTU) Default: 1 ! IPRTU = 5 !

for for

Concentration Deposition

1 = g/m**3 g/m**2/s

2 = mg/m**3 mg/m**2/s

3 = ug/m**3 ug/m**2/s

4 = ng/m**3 ng/m**2/s

5 = Odour Units

6 = TBq/m**3 TBq/m**2/s TBq=terabecquerel

7 = GBq/m**3 GBq/m**2/s GBq=gigabecquerel

8 = Bq/m**3 Bq/m**2/s Bq=becquerel (disintegrations/s)

Messages tracking progress of run

written to the screen ?

(IMESG) Default: 2 ! IMESG = 2 !

0 = no

1 = yes (advection step, puff ID)

2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)

SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

---- CONCENTRATIONS ---- ----- DRY FLUXES ----- ----- WET FLUXES ----- -- MASS FLUX --

SPECIES

/GROUP PRINTED? SAVED ON DISK? PRINTED? SAVED ON DISK? PRINTED? SAVED ON DISK? SAVED ON DISK?

! ODOR = 0, 1, 0, 0, 0, 0, 0!

Note: Species BCON (for MBCON > 0) does not need to be saved on disk.

OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

Logical for debug output

(LDEBUG) Default: F ! LDEBUG = F !

First puff to track

(IPFDEB) Default: 1 ! IPFDEB = 1 !

Number of puffs to track

(NPFDEB) Default: 1 ! NPFDEB = 1 !

Met. period to start output

(NN1) Default: 1 ! NN1 = 1 !

Met. period to end output

(NN2) Default: 10 ! NN2 = 10 !

!END!

INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs

Subgroup (6a)

Number of terrain features (NHILL) Default: 0 ! NHILL = 0 !

Number of special complex terrain

receptors (NCTREC) Default: 0 ! NCTREC = 0 !

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Terrain and CTSG Receptor data for

CTSG hills input in CTDM format ?

(MHILL) No Default ! MHILL = 2 !

1 = Hill and Receptor data created

by CTDM processors & read from

HILL.DAT and HILLRCT.DAT files

2 = Hill data created by OPTHILL &

input below in Subgroup (6b);

Receptor data in Subgroup (6c)

Factor to convert horizontal dimensions Default: 1.0 ! XHILL2M = 1.0 !

to meters (MHILL=1)

Factor to convert vertical dimensions Default: 1.0 ! ZHILL2M = 1.0 !

to meters (MHILL=1)

X-origin of CTDM system relative to No Default ! XCTDMKM = 0 !

CALPUFF coordinate system, in Kilometers (MHILL=1)

Y-origin of CTDM system relative to No Default ! YCTDMKM = 0 !

CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

Subgroup (6b)

1 **

HILL information

HILL	XC	YC	THETAH	ZGRID	RELIEF	EXPO 1	EXPO 2	SCALE 1	SCALE 2	AMAX1	AMAX2
NO.	(km)	(km)	(deg.)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)

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Subgroup (6c)

COMPLEX TERRAIN RECEPTOR INFORMATION

XRCT	YRCT	ZRCT	XHH
(km)	(km)	(m)	
-----	-----	-----	----

1

Description of Complex Terrain Variables:

XC, YC = Coordinates of center of hill

THETAH = Orientation of major axis of hill (clockwise from
North)

ZGRID = Height of the 0 of the grid above mean sea
level

RELIEF = Height of the crest of the hill above the grid elevation

EXPO 1 = Hill-shape exponent for the major axis

EXPO 2 = Hill-shape exponent for the major axis

SCALE 1 = Horizontal length scale along the major axis

SCALE 2 = Horizontal length scale along the minor axis

AMAX = Maximum allowed axis length for the major axis

BMAX = Maximum allowed axis length for the major axis

XRCT, YRCT = Coordinates of the complex terrain receptors

ZRCT = Height of the ground (MSL) at the complex terrain
Receptor

XHH = Hill number associated with each complex terrain receptor
(NOTE: MUST BE ENTERED AS A REAL NUMBER)

**

NOTE: DATA for each hill and CTSG receptor are treated as a separate
input subgroup and therefore must end with an input group terminator.

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INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases

SPECIES	DIFFUSIVITY	ALPHA STAR	REACTIVITY	MESOPHYLL RESISTANCE	HENRY'S LAW COEFFICIENT
NAME	(cm**2/s)		(s/cm)	(dimensionless)	
* SO2 =	.1509,	1000.0,	8.0,	.0,	.04 *
* NO =	.1345,	1.0,	2.0,	25.0,	18.0 *
* NO2 =	.1656,	1.0,	8.0,	5.0,	3.5 *
* HNO3 =	.1628,	1.0,	18.0,	.0,	.0000001 *

!END!

INPUT GROUP: 8 -- Size parameters for dry deposition of particles

For SINGLE SPECIES, the mean and standard deviation are used to compute a deposition velocity for NINT (see group 9) size-ranges, and these are then averaged to obtain a mean deposition velocity.

For GROUPED SPECIES, the size distribution should be explicitly specified (by the 'species' in the group), and the standard deviation for each should be entered as 0. The model will then use the deposition velocity for the stated mean diameter.

SPECIES	GEOMETRIC MASS MEAN	GEOMETRIC STANDARD
NAME	DIAMETER	DEVIATION
	(microns)	(microns)

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*	SO4 =	.48,	2.0 *
*	NO3 =	.48,	2.0 *
*	PM10 =	.48,	2.0 *

!END!

INPUT GROUP: 9 -- Miscellaneous dry deposition parameters

Reference cuticle resistance (s/cm)

(RCUTR) Default: 30 ! RCUTR = 30.0 !

Reference ground resistance (s/cm)

(RGR) Default: 10 ! RGR = 10.0 !

Reference pollutant reactivity

(REACTR) Default: 8 ! REACTR = 8.0 !

Number of particle-size intervals used to

evaluate effective particle deposition velocity

(NINT) Default: 9 ! NINT = 9 !

Vegetation state in unirrigated areas

(IVEG) Default: 1 ! IVEG = 1 !

IVEG=1 for active and unstressed vegetation

IVEG=2 for active and stressed vegetation

IVEG=3 for inactive vegetation

!END!

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INPUT GROUP: 10 -- Wet Deposition Parameters

Scavenging Coefficient -- Units: (sec)**(-1)

Pollutant	Liquid Precip.	Frozen Precip.
-----	-----	-----
* SO2 =	3.0E-05,	0.0E00 *
* SO4 =	1.0E-04,	3.0E-05 *
* NO =	0.0E00,	0.0E00 *
* NO2 =	0.0E00,	0.0E00 *
* HNO3 =	6.0E-05,	0.0E00 *
* NO3 =	1.0E-04,	3.0E-05 *
* PM10 =	1.0E-04,	3.0E-05 *

!END!

INPUT GROUP: 11a, 11b -- Chemistry Parameters

Subgroup (11a)

Several parameters are needed for one or more of the chemical transformation mechanisms. Those used for each mechanism are:

S
M B R O
A B R R R C H 4 B N
B V C N N N M K - - C O D
C M G K I I I H H I I K F V E
M K N N N T T T 2 2 S S P R C C
O O H H H E E E O O R R M A N A

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Mechanism (MCHEM) Z 3 3 3 3 1 2 3 2 2 P P F C X Y

0 None

1 MESOPUFF II X X . . X X X X

2 User Rates

3 RIVAD X X . . X

4 SOA X X X X X .

5 Radioactive Decay X

6 RIVAD/ISORRPIA X X X X X X . . X X X X

7 RIVAD/ISORRPIA/SOA X X X X X X . . X X X X X X . .

Ozone data input option (MOZ) Default: 1 ! MOZ = 0 !

(Used only if MCHEM = 1,3,4,6, or 7)

0 = use a monthly background ozone value

1 = read hourly ozone concentrations from
the OZONE.DAT data file

Monthly ozone concentrations in ppb (BCKO3)

(Used only if MCHEM = 1,3,4,6, or 7 and either

MOZ = 0, or

MOZ = 1 and all hourly O3 data missing)

Default: 12*80.

! BCKO3 = 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00, 80.00 !

Ammonia data option (MNH3) Default: 0 ! MNH3 = 0 !

(Used only if MCHEM = 6 or 7)

0 = use monthly background ammonia values (BCKNH3) - no vertical variation

1 = read monthly background ammonia values for each layer from
the NH3Z.DAT data file

Ammonia vertical averaging option (MAVGNH3)

(Used only if MCHEM = 6 or 7, and MNH3 = 1)

0 = use NH3 at puff center height (no averaging is done)

1 = average NH3 values over vertical extent of puff

Default: 1 ! MAVGNH3 = 1 !

Monthly ammonia concentrations in ppb (BCKNH3)

(Used only if MCHEM = 1 or 3, or

if MCHEM = 6 or 7, and MNH3 = 0)

Default: 12*10.

! BCKNH3 = 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00, 10.00 !

Nighttime SO2 loss rate in %/hour (RNITE1)

(Used only if MCHEM = 1, 6 or 7)

This rate is used only at night for MCHEM=1

and is added to the computed rate both day

and night for MCHEM=6,7 (heterogeneous reactions)

Default: 0.2 ! RNITE1 = .2 !

Nighttime NOx loss rate in %/hour (RNITE2)

(Used only if MCHEM = 1)

Default: 2.0 ! RNITE2 = 2.0 !

Nighttime HNO3 formation rate in %/hour (RNITE3)

(Used only if MCHEM = 1)

Default: 2.0 ! RNITE3 = 2.0 !

H2O2 data input option (MH2O2) Default: 1 ! MH2O2 = 1 !

(Used only if MCHEM = 6 or 7, and MAQCHEM = 1)

0 = use a monthly background H2O2 value

1 = read hourly H2O2 concentrations from

the H2O2.DAT data file

Monthly H2O2 concentrations in ppb (BCKH2O2)

(Used only if MQACHEM = 1 and either

MH2O2 = 0 or

MH2O2 = 1 and all hourly H2O2 data missing)

Default: 12*1.

! BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !

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--- Data for ISORROPIA Option

(used only if MCHEM = 6 or 7)

Minimum relative humidity used in ISORROPIA computations (RH_ISRP)

Default: 50. ! RH_ISRP = 50.0 !

Units: %

Minimum SO₄ used in ISORROPIA computations (SO₄_ISRP)

Default: 0.4 ! SO₄_ISRP = 0.4 !

Units: ug/m³

--- Data for SECONDARY ORGANIC AEROSOL (SOA) Options

(used only if MCHEM = 4 or 7)

The MCHEM = 4 SOA module uses monthly values of:

Fine particulate concentration in ug/m³ (BCKPMF)

Organic fraction of fine particulate (OFRAC)

VOC / NOX ratio (after reaction) (VCNX)

The MCHEM = 7 SOA module uses monthly values of:

Fine particulate concentration in ug/m³ (BCKPMF)

Organic fraction of fine particulate (OFRAC)

These characterize the air mass when computing

the formation of SOA from VOC emissions.

Typical values for several distinct air mass types are:

Month	1	2	3	4	5	6	7	8	9	10	11	12
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Clean Continental

BCKPMF	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
--------	----	----	----	----	----	----	----	----	----	----	----	----

OFRAC	.15	.15	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
-------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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Clean Marine (surface)

BCKPMF .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5 .5
OFRAC .25 .25 .30 .30 .30 .30 .30 .30 .30 .30 .30 .25
VCNX 50. 50. 50. 50. 50. 50. 50. 50. 50. 50. 50. 50.

Urban - low biogenic (controls present)

BCKPMF 30. 30. 30. 30. 30. 30. 30. 30. 30. 30. 30. 30.
OFRAC .20 .20 .25 .25 .25 .25 .25 .25 .20 .20 .20 .20
VCNX 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4.

Urban - high biogenic (controls present)

BCKPMF 60. 60. 60. 60. 60. 60. 60. 60. 60. 60. 60. 60.
OFRAC .25 .25 .30 .30 .30 .55 .55 .55 .35 .35 .35 .25
VCNX 15. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15.

Regional Plume

BCKPMF 20. 20. 20. 20. 20. 20. 20. 20. 20. 20. 20. 20.
OFRAC .20 .20 .25 .35 .25 .40 .40 .40 .30 .30 .30 .20
VCNX 15. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15. 15.

Urban - no controls present

BCKPMF 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100.
OFRAC .30 .30 .35 .35 .35 .55 .55 .55 .35 .35 .35 .30
VCNX 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.

Default: Clean Continental

! BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00!
! OFRAC = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15!
! VCNX = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00!

--- End Data for SECONDARY ORGANIC AEROSOL (SOA) Options

Number of half-life decay specification blocks provided in Subgroup 11b

(Used only if MCHEM = 5)

(NDECAY) Default: 0 !NDECAY = 0!

!END!

Subgroup (11b)

Each species modeled may be assigned a decay half-life (sec), and the associated mass lost may be assigned to one or more other modeled species using a mass yield factor. This information is used only for MCHM=5.

Provide NDECAY blocks assigning the half-life for a parent species and mass yield factors for each child species (if any) produced by the decay.

Set HALF_LIFE=0.0 for NO decay (infinite half-life).

	a	b
SPECIES	Half-Life	Mass Yield
NAME	(sec)	Factor
-----	-----	-----
* SPEC1	= 3600.,	-1.0 * (Parent)
* SPEC2	= -1.0,	0.0 * (Child)

END

a

Specify a half life that is greater than or equal to zero for 1 parent species in each block, and set the yield factor for this species to -1

b

Specify a yield factor that is greater than or equal to zero for 1 or more child species in each block, and set the half-life for each of these species to -1

NOTE: Assignments in each block are treated as a separate input

subgroup and therefore must end with an input group terminator.

If NDECAY=0, no assignments and input group terminators should appear.

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INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters

Horizontal size of puff (m) beyond which
time-dependent dispersion equations (Heffter)
are used to determine sigma-y and
sigma-z (SYTDEP) Default: 550. !SYTDEP = 5.5E02 !

Switch for using Heffter equation for sigma z
as above (0 = Not use Heffter; 1 = use Heffter
(MHFTSZ) Default: 0 !MHFTSZ = 0 !

Stability class used to determine plume
growth rates for puffs above the boundary
layer (JSUP) Default: 5 !JSUP = 5 !

Vertical dispersion constant for stable
conditions (k1 in Eqn. 2.7-3) (CONK1) Default: 0.01 !CONK1 = .01 !

Vertical dispersion constant for neutral/
unstable conditions (k2 in Eqn. 2.7-4)
(CONK2) Default: 0.1 !CONK2 = .1 !

Factor for determining Transition-point from
Schulman-Scire to Huber-Snyder Building Downwash
scheme (SS used for $H_s < H_b + TBD * HL$)
(TBD) Default: 0.5 !TBD = .5 !

TBD < 0 ==> always use Huber-Snyder
TBD = 1.5 ==> always use Schulman-Scire
TBD = 0.5 ==> ISC Transition-point

Range of land use categories for which
urban dispersion is assumed

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(IMIXCTDM) Default: 0 ! IMIXCTDM = 0 !

0 = read PREDICTED mixing heights

1 = read OBSERVED mixing heights

Maximum length of a slug (met. grid units)

(XMXLEN) Default: 1.0 ! XMXLEN = 1.0 !

Maximum travel distance of a puff/slug (in

grid units) during one sampling step

(XSAMLEN) Default: 1.0 ! XSAMLEN = 1.0 !

Maximum Number of slugs/puffs release from

one source during one time step

(MXNEW) Default: 99 ! MXNEW = 99 !

Maximum Number of sampling steps for

one puff/slug during one time step

(MXSAM) Default: 99 ! MXSAM = 99 !

Number of iterations used when computing

the transport wind for a sampling step

that includes gradual rise (for CALMET

and PROFILE winds)

(NCOUNT) Default: 2 ! NCOUNT = 2 !

Minimum sigma y for a new puff/slug (m)

(SYMIN) Default: 1.0 ! SYMIN = 1.0 !

Minimum sigma z for a new puff/slug (m)

(SZMIN) Default: 1.0 ! SZMIN = 1.0 !

Maximum sigma z (m) allowed to avoid

numerical problem in calculating virtual

time or distance. Cap should be large

enough to have no influence on normal events.

Enter a negative cap to disable.

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(SZCAP_M) Default: 5.0e06 ! SZCAP_M = 5.0E06 !

Default minimum turbulence velocities sigma-v and sigma-w

for each stability class over land and over water (m/s)

(SVMIN(12) and SWMIN(12))

```
----- LAND -----      ----- WATER -----  
Stab Class : A  B  C  D  E  F      A  B  C  D  E  F  
-----  
Default SVMIN : .50, .50, .50, .50, .50, .50,   .37, .37, .37, .37, .37, .37  
Default SWMIN : .20, .12, .08, .06, .03, .016,   .20, .12, .08, .06, .03, .016
```

! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.370, 0.370, 0.370, 0.370, 0.370, 0.370 !

! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016, 0.200, 0.120, 0.080, 0.060, 0.030, 0.016 !

Divergence criterion for dw/dz across puff

used to initiate adjustment for horizontal

convergence (1/s)

Partial adjustment starts at CDIV(1), and

full adjustment is reached at CDIV(2)

(CDIV(2)) Default: 0.0,0.0 ! CDIV = .0, .0 !

Search radius (number of cells) for nearest

land and water cells used in the subgrid

TIBL module

(NLUTIBL) Default: 4 ! NLUTIBL = 4 !

Minimum wind speed (m/s) allowed for

non-calm conditions. Also used as minimum

speed returned when using power-law

extrapolation toward surface

(WSCALM) Default: 0.5 ! WSCALM = .5 !

Maximum mixing height (m)

(XMAXZI) Default: 3000. ! XMAXZI = 3000.0 !

Minimum mixing height (m)

(XMINZI) Default: 50. ! XMINZI = 50.0 !

Temperatures (K) used for defining upper bound of
categories for emissions scale-factors

11 upper bounds (K) are entered; the 12th class has no upper limit

(TKCAT(11))

Default : 265., 270., 275., 280., 285., 290., 295., 300., 305., 310., 315. (315.+)

< < < < < < < < < <

Temperature Class: 1 2 3 4 5 6 7 8 9 10 11 (12)

! TKCAT = 265., 270., 275., 280., 285., 290., 295., 300., 305., 310., 315.!

Wind Speeds (m/s) used for defining upper bound of
categories for emissions scale-factors

5 upper bounds (m/s) are entered; the 6th class has no upper limit

(WSCAT(5)) Default :

ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8 (10.8+)

Wind Speed Class: 1 2 3 4 5

! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

Default wind speed profile power-law

exponents for stabilities 1-6

(PLX0(6)) Default : ISC RURAL values

ISC RURAL : .07, .07, .10, .15, .35, .55

ISC URBAN : .15, .15, .20, .25, .30, .30

Stability Class: A B C D E F

! PLX0 = 0.15, 0.15, 0.20, 0.25, 0.30, 0.30 !

Default potential temperature gradient

for stable classes E, F (degK/m)

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(PTG0(2)) Default: 0.020, 0.035

! PTG0 = 0.020, 0.035 !

Default plume path coefficients for
each stability class (used when option
for partial plume height terrain adjustment
is selected -- MCTADJ=3)

(PPC(6)) Stability Class : A B C D E F

Default PPC : .50, .50, .50, .50, .35, .35

--- --- --- --- --- ---

! PPC = 0.50, 0.50, 0.50, 0.50, 0.35, 0.35 !

Slug-to-puff transition criterion factor

equal to sigma-y/length of slug

(SL2PF) Default: 10. ! SL2PF = 10.0 !

Receptor-specific puff/slug properties (e.g., sigmas and height above ground at the time when the trajectory is nearest the receptor) may be extrapolated forward or backward in time along the current step using the current dispersion, for receptors that lie upwind of the puff/slug position at the start of a step, or downwind at the end of a step. Specify the upwind/downwind extrapolation zone in sigma-y units. Using FCLIP=1.0 clips the the upwind zone at one sigma-y at the start of the step and the downwind zone at one sigma-y at the end of the step. This is consistent with the sampling done in CALPUFF versions through v6.42 prior to the introduction of the FCLIP option. The default is No Extrapolation, FCLIP=0.0.

(FCLIP) Default: 0.0 ! FCLIP = 0.0 !

Puff-splitting control variables -----

VERTICAL SPLIT

Number of puffs that result every time a puff
is split - nsplit=2 means that 1 puff splits

into 2

(NSPLIT) Default: 3 ! NSPLIT = 3 !

Time(s) of a day when split puffs are eligible to
be split once again; this is typically set once
per day, around sunset before nocturnal shear develops.
24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)

0=do not re-split 1=eligible for re-split

(IRESPLIT(24)) Default: Hour 17 = 1

! IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0 !

Split is allowed only if last hour's mixing

height (m) exceeds a minimum value

(ZISPLIT) Default: 100. ! ZISPLIT = 100.0 !

Split is allowed only if ratio of last hour's

mixing ht to the maximum mixing ht experienced

by the puff is less than a maximum value (this

postpones a split until a nocturnal layer develops)

(ROLDMAX) Default: 0.25 ! ROLDMAX = 0.25 !

HORIZONTAL SPLIT

Number of puffs that result every time a puff

is split - nsplith=5 means that 1 puff splits

into 5

(NSPLITH) Default: 5 ! NSPLITH = 5 !

Minimum sigma-y (Grid Cells Units) of puff

before it may be split

(SYSPLITH) Default: 1.0 ! SYSPLITH = 1.0 !

Minimum puff elongation rate (SYSPLITH/hr) due to

wind shear, before it may be split

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(SHSPLITH) Default: 2. !SHSPLITH = 2.0 !

Minimum concentration (g/m^3) of each

species in puff before it may be split

Enter array of NSPEC values; if a single value is

entered, it will be used for ALL species

(CNSPLITH) Default: 1.0E-07 !CNSPLITH = 1.0E-07 !

Integration control variables -----

Fractional convergence criterion for numerical SLUG

sampling integration

(EPSSLUG) Default: 1.0e-04 !EPSSLUG = 1.0E-04 !

Fractional convergence criterion for numerical AREA

source integration

(EPSAREA) Default: 1.0e-06 !EPSAREA = 1.0E-06 !

Trajectory step-length (m) used for numerical rise

integration

(DSRISE) Default: 1.0 !DSRISE = 1.0 !

Boundary Condition (BC) Puff control variables -----

Minimum height (m) to which BC puffs are mixed as they are emitted

(MBCON=2 ONLY). Actual height is reset to the current mixing height

at the release point if greater than this minimum.

(HTMINBC) Default: 500. !HTMINBC = 500.0 !

Search radius (km) about a receptor for sampling nearest BC puff.

BC puffs are typically emitted with a spacing of one grid cell

length, so the search radius should be greater than DGRIDKM.

(RSAMPBC) Default: 10. !RSAMPBC = 10.0 !

Near-Surface depletion adjustment to concentration profile used when

sampling BC puffs?

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(MDEPBC) Default: 1 ! MDEPBC = 1 !

0 = Concentration is NOT adjusted for depletion

1 = Adjust Concentration for depletion

!END!

INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters

Subgroup (13a)

Number of point sources with
parameters provided below (NPT1) No default ! NPT1 = 5 !

Units used for point source
emissions below (IPTU) Default: 1 ! IPTU = 5 !

- 1 = g/s
- 2 = kg/hr
- 3 = lb/hr
- 4 = tons/yr
- 5 = Odour Unit * m**3/s (vol. flux of odour compound)
- 6 = Odour Unit * m**3/min
- 7 = metric tons/yr
- 8 = Bq/s (Bq = becquerel = disintegrations/s)
- 9 = GBq/yr

Number of source-species
combinations with variable
emissions scaling factors

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provided below in (13d) (NSPT1) Default: 0 ! NSPT1 = 5 !

Number of point sources with

variable emission parameters

provided in external file (NPT2) No default ! NPT2 = 0 !

(If NPT2 > 0, these point

source emissions are read from

the file: PTEMARB.DAT)

!END!

Subgroup (13b)

a

POINT SOURCE: CONSTANT DATA

b c

Source	X	Y	Stack	Base	Stack	Exit	Exit	Bldg.	Emission
No.	Coordinate	Coordinate	Height	Elevation	Diameter	Vel.	Temp.	Dwash	Rates
	(km)	(km)	(m)	(m)	(m)	(m/s)	(deg. K)		

1 ! SRCNAM = BTF !

1 ! X = 303.279, 6265.224, 14.00, 28.00, 0.75, 14.260, 291.00, 0.0, 12599.750 !

1 ! ZPLTFM = .0 !

1 ! FMFAC = 1.0 ! !END!

2 ! SRCNAM = New_BTF !

2 ! X = 303.408, 6265.071, 14.00, 26.00, 0.62, 14.997, 291.00, 0.0, 2263.889 !

2 ! ZPLTFM = .0 !

2 ! FMFAC = 1.0 ! !END!

3 ! SRCNAM = SPSV1 !

3 ! X = 303.356, 6265.193, 9.00, 25.00, 0.30, 1.179, 291.00, 0.0, 833.333 !

3 ! ZPLTFM = .0 !

3 ! FMFAC = 1.0 ! !END!

4 ! SRCNAM = SPSV2 !

4!X= 303.357,6265.194, 9.00, 25.00, 0.30, 1.179,291.00, 0.0,833.333!

4!ZPLTFM = .0!

4!FMFAC = 1.0! !END!

5!SRCNAM = SPSV3!

5!X= 303.359,6265.195, 9.00, 25.00, 0.30, 1.179,291.00, 0.0,833.333!

5!ZPLTFM = .0!

5!FMFAC = 1.0! !END!

a

Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

SRCNAM is a 12-character name for a source

(No default)

X is an array holding the source data listed by the column headings

(No default)

SIGYZI is an array holding the initial sigma-y and sigma-z (m)

(Default: 0.,0.)

FMFAC is a vertical momentum flux factor (0. or 1.0) used to represent

the effect of rain-caps or other physical configurations that
reduce momentum rise associated with the actual exit velocity.

(Default: 1.0 -- full momentum used)

ZPLTFM is the platform height (m) for sources influenced by an isolated

structure that has a significant open area between the surface
and the bulk of the structure, such as an offshore oil platform.

The Base Elevation is that of the surface (ground or ocean),
and the Stack Height is the release height above the Base (not
above the platform). Building heights entered in Subgroup 13c
must be those of the buildings on the platform, measured from
the platform deck. ZPLTFM is used only with MBDW=1 (ISC
downwash method) for sources with building downwash.

(Default: 0.0)

b

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0. = No building downwash modeled

1. = Downwash modeled for buildings resting on the surface

2. = Downwash modeled for buildings raised above the surface (ZPLTFM > 0.)

NOTE: must be entered as a REAL number (i.e., with decimal point)

c

An emission rate must be entered for every pollutant modeled.

Enter emission rate of zero for secondary pollutants that are

modeled, but not emitted. Units are specified by IPTU

(e.g. 1 for g/s).

Subgroup (13c)

BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH

Source

a

No. Effective building height, width, length and X/Y offset (in meters)

every 10 degrees. LENGTH, XBADJ, and YBADJ are only needed for

MBDW=2 (PRIME downwash option)

1 * SRCNAM = STK1 *

1 * HEIGHT = 16.00, 16.00, 16.00, 16.00, 16.00, 16.00,

16.00, 16.00, 16.00, 16.00, 16.00, 16.00,

16.00, 16.00, 16.00, 16.00, 16.00, 16.00,

16.00, 16.00, 16.00, 16.00, 16.00, 16.00,

16.00, 16.00, 35.00, 35.00, 35.00, 16.00,

16.00, 16.00, 16.00, 16.00, 16.00, 16.00 *

1 * WIDTH = 148.62, 128.00, 173.25, 213.24, 246.75, 289.75,

330.06, 360.34, 379.67, 387.46, 393.50, 401.68,

397.66, 381.55, 353.84, 315.39, 267.35, 211.19,

148.62, 128.00, 173.25, 213.24, 246.75, 289.75,

330.06, 360.34, 39.66, 39.49, 39.94, 401.68,

397.66, 381.55, 353.84, 315.39, 267.35, 211.19 *

1 * LENGTH = 387.46, 393.50, 401.68, 397.66, 381.55, 353.84,

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315.39, 267.35, 211.19, 148.62, 128.00, 173.25,
213.24, 246.75, 289.75, 330.06, 360.34, 379.67,
387.46, 393.50, 401.68, 397.66, 381.55, 353.84,
315.39, 267.35, 18.37, 11.88, 11.21, 173.25,
213.24, 246.75, 289.75, 330.06, 360.34, 379.67 *
1 * XBADJ = -291.24, -280.58, -273.10, -257.31, -233.71, -203.01,
-166.14, -124.22, -78.53, -30.45, -0.69, -0.42,
-0.14, 0.15, -16.56, -38.87, -60.01, -79.32,
-96.22, -112.92, -128.59, -140.34, -147.83, -150.83,
-149.25, -143.13, -183.53, -183.90, -181.79, -172.83,
-213.10, -246.90, -273.19, -291.18, -300.33, -300.35 *
1 * YBADJ = -43.86, -63.31, -86.20, -106.48, -123.52, -128.31,
-126.15, -120.16, -110.52, -97.51, -83.83, -72.25,
-58.49, -42.94, -26.09, -8.44, 9.46, 27.07,
43.86, 63.31, 86.20, 106.48, 123.52, 128.31,
126.15, 120.16, 36.30, 5.49, -25.74, 72.26,
58.49, 42.94, 26.09, 8.44, -9.46, -27.07 *

END

a

Building height, width, length, and X/Y offset from the source are treated as a separate input subgroup for each source and therefore must end with an input group terminator. The X/Y offset is the position, relative to the stack, of the center of the upwind face of the projected building, with the x-axis pointing along the flow direction.

Subgroup (13d)

a

POINT SOURCE: EMISSION-RATE SCALING FACTORS

Use this subgroup to identify temporal variations in the emission

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rates given in 13b. Factors assigned multiply the rates in 13b.

Skip sources here that have constant emissions. For more elaborate variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

Sets of emission-rate scale factors are defined in Input Group 19, and are referenced by the FACTORNAME. Provide NSPT1 lines that identify the emission-rate scale factor table for each source-species combination that uses the scaling option. Note that a scale-factor table can be used with more than one source-species combination so a FACTORNAME can be repeated.

Source- Species No.	Source Name (SRCNAM)	Species Name (CSPEC)	Scale-factor table Name (FACTORNAME)

1	! SCALEFACTOR = BTF,	ODOR,	POINTS1 ! !END!
2	! SCALEFACTOR = NEW_BT,	ODOR,	POINTS1 ! !END!
3	! SCALEFACTOR = SPSV1,	ODOR,	POINTS1 ! !END!
4	! SCALEFACTOR = SPSV2,	ODOR,	POINTS1 ! !END!
5	! SCALEFACTOR = SPSV3,	ODOR,	POINTS1 ! !END!

a

Assignment for each source-specie is treated as a separate input subgroup and therefore must end with an input group terminator.

b

Source name must match one of the SRCNAM names defined in Input Group 13b

c

Species name must match one of the CSPEC names of emitted species defined in Input Group 3

d

Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

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INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters

Subgroup (14a)

Number of polygon area sources with

parameters specified below (NAR1) No default ! NAR1 = 16 !

Units used for area source

emissions below (IARU) Default: 1 ! IARU = 5 !

1 = g/m**2/s

2 = kg/m**2/hr

3 = lb/m**2/hr

4 = tons/m**2/yr

5 = Odour Unit * m/s (vol. flux/m**2 of odour compound)

6 = Odour Unit * m/min

7 = metric tons/m**2/yr

8 = Bq/m**2/s (Bq = becquerel = disintegrations/s)

9 = GBq/m**2/yr

Number of source-species

combinations with variable

emissions scaling factors

provided below in (14d) (NSAR1) Default: 0 ! NSAR1 = 16 !

Number of buoyant polygon area sources

with variable location and emission

parameters (NAR2) No default ! NAR2 = 0 !

(If NAR2 > 0, ALL parameter data for

these sources are read from the file: BAEMARB.DAT)

!END!

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Subgroup (14b)

a

AREA SOURCE: CONSTANT DATA

b

Source	Effect.	Base	Initial	Emission
No.	Height	Elevation	Sigma z	Rates
	(m)	(m)	(m)	

1 ! SRCNAM = BIORCTR !

1 ! X = 7.00, 25.00, 1.00, 0.500 !

!END!

2 ! SRCNAM = MBR !

2 ! X = 7.00, 25.00, 1.00, 0.500 !

!END!

3 ! SRCNAM = IWS !

3 ! X = 6.00, 28.00, 1.00, 0.400 !

!END!

4 ! SRCNAM = SL !

4 ! X = 4.00, 28.00, 1.00, 0.800 !

!END!

5 ! SRCNAM = SB !

5 ! X = 2.00, 28.00, 1.00, 0.050 !

!END!

6 ! SRCNAM = GB !

6 ! X = 2.00, 28.00, 1.00, 0.050 !

!END!

7 ! SRCNAM = MPU !

7 ! X = 3.00, 30.00, 1.00, 0.800 !

!END!

8 ! SRCNAM = MPS !

8 ! X = 3.00, 30.00, 1.00, 0.400 !

!END!

9 ! SRCNAM = PST !

9 ! X = 2.00, 30.00, 1.00, 0.250 !

!END!

10 ! SRCNAM = AGS1 !

10 ! X = 1.00, 30.00, 1.00, 0.300 !

!END!

11 ! SRCNAM = AGS2 !

11 ! X = 1.00, 29.00, 1.00, 0.300 !

!END!

12 ! SRCNAM = AGS3 !

12 ! X = 1.00, 29.00, 1.00, 0.300 !

!END!

13 ! SRCNAM = AGS4 !

13 ! X = 1.00, 29.00, 1.00, 3.000 !

!END!

14 ! SRCNAM = WLT !

14 ! X = 1.00, 29.00, 1.00, 1.500 !

!END!

15 ! SRCNAM = SBT !

15 ! X = 1.00, 29.00, 1.00, 0.300 !

!END!

16 ! SRCNAM = TPS !

16 ! X = 4.50, 30.00, 1.00, 0.120 !

!END!

a

Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

b

An emission rate must be entered for every pollutant modeled.

Enter emission rate of zero for secondary pollutants that are
modeled, but not emitted. Units are specified by IARU

(e.g. 1 for g/m**2/s).

Subgroup (14c)

COORDINATES (km) FOR EACH VERTEX(4) OF EACH POLYGON

Source	a
--------	---

No. Ordered list of X followed by list of Y, grouped by source

1 ! SRCNAM = BIORCTR !

1 ! XVERT = 303.413, 303.379, 303.437, 303.470 !

1 ! YVERT = 6264.933, 6264.981, 6265.020, 6264.972 !

!END!

2 ! SRCNAM = MBR !

2 ! XVERT = 303.385, 303.370, 303.394, 303.409 !

2 ! YVERT = 6264.916, 6264.937, 6264.954, 6264.933 !

!END!

3 ! SRCNAM = IWS !

3 ! XVERT = 303.487, 303.460, 303.466, 303.493 !

3 ! YVERT = 6265.162, 6265.200, 6265.205, 6265.167 !

!END!

4 ! SRCNAM = SL !

4 ! XVERT = 303.479, 303.472, 303.473, 303.480 !

4 ! YVERT = 6265.189, 6265.198, 6265.198, 6265.189 !

!END!

5 ! SRCNAM = SB !

5 ! XVERT = 303.480, 303.475, 303.477, 303.482 !

5 ! YVERT = 6265.190, 6265.197, 6265.199, 6265.192 !

!END!

6 ! SRCNAM = GB !

6 ! XVERT = 303.492, 303.487, 303.489, 303.494 !

6 ! YVERT = 6265.174, 6265.181, 6265.182, 6265.176 !

!END!

7 ! SRCNAM = MPU !

7 ! XVERT = 303.447, 303.446, 303.461, 303.462 !

7 ! YVERT = 6265.043, 6265.045, 6265.057, 6265.054 !

!END!

8 ! SRCNAM = MPS !

8 ! XVERT = 303.454, 303.445, 303.465, 303.475 !

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8 ! YVERT = 6265.029, 6265.041, 6265.056, 6265.044 !

!END!

9 ! SRCNAM = PST !

9 ! XVERT = 303.471, 303.466, 303.469, 303.474 !

9 ! YVERT = 6265.048, 6265.054, 6265.056, 6265.050 !

!END!

10 ! SRCNAM = AGS1 !

10 ! XVERT = 303.354, 303.331, 303.351, 303.375 !

10 ! YVERT = 6264.975, 6265.007, 6265.022, 6264.989 !

!END!

11 ! SRCNAM = AGS2 !

11 ! XVERT = 303.375, 303.351, 303.372, 303.395 !

11 ! YVERT = 6264.989, 6265.022, 6265.036, 6265.004 !

!END!

12 ! SRCNAM = AGS3 !

12 ! XVERT = 303.395, 303.372, 303.392, 303.415 !

12 ! YVERT = 6265.004, 6265.036, 6265.051, 6265.018 !

!END!

13 ! SRCNAM = AGS4 !

13 ! XVERT = 303.415, 303.392, 303.413, 303.435 !

13 ! YVERT = 6265.018, 6265.051, 6265.065, 6265.033 !

!END!

14 ! SRCNAM = WLT !

14 ! XVERT = 303.420, 303.413, 303.417, 303.425 !

14 ! YVERT = 6265.055, 6265.065, 6265.068, 6265.058 !

!END!

15 ! SRCNAM = SBT !

15 ! XVERT = 303.425, 303.417, 303.426, 303.433 !

15 ! YVERT = 6265.058, 6265.068, 6265.074, 6265.065 !

!END!

16 ! SRCNAM = TPS !

16 ! XVERT = 303.450, 303.442, 303.447, 303.456 !

16 ! YVERT = 6265.071, 6265.083, 6265.087, 6265.076 !

!END!

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a

Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

Subgroup (14d)

a

AREA SOURCE: EMISSION-RATE SCALING FACTORS

Use this subgroup to identify temporal variations in the emission
rates given in 14b. Factors assigned multiply the rates in 14b.
Skip sources here that have constant emissions. For more elaborate
variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

Sets of emission-rate scale factors are defined in Input Group 19, and
are referenced by the FACTORNAME. Provide NSAR1 lines that identify the
emission-rate scale factor table for each source-species combination that
uses the scaling option. Note that a scale-factor table can be used with
more than one source-species combination so a FACTORNAME can be repeated.

Source- Species No.	Source Name (SRCNAM)	Species Name (CSPEC)	Scale-factor table Name (FACTORNAME)
1	BIORCTR,	ODOR,	AREAS1 ! !END!
2	MBR,	ODOR,	AREAS1 ! !END!
3	IWS,	ODOR,	AREAS1 ! !END!
4	SL,	ODOR,	AREAS1 ! !END!
5	SB,	ODOR,	AREAS1 ! !END!
6	GB,	ODOR,	AREAS1 ! !END!
7	MPU,	ODOR,	AREAS1 ! !END!
8	MPS,	ODOR,	AREAS1 ! !END!

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```
9 ! SCALEFACTOR = PST,    ODOR,    AREAS1    ! !END!
10 ! SCALEFACTOR = AGS1,   ODOR,    AREAS1    ! !END!
11 ! SCALEFACTOR = AGS2,   ODOR,    AREAS1    ! !END!
12 ! SCALEFACTOR = AGS3,   ODOR,    AREAS1    ! !END!
13 ! SCALEFACTOR = AGS4,   ODOR,    AREAS1    ! !END!
14 ! SCALEFACTOR = WLT,    ODOR,    AREAS1    ! !END!
15 ! SCALEFACTOR = SBT,    ODOR,    AREAS1    ! !END!
16 ! SCALEFACTOR = TPS,    ODOR,    AREAS1    ! !END!
```

a

Assignment for each source-specie is treated as a separate input subgroup
and therefore must end with an input group terminator.

b

Source name must match one of the SRCNAM names defined in Input Group 14b

c

Species name must match one of the CSPEC names of emitted species defined in Input Group 3

d

Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters

Subgroup (15a)

Number of buoyant line sources

with variable location and emission

parameters (NLN2) No default ! NLN2 = 0 !

(If NLN2 > 0, ALL parameter data for

these sources are read from the file: LNEMARB.DAT)

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Number of buoyant line sources (NLINES) No default ! NLINES = 0 !

Units used for line source

emissions below (ILNU) Default: 1 ! ILNU = 1 !

- 1 = g/s
- 2 = kg/hr
- 3 = lb/hr
- 4 = tons/yr
- 5 = Odour Unit * m³/s (vol. flux of odour compound)
- 6 = Odour Unit * m³/min
- 7 = metric tons/yr
- 8 = Bq/s (Bq = becquerel = disintegrations/s)
- 9 = GBq/yr

Number of source-species

combinations with variable

emissions scaling factors

provided below in (15c) (NSLN1) Default: 0 ! NSLN1 = 0 !

Maximum number of segments used to model

each line (MXNSEG) Default: 7 ! MXNSEG = 7 !

The following variables are required only if NLINES > 0. They are
used in the buoyant line source plume rise calculations.

Number of distances at which Default: 6 ! NLRISE = 6 !
transitional rise is computed

Average building length (XL) No default ! XL = .0 !
(in meters)

Average building height (HBL) No default ! HBL = .0 !
(in meters)

Average building width (WBL) No default ! WBL = .0 !

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(in meters)

Average line source width (WML) No default ! WML = .0 !

(in meters)

Average separation between buildings (DXL) No default ! DXL = .0 !

(in meters)

Average buoyancy parameter (FPRIMEL) No default ! FPRIMEL = .0 !

(in m**4/s**3)

!END!

Subgroup (15b)

BUOYANT LINE SOURCE: CONSTANT DATA

a

Source	Beg. X	Beg. Y	End. X	End. Y	Release	Base	Emission
No.	Coordinate	Coordinate	Coordinate	Coordinate	Height	Elevation	Rates
	(km)	(km)	(km)	(m)	(m)		

1 * SRCNAM = L1 *							
1 * X =	100.0,	200.0,	300.0,	400.0,	5.000,	6.000,	7.0E00,
					8.0E00,		
					9.0E00,		
					1.0E01,		
					1.1E01,		
					1.2E01 *		

END

a

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Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

b

An emission rate must be entered for every pollutant modeled.

Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by ILNTU

(e.g. 1 for g/s).

Subgroup (15c)

a

BUOYANT LINE SOURCE: EMISSION-RATE SCALING FACTORS

Use this subgroup to identify temporal variations in the emission rates given in 15b. Factors assigned multiply the rates in 15b.

Skip sources here that have constant emissions. For more elaborate variation in source parameters, use LNEARB.DAT and NLN2 > 0.

Sets of emission-rate scale factors are defined in Input Group 19, and are referenced by the FACTORNAME. Provide NSLN1 lines that identify the emission-rate scale factor table for each source-species combination that uses the scaling option. Note that a scale-factor table can be used with more than one source-species combination so a FACTORNAME can be repeated.

Source-	Source	Species	Scale-factor table
Species	Name b	Name c	Name d
No.	(SRCNAM)	(CSPEC)	(FACTORNAME)

1	* SCALEFACTOR = 1,	SO2,	LINES * *END*

a

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Assignment for each source-specie is treated as a separate input subgroup
and therefore must end with an input group terminator.

b

Source name must match one of the SRCNAM names defined in Input Group 15b

c

Species name must match one of the CSPEC names of emitted species defined in Input Group 3

d

Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters

Subgroup (16a)

Number of volume sources with
parameters provided in 16b,c (NVL1) No default ! NVL1 = 1 !

Units used for volume source
emissions below in 16b (IVLU) Default: 1 ! IVLU = 5 !

- 1 = g/s
- 2 = kg/hr
- 3 = lb/hr
- 4 = tons/yr
- 5 = Odour Unit * m³/s (vol. flux of odour compound)
- 6 = Odour Unit * m³/min
- 7 = metric tons/yr
- 8 = Bq/s (Bq = becquerel = disintegrations/s)
- 9 = GBq/yr

Number of source-species

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combinations with variable

emissions scaling factors

provided below in (16c) (NSVL1) Default: 0 ! NSVL1 = 1 !

Number of volume sources with

variable location and emission

parameters (NVL2) No default ! NVL2 = 0 !

(If NVL2 > 0, ALL parameter data for

these sources are read from the VOLEMARB.DAT file(s))

!END!

Subgroup (16b)

a

VOLUME SOURCE: CONSTANT DATA

b

Source	X	Y	Effect.	Base	Initial	Initial	Emission
No.	Coordinate	Coordinate	Height	Elevation	Sigma y	Sigma z	Rates
	(km)	(km)	(m)	(m)	(m)	(m)	

1 ! SRCNAM = SPSGNDV1 !

1 ! X = 303.346, 6265.203, 1.00, 25.00, 0.50, 0.500, 346.361 !

!END!

a

Data for each source are treated as a separate input subgroup
and therefore must end with an input group terminator.

b

An emission rate must be entered for every pollutant modeled.
Enter emission rate of zero for secondary pollutants that are

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modeled, but not emitted. Units are specified by IVLU

(e.g. 1 for g/s).

Subgroup (16c)

a

VOLUME SOURCE: EMISSION-RATE SCALING FACTORS

Use this subgroup to identify temporal variations in the emission rates given in 16b. Factors assigned multiply the rates in 16b.

Skip sources here that have constant emissions. For more elaborate variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

Sets of emission-rate scale factors are defined in Input Group 19, and are referenced by the FACTORNAME. Provide NSVL1 lines that identify the emission-rate scale factor table for each source-species combination that uses the scaling option. Note that a scale-factor table can be used with more than one source-species combination so a FACTORNAME can be repeated.

Source- Species No.	Source Name (SRCNAM)	Species Name (CSPEC)	Scale-factor table Name (FACTORNAME)

1	!SCALEFACTOR =	SPSGNDV1, ODOR,	VOLUMES1 ! !END!

a

Assignment for each source-specie is treated as a separate input subgroup and therefore must end with an input group terminator.

b

Source name must match one of the SRCNAM names defined in Input Group 16b

c

Species name must match one of the CSPEC names of emitted species defined in Input Group 3

d

Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

INPUT GROUP: 17 -- FLARE source control parameters (variable emissions file)

Number of flare sources defined in FLEMARB.DAT file(s)

(NFL2) Default: 0 !NFL2 = 0 !

(At least 1 FLEMARB.DAT file is needed if NFL2 > 0)

!END!

INPUT GROUPS: 18a, 18b, 18c -- Road Emissions parameters

Subgroup (18a)

Emissions from roads are generated from individual line segments defined by a sequence of coordinates provided for each road-link. Each link is entered as a discrete source and is defined as a section of the road for which emissions are uniform.

A long, winding isolated road might be characterized by a single link made up of many coordinate triples (x,y,z) that describe its pathway. These points should be sufficient to resolve curves, but need not have uniform spacing. For example, a straight flat segment can be defined by 2 points, regardless of the distance covered. Long line segments are automatically

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divided further within the model into segments that are limited by the grid-cell boundaries (no segment may extend across multiple cells).

One emission rate (g/m/s) for each species is used for the entire road.

Near a congested intersection, many short links may be required to resolve the spatial and temporal distribution of emissions. Each is entered and modeled as a discrete source.

Number of road-links with emission parameters

provided in Subgroup 18b (NRD1) No default ! NRD1 = 0 !

Number of road-links with arbitrarily time-varying

emission parameters (NRD2) No default ! NRD2 = 0 !

(If NRD2 > 0, ALL variable road data
are read from the file: RDEMARB.DAT)

Emissions from one or more of the roads presented in Subgroup 18b may vary over time-based cycles or by meteorology. This variability is modeled by applying an emission-rate scale factor specified for particular road links and species in Subgroup 18c.

Number of road links and species combinations

with variable emission-rate scale-factors

(NSFRDS) Default: 0 ! NSFRDS = 0 !

!END!

Subgroup (18b)

a

DATA FOR ROADS WITH CONSTANT OR SCALED EMISSION PARAMETERS

b

Road	Effect.	Initial	Initial	Emission
------	---------	---------	---------	----------

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No.	Height (mAGL)	Sigma z (m)	Sigma y (m)	Rates (g/s/m)
-----	------------------	----------------	----------------	------------------

-----	-----	-----	-----	-----
-------	-------	-------	-------	-------

c

1 * SRCNAM = MAIN_ST_32 *

1 * X = 2.0, 3.0, 4.2, 0.1 *

END

2 * SRCNAM = CENTRAL *

2 * X = 1.0, 1.5, 3.5, 0.03 *

END

a

Data for each of the NRD1 roads are treated as a separate input subgroup and therefore must end with an input group terminator.

b

NSPEC Emission rates must be entered (one for every pollutant modeled).
Enter emission rate of zero for secondary pollutants.

c

Road-source names are entered without spaces, and may be 16 characters long.

Subgroup (18c)

a

EMISSION-RATE SCALING FACTORS

Use this subgroup to identify temporal variations in the emission rates given in 18b. Factors assigned multiply the rates in 18b.

Skip sources here that have constant emissions. For more elaborate variation in source parameters, use RDEMARB.DAT and NRD2 > 0.

Sets of emission-rate scale factors are defined in Input Group 19, and

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are referenced by the FACTORNAME. Provide NSFRDS lines that identify the emission-rate scale factor table for each source-species combination that uses the scaling option. Note that a scale-factor table can be used with more than one source-species combination so a FACTORNAME can be repeated.

Source- Species No.	Source Name (SRCNAM)	Species Name (CSPEC)	Scale-factor table Name (FACTORNAME)

1	* SCALEFACTOR = 1,	PM2.5,	MAJOR_HIGHWAY_004 * *END*

a

Assignment for each source-specie is treated as a separate input subgroup and therefore must end with an input group terminator.

b

Source name must match one of the SRCNAM names defined in Input Group 18b

c

Species name must match one of the CSPEC names of emitted species defined in Input Group 3

d

Scale-factor name must match one of the FACTORNAME names defined in Input Group 19

Subgroup (18d)

a

COORDINATES FOR EACH NAMED ROAD

X	Y	Ground
---	---	--------

Coordinate	Coordinate	Coordinate	Elevation
------------	------------	------------	-----------

No.	(km)	(km)	(m)
-----	------	------	-----

* SRCNAM = MAIN_ST_32 *

* NPTROAD = 8 *

END

1 * XYZ = 0.000, 0.500, 0.000 * *END*

2 * XYZ = 0.087, 0.492, 0.000 * *END*

3 * XYZ = 0.171, 0.470, 0.000 * *END*

4 * XYZ = 0.250, 0.433, 0.000 * *END*

5 * XYZ = 0.321, 0.383, 0.000 * *END*

6 * XYZ = 0.383, 0.321, 0.000 * *END*

7 * XYZ = 0.433, 0.250, 0.000 * *END*

8 * XYZ = 0.470, 0.171, 0.000 * *END*

*SRCNAM = CENTRAL *

*NPTROAD = 4 *

END

1 * XYZ = 1.000, -0.500, 0.000 * *END*

2 * XYZ = 1.021, -0.400, 0.000 * *END*

3 * XYZ = 1.370, 0.400, 0.000 * *END*

4 * XYZ = 1.750, 0.503, 0.000 * *END*

a

Each line of coordinates is treated as a separate input subgroup
and therefore must end with an input group terminator.

INPUT GROUPS: 19a, 19b -- Emission rate scale-factor tables

Use this group to enter variation factors applied to emission rates for any
source-specie combinations that use this feature. The tables of emission-rate
scale factors are referenced by the name assigned to FACTORNAME. These names
do not need to include specific source or species names used in the simulation,
particularly if one factor table is used for many types of sources and species,
but should be descriptive. But if a factor table applies to just one source,

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the reference name for it should generally contain that source-name.

FACTORNAME must NOT include spaces.

The FACTORTYPE for each table must be one of the following:

CONSTANT1 1 scaling factor

MONTH12 12 scaling factors: months 1-12

DAY7 7 scaling factors: days 1-7

 [SUNDAY,MONDAY, ... FRIDAY,SATURDAY]

HOUR24 24 scaling factors: hours 1-24

HOUR24_DAY7 168 scaling factors: hours 1-24,

 repeated 7 times: SUNDAY, MONDAY, ... SATURDAY

HOUR24_MONTH12 288 scaling factors: hours 1-24,

 repeated 12 times: months 1-12

WSP6 6 scaling factors: wind speed classes 1-6

 [speed classes (WSCAT) defined in Group 12]

WSP6_PGCLASS6 36 scaling factors: wind speed classes 1-6

 repeated 6 times: PG classes A,B,C,D,E,F

 [speed classes (WSCAT) defined in Group 12]

TEMPERATURE12 12 scaling factors: temperature classes 1-12

 [temperature classes (TKCAT) defined in Group 12]

The number of tables defined may exceed the number of tables referenced in the input groups for each source type above (for convenience), but tables for all FACTORNAME names referenced must be present here.

Subgroup (19a)

Number of Emission Scale-Factor

tables (NSFTAB) Default: 0 ! NSFTAB = 3 !

!END!

Subgroup (19b)

a,b,c

Enter factors for NSFTAB Emission Scale-Factor tables

```
1 !FACTORNAME = POINTS1      !
1 !FACTORTYPE  = WSP6_PGCLASS6 !
1 !FACTORTABLE = 2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3 !
1 !END!
```

```
2 !FACTORNAME = AREAS1      !
2 !FACTORTYPE  = WSP6_PGCLASS6 !
2 !FACTORTABLE = 2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    1.9,1.9,1.9,1.9,1.9,1.9,
    1.9,1.9,1.9,1.9,1.9,1.9 !
2 !END!
```

```
3 !FACTORNAME = VOLUMES1    !
3 !FACTORTYPE  = WSP6_PGCLASS6 !
3 !FACTORTABLE = 2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3,
    2.3,2.3,2.3,2.3,2.3,2.3 !
3 !END!
```

a

Assignments for each table are treated as a separate input subgroup
and therefore must end with an input group terminator.

b

FACTORNAME must be no longer than 40 characters

c

Spaces are NOT allowed in any FACTORNAME or FACTORTYPE assignment,
and the names are NOT case-sensitive

INPUT GROUPS: 20a, 20b, 20c -- Non-gridded (discrete) receptor information

Subgroup (20a)

Number of non-gridded receptors (NREC) No default ! NREC = 1681 !

Group names can be used to assign receptor locations in
Subgroup 20c and thereby provide an identification that
can be referenced when postprocessing receptors. The
default assignment name X is used when NRGRP = 0.

Number of receptor group names (NRGRP) Default: 0 ! NRGRP = 0 !

!END!

Subgroup (20b)

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Provide a name for each receptor group if NRGRP>0.

Enter NRGRP lines.

a,b

Group Name

1 * RGRPNAM = Group_A * *END*

2 * RGRPNAM = Group_B * *END*

3 * RGRPNAM = Group_C * *END*

4 * RGRPNAM = Group_D * *END*

5 * RGRPNAM = Group_E * *END*

a

Each group name provided is treated as a separate input subgroup

and therefore must end with an input group terminator.

b

Receptor group names must not include blanks.

Subgroup (20c)

a

NON-GRIDDED (DISCRETE) RECEPTOR DATA

c X Y Ground Height b

Receptor Group Coordinate Coordinate Elevation Above Ground

No. Name (km) (km) (m) (m)

1!X = 301.5, 6263.0, 30.523, 0.000! !END!

2!X = 301.6, 6263.0, 28.845, 0.000! !END!

3!X = 301.7, 6263.0, 28.931, 0.000! !END!

4!X = 301.8, 6263.0, 28.098, 0.000! !END!

5!X = 301.9, 6263.0, 28.215, 0.000! !END!

6!X = 302.0, 6263.0, 28.626, 0.000! !END!

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7!X= 302.1, 6263.0, 28.281, 0.000! !END!
8!X= 302.2, 6263.0, 28.917, 0.000! !END!
9!X= 302.3, 6263.0, 29.819, 0.000! !END!
10!X= 302.4, 6263.0, 32.006, 0.000! !END!
11!X= 302.5, 6263.0, 34.812, 0.000! !END!
12!X= 302.6, 6263.0, 37.801, 0.000! !END!
13!X= 302.7, 6263.0, 39.202, 0.000! !END!
14!X= 302.8, 6263.0, 40.256, 0.000! !END!
15!X= 302.9, 6263.0, 42.159, 0.000! !END!
16!X= 303.0, 6263.0, 42.893, 0.000! !END!
17!X= 303.1, 6263.0, 40.598, 0.000! !END!
18!X= 303.2, 6263.0, 39.111, 0.000! !END!
19!X= 303.3, 6263.0, 38.073, 0.000! !END!
20!X= 303.4, 6263.0, 37.506, 0.000! !END!
21!X= 303.5, 6263.0, 35.947, 0.000! !END!
22!X= 303.6, 6263.0, 35.236, 0.000! !END!
23!X= 303.7, 6263.0, 34.664, 0.000! !END!
24!X= 303.8, 6263.0, 38.590, 0.000! !END!
25!X= 303.9, 6263.0, 41.523, 0.000! !END!
26!X= 304.0, 6263.0, 44.822, 0.000! !END!
27!X= 304.1, 6263.0, 46.787, 0.000! !END!
28!X= 304.2, 6263.0, 48.598, 0.000! !END!
29!X= 304.3, 6263.0, 45.739, 0.000! !END!
30!X= 304.4, 6263.0, 41.226, 0.000! !END!
31!X= 304.5, 6263.0, 39.087, 0.000! !END!
32!X= 304.6, 6263.0, 37.539, 0.000! !END!
33!X= 304.7, 6263.0, 38.099, 0.000! !END!
34!X= 304.8, 6263.0, 41.580, 0.000! !END!
35!X= 304.9, 6263.0, 41.850, 0.000! !END!
36!X= 305.0, 6263.0, 40.660, 0.000! !END!
37!X= 305.1, 6263.0, 39.695, 0.000! !END!
38!X= 305.2, 6263.0, 39.429, 0.000! !END!
39!X= 305.3, 6263.0, 38.746, 0.000! !END!
40!X= 305.4, 6263.0, 36.437, 0.000! !END!
41!X= 305.5, 6263.0, 35.001, 0.000! !END!
42!X= 301.5, 6263.1, 29.833, 0.000! !END!

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43!X= 301.6, 6263.1, 28.870, 0.000! !END!
44!X= 301.7, 6263.1, 27.727, 0.000! !END!
45!X= 301.8, 6263.1, 27.526, 0.000! !END!
46!X= 301.9, 6263.1, 25.386, 0.000! !END!
47!X= 302.0, 6263.1, 27.223, 0.000! !END!
48!X= 302.1, 6263.1, 27.798, 0.000! !END!
49!X= 302.2, 6263.1, 29.140, 0.000! !END!
50!X= 302.3, 6263.1, 29.753, 0.000! !END!
51!X= 302.4, 6263.1, 31.679, 0.000! !END!
52!X= 302.5, 6263.1, 33.107, 0.000! !END!
53!X= 302.6, 6263.1, 34.965, 0.000! !END!
54!X= 302.7, 6263.1, 37.135, 0.000! !END!
55!X= 302.8, 6263.1, 39.221, 0.000! !END!
56!X= 302.9, 6263.1, 41.283, 0.000! !END!
57!X= 303.0, 6263.1, 41.899, 0.000! !END!
58!X= 303.1, 6263.1, 40.502, 0.000! !END!
59!X= 303.2, 6263.1, 37.309, 0.000! !END!
60!X= 303.3, 6263.1, 36.140, 0.000! !END!
61!X= 303.4, 6263.1, 34.865, 0.000! !END!
62!X= 303.5, 6263.1, 33.947, 0.000! !END!
63!X= 303.6, 6263.1, 33.392, 0.000! !END!
64!X= 303.7, 6263.1, 33.898, 0.000! !END!
65!X= 303.8, 6263.1, 35.034, 0.000! !END!
66!X= 303.9, 6263.1, 42.224, 0.000! !END!
67!X= 304.0, 6263.1, 44.260, 0.000! !END!
68!X= 304.1, 6263.1, 46.562, 0.000! !END!
69!X= 304.2, 6263.1, 47.855, 0.000! !END!
70!X= 304.3, 6263.1, 45.810, 0.000! !END!
71!X= 304.4, 6263.1, 41.880, 0.000! !END!
72!X= 304.5, 6263.1, 39.075, 0.000! !END!
73!X= 304.6, 6263.1, 36.919, 0.000! !END!
74!X= 304.7, 6263.1, 36.792, 0.000! !END!
75!X= 304.8, 6263.1, 38.837, 0.000! !END!
76!X= 304.9, 6263.1, 40.203, 0.000! !END!
77!X= 305.0, 6263.1, 38.110, 0.000! !END!
78!X= 305.1, 6263.1, 36.937, 0.000! !END!

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79!X= 305.2, 6263.1, 36.234, 0.000! !END!
80!X= 305.3, 6263.1, 35.987, 0.000! !END!
81!X= 305.4, 6263.1, 34.990, 0.000! !END!
82!X= 305.5, 6263.1, 34.614, 0.000! !END!
83!X= 301.5, 6263.2, 29.939, 0.000! !END!
84!X= 301.6, 6263.2, 28.639, 0.000! !END!
85!X= 301.7, 6263.2, 28.135, 0.000! !END!
86!X= 301.8, 6263.2, 27.813, 0.000! !END!
87!X= 301.9, 6263.2, 26.559, 0.000! !END!
88!X= 302.0, 6263.2, 26.998, 0.000! !END!
89!X= 302.1, 6263.2, 27.091, 0.000! !END!
90!X= 302.2, 6263.2, 28.125, 0.000! !END!
91!X= 302.3, 6263.2, 29.542, 0.000! !END!
92!X= 302.4, 6263.2, 31.108, 0.000! !END!
93!X= 302.5, 6263.2, 32.148, 0.000! !END!
94!X= 302.6, 6263.2, 34.794, 0.000! !END!
95!X= 302.7, 6263.2, 37.042, 0.000! !END!
96!X= 302.8, 6263.2, 36.679, 0.000! !END!
97!X= 302.9, 6263.2, 38.996, 0.000! !END!
98!X= 303.0, 6263.2, 39.916, 0.000! !END!
99!X= 303.1, 6263.2, 38.646, 0.000! !END!
100!X= 303.2, 6263.2, 37.101, 0.000! !END!
101!X= 303.3, 6263.2, 35.646, 0.000! !END!
102!X= 303.4, 6263.2, 34.863, 0.000! !END!
103!X= 303.5, 6263.2, 34.305, 0.000! !END!
104!X= 303.6, 6263.2, 33.682, 0.000! !END!
105!X= 303.7, 6263.2, 33.391, 0.000! !END!
106!X= 303.8, 6263.2, 34.504, 0.000! !END!
107!X= 303.9, 6263.2, 41.581, 0.000! !END!
108!X= 304.0, 6263.2, 44.996, 0.000! !END!
109!X= 304.1, 6263.2, 46.532, 0.000! !END!
110!X= 304.2, 6263.2, 45.522, 0.000! !END!
111!X= 304.3, 6263.2, 43.955, 0.000! !END!
112!X= 304.4, 6263.2, 40.280, 0.000! !END!
113!X= 304.5, 6263.2, 38.240, 0.000! !END!
114!X= 304.6, 6263.2, 36.356, 0.000! !END!

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115!X = 304.7, 6263.2, 35.815, 0.000! !END!
116!X = 304.8, 6263.2, 36.254, 0.000! !END!
117!X = 304.9, 6263.2, 38.112, 0.000! !END!
118!X = 305.0, 6263.2, 37.612, 0.000! !END!
119!X = 305.1, 6263.2, 35.193, 0.000! !END!
120!X = 305.2, 6263.2, 34.300, 0.000! !END!
121!X = 305.3, 6263.2, 34.028, 0.000! !END!
122!X = 305.4, 6263.2, 33.614, 0.000! !END!
123!X = 305.5, 6263.2, 33.836, 0.000! !END!
124!X = 301.5, 6263.3, 29.565, 0.000! !END!
125!X = 301.6, 6263.3, 28.016, 0.000! !END!
126!X = 301.7, 6263.3, 27.727, 0.000! !END!
127!X = 301.8, 6263.3, 27.330, 0.000! !END!
128!X = 301.9, 6263.3, 26.536, 0.000! !END!
129!X = 302.0, 6263.3, 26.790, 0.000! !END!
130!X = 302.1, 6263.3, 27.110, 0.000! !END!
131!X = 302.2, 6263.3, 27.346, 0.000! !END!
132!X = 302.3, 6263.3, 28.916, 0.000! !END!
133!X = 302.4, 6263.3, 29.898, 0.000! !END!
134!X = 302.5, 6263.3, 31.694, 0.000! !END!
135!X = 302.6, 6263.3, 32.993, 0.000! !END!
136!X = 302.7, 6263.3, 33.303, 0.000! !END!
137!X = 302.8, 6263.3, 36.621, 0.000! !END!
138!X = 302.9, 6263.3, 38.260, 0.000! !END!
139!X = 303.0, 6263.3, 40.914, 0.000! !END!
140!X = 303.1, 6263.3, 38.304, 0.000! !END!
141!X = 303.2, 6263.3, 35.869, 0.000! !END!
142!X = 303.3, 6263.3, 34.376, 0.000! !END!
143!X = 303.4, 6263.3, 34.027, 0.000! !END!
144!X = 303.5, 6263.3, 32.962, 0.000! !END!
145!X = 303.6, 6263.3, 35.502, 0.000! !END!
146!X = 303.7, 6263.3, 33.992, 0.000! !END!
147!X = 303.8, 6263.3, 36.878, 0.000! !END!
148!X = 303.9, 6263.3, 44.625, 0.000! !END!
149!X = 304.0, 6263.3, 46.798, 0.000! !END!
150!X = 304.1, 6263.3, 46.099, 0.000! !END!

151!X = 304.2, 6263.3, 43.055, 0.000! !END!
152!X = 304.3, 6263.3, 44.792, 0.000! !END!
153!X = 304.4, 6263.3, 41.260, 0.000! !END!
154!X = 304.5, 6263.3, 38.282, 0.000! !END!
155!X = 304.6, 6263.3, 35.709, 0.000! !END!
156!X = 304.7, 6263.3, 33.977, 0.000! !END!
157!X = 304.8, 6263.3, 34.504, 0.000! !END!
158!X = 304.9, 6263.3, 36.584, 0.000! !END!
159!X = 305.0, 6263.3, 36.462, 0.000! !END!
160!X = 305.1, 6263.3, 34.141, 0.000! !END!
161!X = 305.2, 6263.3, 33.804, 0.000! !END!
162!X = 305.3, 6263.3, 33.031, 0.000! !END!
163!X = 305.4, 6263.3, 33.730, 0.000! !END!
164!X = 305.5, 6263.3, 34.530, 0.000! !END!
165!X = 301.5, 6263.4, 29.566, 0.000! !END!
166!X = 301.6, 6263.4, 28.317, 0.000! !END!
167!X = 301.7, 6263.4, 27.109, 0.000! !END!
168!X = 301.8, 6263.4, 26.789, 0.000! !END!
169!X = 301.9, 6263.4, 25.819, 0.000! !END!
170!X = 302.0, 6263.4, 26.721, 0.000! !END!
171!X = 302.1, 6263.4, 26.835, 0.000! !END!
172!X = 302.2, 6263.4, 27.316, 0.000! !END!
173!X = 302.3, 6263.4, 28.535, 0.000! !END!
174!X = 302.4, 6263.4, 29.507, 0.000! !END!
175!X = 302.5, 6263.4, 30.797, 0.000! !END!
176!X = 302.6, 6263.4, 31.834, 0.000! !END!
177!X = 302.7, 6263.4, 33.519, 0.000! !END!
178!X = 302.8, 6263.4, 35.045, 0.000! !END!
179!X = 302.9, 6263.4, 37.968, 0.000! !END!
180!X = 303.0, 6263.4, 41.857, 0.000! !END!
181!X = 303.1, 6263.4, 39.473, 0.000! !END!
182!X = 303.2, 6263.4, 35.197, 0.000! !END!
183!X = 303.3, 6263.4, 33.490, 0.000! !END!
184!X = 303.4, 6263.4, 32.381, 0.000! !END!
185!X = 303.5, 6263.4, 32.388, 0.000! !END!
186!X = 303.6, 6263.4, 35.464, 0.000! !END!

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187!X = 303.7, 6263.4, 37.590, 0.000! !END!
188!X = 303.8, 6263.4, 40.345, 0.000! !END!
189!X = 303.9, 6263.4, 46.091, 0.000! !END!
190!X = 304.0, 6263.4, 44.702, 0.000! !END!
191!X = 304.1, 6263.4, 41.703, 0.000! !END!
192!X = 304.2, 6263.4, 41.437, 0.000! !END!
193!X = 304.3, 6263.4, 45.174, 0.000! !END!
194!X = 304.4, 6263.4, 42.271, 0.000! !END!
195!X = 304.5, 6263.4, 38.639, 0.000! !END!
196!X = 304.6, 6263.4, 35.740, 0.000! !END!
197!X = 304.7, 6263.4, 33.038, 0.000! !END!
198!X = 304.8, 6263.4, 34.012, 0.000! !END!
199!X = 304.9, 6263.4, 35.248, 0.000! !END!
200!X = 305.0, 6263.4, 33.814, 0.000! !END!
201!X = 305.1, 6263.4, 33.300, 0.000! !END!
202!X = 305.2, 6263.4, 33.218, 0.000! !END!
203!X = 305.3, 6263.4, 33.100, 0.000! !END!
204!X = 305.4, 6263.4, 33.704, 0.000! !END!
205!X = 305.5, 6263.4, 34.324, 0.000! !END!
206!X = 301.5, 6263.5, 29.539, 0.000! !END!
207!X = 301.6, 6263.5, 28.695, 0.000! !END!
208!X = 301.7, 6263.5, 27.687, 0.000! !END!
209!X = 301.8, 6263.5, 26.206, 0.000! !END!
210!X = 301.9, 6263.5, 26.351, 0.000! !END!
211!X = 302.0, 6263.5, 24.559, 0.000! !END!
212!X = 302.1, 6263.5, 26.006, 0.000! !END!
213!X = 302.2, 6263.5, 27.529, 0.000! !END!
214!X = 302.3, 6263.5, 27.758, 0.000! !END!
215!X = 302.4, 6263.5, 28.430, 0.000! !END!
216!X = 302.5, 6263.5, 28.820, 0.000! !END!
217!X = 302.6, 6263.5, 30.486, 0.000! !END!
218!X = 302.7, 6263.5, 31.646, 0.000! !END!
219!X = 302.8, 6263.5, 34.557, 0.000! !END!
220!X = 302.9, 6263.5, 38.439, 0.000! !END!
221!X = 303.0, 6263.5, 41.557, 0.000! !END!
222!X = 303.1, 6263.5, 38.509, 0.000! !END!

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223!X = 303.2, 6263.5, 34.843, 0.000! !END!
224!X = 303.3, 6263.5, 31.489, 0.000! !END!
225!X = 303.4, 6263.5, 31.900, 0.000! !END!
226!X = 303.5, 6263.5, 31.186, 0.000! !END!
227!X = 303.6, 6263.5, 34.809, 0.000! !END!
228!X = 303.7, 6263.5, 38.813, 0.000! !END!
229!X = 303.8, 6263.5, 41.776, 0.000! !END!
230!X = 303.9, 6263.5, 44.498, 0.000! !END!
231!X = 304.0, 6263.5, 42.024, 0.000! !END!
232!X = 304.1, 6263.5, 38.968, 0.000! !END!
233!X = 304.2, 6263.5, 40.092, 0.000! !END!
234!X = 304.3, 6263.5, 42.055, 0.000! !END!
235!X = 304.4, 6263.5, 40.391, 0.000! !END!
236!X = 304.5, 6263.5, 37.964, 0.000! !END!
237!X = 304.6, 6263.5, 36.373, 0.000! !END!
238!X = 304.7, 6263.5, 33.566, 0.000! !END!
239!X = 304.8, 6263.5, 33.135, 0.000! !END!
240!X = 304.9, 6263.5, 33.882, 0.000! !END!
241!X = 305.0, 6263.5, 33.136, 0.000! !END!
242!X = 305.1, 6263.5, 32.695, 0.000! !END!
243!X = 305.2, 6263.5, 32.472, 0.000! !END!
244!X = 305.3, 6263.5, 33.106, 0.000! !END!
245!X = 305.4, 6263.5, 33.289, 0.000! !END!
246!X = 305.5, 6263.5, 35.438, 0.000! !END!
247!X = 301.5, 6263.6, 30.223, 0.000! !END!
248!X = 301.6, 6263.6, 29.593, 0.000! !END!
249!X = 301.7, 6263.6, 29.627, 0.000! !END!
250!X = 301.8, 6263.6, 26.649, 0.000! !END!
251!X = 301.9, 6263.6, 26.207, 0.000! !END!
252!X = 302.0, 6263.6, 26.417, 0.000! !END!
253!X = 302.1, 6263.6, 26.118, 0.000! !END!
254!X = 302.2, 6263.6, 25.975, 0.000! !END!
255!X = 302.3, 6263.6, 26.262, 0.000! !END!
256!X = 302.4, 6263.6, 27.118, 0.000! !END!
257!X = 302.5, 6263.6, 27.763, 0.000! !END!
258!X = 302.6, 6263.6, 28.700, 0.000! !END!

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259!X = 302.7, 6263.6, 31.084, 0.000! !END!
260!X = 302.8, 6263.6, 33.948, 0.000! !END!
261!X = 302.9, 6263.6, 37.570, 0.000! !END!
262!X = 303.0, 6263.6, 40.136, 0.000! !END!
263!X = 303.1, 6263.6, 37.355, 0.000! !END!
264!X = 303.2, 6263.6, 34.477, 0.000! !END!
265!X = 303.3, 6263.6, 30.784, 0.000! !END!
266!X = 303.4, 6263.6, 30.805, 0.000! !END!
267!X = 303.5, 6263.6, 29.119, 0.000! !END!
268!X = 303.6, 6263.6, 33.886, 0.000! !END!
269!X = 303.7, 6263.6, 38.047, 0.000! !END!
270!X = 303.8, 6263.6, 42.227, 0.000! !END!
271!X = 303.9, 6263.6, 43.157, 0.000! !END!
272!X = 304.0, 6263.6, 39.606, 0.000! !END!
273!X = 304.1, 6263.6, 37.214, 0.000! !END!
274!X = 304.2, 6263.6, 37.392, 0.000! !END!
275!X = 304.3, 6263.6, 40.735, 0.000! !END!
276!X = 304.4, 6263.6, 41.458, 0.000! !END!
277!X = 304.5, 6263.6, 39.472, 0.000! !END!
278!X = 304.6, 6263.6, 36.908, 0.000! !END!
279!X = 304.7, 6263.6, 33.677, 0.000! !END!
280!X = 304.8, 6263.6, 31.108, 0.000! !END!
281!X = 304.9, 6263.6, 32.433, 0.000! !END!
282!X = 305.0, 6263.6, 32.659, 0.000! !END!
283!X = 305.1, 6263.6, 28.844, 0.000! !END!
284!X = 305.2, 6263.6, 32.502, 0.000! !END!
285!X = 305.3, 6263.6, 32.656, 0.000! !END!
286!X = 305.4, 6263.6, 34.066, 0.000! !END!
287!X = 305.5, 6263.6, 36.235, 0.000! !END!
288!X = 301.5, 6263.7, 30.553, 0.000! !END!
289!X = 301.6, 6263.7, 29.532, 0.000! !END!
290!X = 301.7, 6263.7, 29.420, 0.000! !END!
291!X = 301.8, 6263.7, 27.036, 0.000! !END!
292!X = 301.9, 6263.7, 26.646, 0.000! !END!
293!X = 302.0, 6263.7, 26.401, 0.000! !END!
294!X = 302.1, 6263.7, 24.298, 0.000! !END!

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295!X = 302.2, 6263.7, 25.908, 0.000! !END!
296!X = 302.3, 6263.7, 25.551, 0.000! !END!
297!X = 302.4, 6263.7, 26.358, 0.000! !END!
298!X = 302.5, 6263.7, 27.498, 0.000! !END!
299!X = 302.6, 6263.7, 28.729, 0.000! !END!
300!X = 302.7, 6263.7, 30.588, 0.000! !END!
301!X = 302.8, 6263.7, 33.214, 0.000! !END!
302!X = 302.9, 6263.7, 36.164, 0.000! !END!
303!X = 303.0, 6263.7, 38.356, 0.000! !END!
304!X = 303.1, 6263.7, 36.103, 0.000! !END!
305!X = 303.2, 6263.7, 33.250, 0.000! !END!
306!X = 303.3, 6263.7, 31.070, 0.000! !END!
307!X = 303.4, 6263.7, 30.831, 0.000! !END!
308!X = 303.5, 6263.7, 29.419, 0.000! !END!
309!X = 303.6, 6263.7, 33.943, 0.000! !END!
310!X = 303.7, 6263.7, 36.920, 0.000! !END!
311!X = 303.8, 6263.7, 39.686, 0.000! !END!
312!X = 303.9, 6263.7, 39.212, 0.000! !END!
313!X = 304.0, 6263.7, 36.685, 0.000! !END!
314!X = 304.1, 6263.7, 34.783, 0.000! !END!
315!X = 304.2, 6263.7, 35.901, 0.000! !END!
316!X = 304.3, 6263.7, 38.968, 0.000! !END!
317!X = 304.4, 6263.7, 39.162, 0.000! !END!
318!X = 304.5, 6263.7, 38.541, 0.000! !END!
319!X = 304.6, 6263.7, 36.289, 0.000! !END!
320!X = 304.7, 6263.7, 33.482, 0.000! !END!
321!X = 304.8, 6263.7, 30.181, 0.000! !END!
322!X = 304.9, 6263.7, 31.715, 0.000! !END!
323!X = 305.0, 6263.7, 31.609, 0.000! !END!
324!X = 305.1, 6263.7, 31.513, 0.000! !END!
325!X = 305.2, 6263.7, 32.488, 0.000! !END!
326!X = 305.3, 6263.7, 32.754, 0.000! !END!
327!X = 305.4, 6263.7, 34.338, 0.000! !END!
328!X = 305.5, 6263.7, 37.646, 0.000! !END!
329!X = 301.5, 6263.8, 29.899, 0.000! !END!
330!X = 301.6, 6263.8, 29.615, 0.000! !END!

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331!X = 301.7, 6263.8, 28.897, 0.000! !END!
332!X = 301.8, 6263.8, 27.275, 0.000! !END!
333!X = 301.9, 6263.8, 25.895, 0.000! !END!
334!X = 302.0, 6263.8, 26.137, 0.000! !END!
335!X = 302.1, 6263.8, 25.679, 0.000! !END!
336!X = 302.2, 6263.8, 24.883, 0.000! !END!
337!X = 302.3, 6263.8, 25.550, 0.000! !END!
338!X = 302.4, 6263.8, 26.014, 0.000! !END!
339!X = 302.5, 6263.8, 26.478, 0.000! !END!
340!X = 302.6, 6263.8, 27.570, 0.000! !END!
341!X = 302.7, 6263.8, 29.865, 0.000! !END!
342!X = 302.8, 6263.8, 32.559, 0.000! !END!
343!X = 302.9, 6263.8, 37.404, 0.000! !END!
344!X = 303.0, 6263.8, 38.193, 0.000! !END!
345!X = 303.1, 6263.8, 34.052, 0.000! !END!
346!X = 303.2, 6263.8, 31.863, 0.000! !END!
347!X = 303.3, 6263.8, 30.030, 0.000! !END!
348!X = 303.4, 6263.8, 30.435, 0.000! !END!
349!X = 303.5, 6263.8, 30.196, 0.000! !END!
350!X = 303.6, 6263.8, 32.633, 0.000! !END!
351!X = 303.7, 6263.8, 35.772, 0.000! !END!
352!X = 303.8, 6263.8, 36.931, 0.000! !END!
353!X = 303.9, 6263.8, 35.398, 0.000! !END!
354!X = 304.0, 6263.8, 33.974, 0.000! !END!
355!X = 304.1, 6263.8, 32.282, 0.000! !END!
356!X = 304.2, 6263.8, 34.750, 0.000! !END!
357!X = 304.3, 6263.8, 35.996, 0.000! !END!
358!X = 304.4, 6263.8, 36.090, 0.000! !END!
359!X = 304.5, 6263.8, 36.156, 0.000! !END!
360!X = 304.6, 6263.8, 35.574, 0.000! !END!
361!X = 304.7, 6263.8, 31.196, 0.000! !END!
362!X = 304.8, 6263.8, 30.964, 0.000! !END!
363!X = 304.9, 6263.8, 30.990, 0.000! !END!
364!X = 305.0, 6263.8, 30.689, 0.000! !END!
365!X = 305.1, 6263.8, 31.372, 0.000! !END!
366!X = 305.2, 6263.8, 32.218, 0.000! !END!

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367!X = 305.3, 6263.8, 33.135, 0.000! !END!
368!X = 305.4, 6263.8, 35.213, 0.000! !END!
369!X = 305.5, 6263.8, 39.619, 0.000! !END!
370!X = 301.5, 6263.9, 32.634, 0.000! !END!
371!X = 301.6, 6263.9, 31.213, 0.000! !END!
372!X = 301.7, 6263.9, 29.286, 0.000! !END!
373!X = 301.8, 6263.9, 28.359, 0.000! !END!
374!X = 301.9, 6263.9, 26.391, 0.000! !END!
375!X = 302.0, 6263.9, 25.104, 0.000! !END!
376!X = 302.1, 6263.9, 25.441, 0.000! !END!
377!X = 302.2, 6263.9, 25.711, 0.000! !END!
378!X = 302.3, 6263.9, 25.640, 0.000! !END!
379!X = 302.4, 6263.9, 25.846, 0.000! !END!
380!X = 302.5, 6263.9, 26.354, 0.000! !END!
381!X = 302.6, 6263.9, 27.267, 0.000! !END!
382!X = 302.7, 6263.9, 29.160, 0.000! !END!
383!X = 302.8, 6263.9, 32.327, 0.000! !END!
384!X = 302.9, 6263.9, 35.457, 0.000! !END!
385!X = 303.0, 6263.9, 37.063, 0.000! !END!
386!X = 303.1, 6263.9, 34.614, 0.000! !END!
387!X = 303.2, 6263.9, 31.750, 0.000! !END!
388!X = 303.3, 6263.9, 29.607, 0.000! !END!
389!X = 303.4, 6263.9, 29.662, 0.000! !END!
390!X = 303.5, 6263.9, 28.805, 0.000! !END!
391!X = 303.6, 6263.9, 32.998, 0.000! !END!
392!X = 303.7, 6263.9, 34.573, 0.000! !END!
393!X = 303.8, 6263.9, 34.327, 0.000! !END!
394!X = 303.9, 6263.9, 32.350, 0.000! !END!
395!X = 304.0, 6263.9, 31.685, 0.000! !END!
396!X = 304.1, 6263.9, 31.944, 0.000! !END!
397!X = 304.2, 6263.9, 33.284, 0.000! !END!
398!X = 304.3, 6263.9, 33.132, 0.000! !END!
399!X = 304.4, 6263.9, 32.550, 0.000! !END!
400!X = 304.5, 6263.9, 32.157, 0.000! !END!
401!X = 304.6, 6263.9, 31.527, 0.000! !END!
402!X = 304.7, 6263.9, 29.975, 0.000! !END!

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403!X = 304.8, 6263.9, 30.206, 0.000! !END!
404!X = 304.9, 6263.9, 30.336, 0.000! !END!
405!X = 305.0, 6263.9, 31.103, 0.000! !END!
406!X = 305.1, 6263.9, 32.169, 0.000! !END!
407!X = 305.2, 6263.9, 32.914, 0.000! !END!
408!X = 305.3, 6263.9, 33.924, 0.000! !END!
409!X = 305.4, 6263.9, 36.034, 0.000! !END!
410!X = 305.5, 6263.9, 39.172, 0.000! !END!
411!X = 301.5, 6264.0, 37.559, 0.000! !END!
412!X = 301.6, 6264.0, 34.850, 0.000! !END!
413!X = 301.7, 6264.0, 29.868, 0.000! !END!
414!X = 301.8, 6264.0, 28.650, 0.000! !END!
415!X = 301.9, 6264.0, 25.955, 0.000! !END!
416!X = 302.0, 6264.0, 26.051, 0.000! !END!
417!X = 302.1, 6264.0, 24.917, 0.000! !END!
418!X = 302.2, 6264.0, 25.546, 0.000! !END!
419!X = 302.3, 6264.0, 25.235, 0.000! !END!
420!X = 302.4, 6264.0, 25.249, 0.000! !END!
421!X = 302.5, 6264.0, 26.051, 0.000! !END!
422!X = 302.6, 6264.0, 26.768, 0.000! !END!
423!X = 302.7, 6264.0, 28.656, 0.000! !END!
424!X = 302.8, 6264.0, 30.944, 0.000! !END!
425!X = 302.9, 6264.0, 33.517, 0.000! !END!
426!X = 303.0, 6264.0, 34.775, 0.000! !END!
427!X = 303.1, 6264.0, 32.866, 0.000! !END!
428!X = 303.2, 6264.0, 31.220, 0.000! !END!
429!X = 303.3, 6264.0, 29.028, 0.000! !END!
430!X = 303.4, 6264.0, 28.384, 0.000! !END!
431!X = 303.5, 6264.0, 28.701, 0.000! !END!
432!X = 303.6, 6264.0, 30.097, 0.000! !END!
433!X = 303.7, 6264.0, 32.030, 0.000! !END!
434!X = 303.8, 6264.0, 31.629, 0.000! !END!
435!X = 303.9, 6264.0, 29.575, 0.000! !END!
436!X = 304.0, 6264.0, 30.248, 0.000! !END!
437!X = 304.1, 6264.0, 30.739, 0.000! !END!
438!X = 304.2, 6264.0, 30.393, 0.000! !END!

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439!X = 304.3, 6264.0, 29.728, 0.000! !END!
440!X = 304.4, 6264.0, 26.027, 0.000! !END!
441!X = 304.5, 6264.0, 28.583, 0.000! !END!
442!X = 304.6, 6264.0, 29.246, 0.000! !END!
443!X = 304.7, 6264.0, 30.134, 0.000! !END!
444!X = 304.8, 6264.0, 29.282, 0.000! !END!
445!X = 304.9, 6264.0, 30.681, 0.000! !END!
446!X = 305.0, 6264.0, 33.302, 0.000! !END!
447!X = 305.1, 6264.0, 34.398, 0.000! !END!
448!X = 305.2, 6264.0, 35.635, 0.000! !END!
449!X = 305.3, 6264.0, 34.776, 0.000! !END!
450!X = 305.4, 6264.0, 36.652, 0.000! !END!
451!X = 305.5, 6264.0, 39.135, 0.000! !END!
452!X = 301.5, 6264.1, 41.570, 0.000! !END!
453!X = 301.6, 6264.1, 34.739, 0.000! !END!
454!X = 301.7, 6264.1, 30.008, 0.000! !END!
455!X = 301.8, 6264.1, 28.737, 0.000! !END!
456!X = 301.9, 6264.1, 25.336, 0.000! !END!
457!X = 302.0, 6264.1, 25.761, 0.000! !END!
458!X = 302.1, 6264.1, 24.712, 0.000! !END!
459!X = 302.2, 6264.1, 23.664, 0.000! !END!
460!X = 302.3, 6264.1, 25.133, 0.000! !END!
461!X = 302.4, 6264.1, 25.193, 0.000! !END!
462!X = 302.5, 6264.1, 25.975, 0.000! !END!
463!X = 302.6, 6264.1, 26.148, 0.000! !END!
464!X = 302.7, 6264.1, 28.062, 0.000! !END!
465!X = 302.8, 6264.1, 30.635, 0.000! !END!
466!X = 302.9, 6264.1, 33.530, 0.000! !END!
467!X = 303.0, 6264.1, 35.245, 0.000! !END!
468!X = 303.1, 6264.1, 33.517, 0.000! !END!
469!X = 303.2, 6264.1, 31.176, 0.000! !END!
470!X = 303.3, 6264.1, 28.908, 0.000! !END!
471!X = 303.4, 6264.1, 28.147, 0.000! !END!
472!X = 303.5, 6264.1, 28.045, 0.000! !END!
473!X = 303.6, 6264.1, 28.389, 0.000! !END!
474!X = 303.7, 6264.1, 28.987, 0.000! !END!

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475!X = 303.8, 6264.1, 29.077, 0.000! !END!
476!X = 303.9, 6264.1, 28.840, 0.000! !END!
477!X = 304.0, 6264.1, 28.975, 0.000! !END!
478!X = 304.1, 6264.1, 29.128, 0.000! !END!
479!X = 304.2, 6264.1, 28.284, 0.000! !END!
480!X = 304.3, 6264.1, 27.314, 0.000! !END!
481!X = 304.4, 6264.1, 29.712, 0.000! !END!
482!X = 304.5, 6264.1, 29.877, 0.000! !END!
483!X = 304.6, 6264.1, 30.065, 0.000! !END!
484!X = 304.7, 6264.1, 29.649, 0.000! !END!
485!X = 304.8, 6264.1, 31.410, 0.000! !END!
486!X = 304.9, 6264.1, 37.344, 0.000! !END!
487!X = 305.0, 6264.1, 42.067, 0.000! !END!
488!X = 305.1, 6264.1, 40.582, 0.000! !END!
489!X = 305.2, 6264.1, 40.233, 0.000! !END!
490!X = 305.3, 6264.1, 38.501, 0.000! !END!
491!X = 305.4, 6264.1, 37.294, 0.000! !END!
492!X = 305.5, 6264.1, 41.798, 0.000! !END!
493!X = 301.5, 6264.2, 41.599, 0.000! !END!
494!X = 301.6, 6264.2, 35.727, 0.000! !END!
495!X = 301.7, 6264.2, 31.112, 0.000! !END!
496!X = 301.8, 6264.2, 28.578, 0.000! !END!
497!X = 301.9, 6264.2, 26.341, 0.000! !END!
498!X = 302.0, 6264.2, 25.015, 0.000! !END!
499!X = 302.1, 6264.2, 24.940, 0.000! !END!
500!X = 302.2, 6264.2, 24.814, 0.000! !END!
501!X = 302.3, 6264.2, 24.617, 0.000! !END!
502!X = 302.4, 6264.2, 24.528, 0.000! !END!
503!X = 302.5, 6264.2, 25.109, 0.000! !END!
504!X = 302.6, 6264.2, 25.219, 0.000! !END!
505!X = 302.7, 6264.2, 27.326, 0.000! !END!
506!X = 302.8, 6264.2, 30.144, 0.000! !END!
507!X = 302.9, 6264.2, 34.186, 0.000! !END!
508!X = 303.0, 6264.2, 34.565, 0.000! !END!
509!X = 303.1, 6264.2, 33.833, 0.000! !END!
510!X = 303.2, 6264.2, 32.166, 0.000! !END!

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511!X = 303.3, 6264.2, 28.601, 0.000! !END!
512!X = 303.4, 6264.2, 27.737, 0.000! !END!
513!X = 303.5, 6264.2, 27.045, 0.000! !END!
514!X = 303.6, 6264.2, 26.903, 0.000! !END!
515!X = 303.7, 6264.2, 26.589, 0.000! !END!
516!X = 303.8, 6264.2, 27.139, 0.000! !END!
517!X = 303.9, 6264.2, 27.689, 0.000! !END!
518!X = 304.0, 6264.2, 27.617, 0.000! !END!
519!X = 304.1, 6264.2, 26.599, 0.000! !END!
520!X = 304.2, 6264.2, 28.085, 0.000! !END!
521!X = 304.3, 6264.2, 28.253, 0.000! !END!
522!X = 304.4, 6264.2, 29.372, 0.000! !END!
523!X = 304.5, 6264.2, 29.941, 0.000! !END!
524!X = 304.6, 6264.2, 29.568, 0.000! !END!
525!X = 304.7, 6264.2, 30.848, 0.000! !END!
526!X = 304.8, 6264.2, 34.387, 0.000! !END!
527!X = 304.9, 6264.2, 46.065, 0.000! !END!
528!X = 305.0, 6264.2, 55.428, 0.000! !END!
529!X = 305.1, 6264.2, 53.669, 0.000! !END!
530!X = 305.2, 6264.2, 46.028, 0.000! !END!
531!X = 305.3, 6264.2, 42.568, 0.000! !END!
532!X = 305.4, 6264.2, 40.455, 0.000! !END!
533!X = 305.5, 6264.2, 40.417, 0.000! !END!
534!X = 301.5, 6264.3, 37.730, 0.000! !END!
535!X = 301.6, 6264.3, 35.263, 0.000! !END!
536!X = 301.7, 6264.3, 33.416, 0.000! !END!
537!X = 301.8, 6264.3, 28.926, 0.000! !END!
538!X = 301.9, 6264.3, 27.783, 0.000! !END!
539!X = 302.0, 6264.3, 24.953, 0.000! !END!
540!X = 302.1, 6264.3, 24.333, 0.000! !END!
541!X = 302.2, 6264.3, 24.029, 0.000! !END!
542!X = 302.3, 6264.3, 22.013, 0.000! !END!
543!X = 302.4, 6264.3, 24.744, 0.000! !END!
544!X = 302.5, 6264.3, 24.437, 0.000! !END!
545!X = 302.6, 6264.3, 26.292, 0.000! !END!
546!X = 302.7, 6264.3, 26.616, 0.000! !END!

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547!X = 302.8, 6264.3, 29.265, 0.000! !END!
548!X = 302.9, 6264.3, 32.498, 0.000! !END!
549!X = 303.0, 6264.3, 33.138, 0.000! !END!
550!X = 303.1, 6264.3, 31.589, 0.000! !END!
551!X = 303.2, 6264.3, 29.943, 0.000! !END!
552!X = 303.3, 6264.3, 26.990, 0.000! !END!
553!X = 303.4, 6264.3, 26.089, 0.000! !END!
554!X = 303.5, 6264.3, 26.515, 0.000! !END!
555!X = 303.6, 6264.3, 26.700, 0.000! !END!
556!X = 303.7, 6264.3, 26.890, 0.000! !END!
557!X = 303.8, 6264.3, 27.086, 0.000! !END!
558!X = 303.9, 6264.3, 27.160, 0.000! !END!
559!X = 304.0, 6264.3, 24.840, 0.000! !END!
560!X = 304.1, 6264.3, 28.207, 0.000! !END!
561!X = 304.2, 6264.3, 28.514, 0.000! !END!
562!X = 304.3, 6264.3, 28.826, 0.000! !END!
563!X = 304.4, 6264.3, 28.993, 0.000! !END!
564!X = 304.5, 6264.3, 29.899, 0.000! !END!
565!X = 304.6, 6264.3, 31.188, 0.000! !END!
566!X = 304.7, 6264.3, 32.846, 0.000! !END!
567!X = 304.8, 6264.3, 36.378, 0.000! !END!
568!X = 304.9, 6264.3, 47.670, 0.000! !END!
569!X = 305.0, 6264.3, 60.137, 0.000! !END!
570!X = 305.1, 6264.3, 58.903, 0.000! !END!
571!X = 305.2, 6264.3, 53.440, 0.000! !END!
572!X = 305.3, 6264.3, 46.764, 0.000! !END!
573!X = 305.4, 6264.3, 44.610, 0.000! !END!
574!X = 305.5, 6264.3, 43.828, 0.000! !END!
575!X = 301.5, 6264.4, 35.746, 0.000! !END!
576!X = 301.6, 6264.4, 33.546, 0.000! !END!
577!X = 301.7, 6264.4, 32.041, 0.000! !END!
578!X = 301.8, 6264.4, 29.012, 0.000! !END!
579!X = 301.9, 6264.4, 27.840, 0.000! !END!
580!X = 302.0, 6264.4, 25.645, 0.000! !END!
581!X = 302.1, 6264.4, 25.377, 0.000! !END!
582!X = 302.2, 6264.4, 22.834, 0.000! !END!

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583!X = 302.3, 6264.4, 23.567, 0.000! !END!
584!X = 302.4, 6264.4, 24.664, 0.000! !END!
585!X = 302.5, 6264.4, 25.539, 0.000! !END!
586!X = 302.6, 6264.4, 25.439, 0.000! !END!
587!X = 302.7, 6264.4, 26.062, 0.000! !END!
588!X = 302.8, 6264.4, 29.997, 0.000! !END!
589!X = 302.9, 6264.4, 32.622, 0.000! !END!
590!X = 303.0, 6264.4, 31.908, 0.000! !END!
591!X = 303.1, 6264.4, 30.256, 0.000! !END!
592!X = 303.2, 6264.4, 27.821, 0.000! !END!
593!X = 303.3, 6264.4, 26.168, 0.000! !END!
594!X = 303.4, 6264.4, 25.717, 0.000! !END!
595!X = 303.5, 6264.4, 25.558, 0.000! !END!
596!X = 303.6, 6264.4, 25.913, 0.000! !END!
597!X = 303.7, 6264.4, 26.995, 0.000! !END!
598!X = 303.8, 6264.4, 26.229, 0.000! !END!
599!X = 303.9, 6264.4, 27.310, 0.000! !END!
600!X = 304.0, 6264.4, 26.786, 0.000! !END!
601!X = 304.1, 6264.4, 28.211, 0.000! !END!
602!X = 304.2, 6264.4, 28.366, 0.000! !END!
603!X = 304.3, 6264.4, 28.884, 0.000! !END!
604!X = 304.4, 6264.4, 29.518, 0.000! !END!
605!X = 304.5, 6264.4, 30.687, 0.000! !END!
606!X = 304.6, 6264.4, 32.838, 0.000! !END!
607!X = 304.7, 6264.4, 34.633, 0.000! !END!
608!X = 304.8, 6264.4, 37.048, 0.000! !END!
609!X = 304.9, 6264.4, 41.228, 0.000! !END!
610!X = 305.0, 6264.4, 48.163, 0.000! !END!
611!X = 305.1, 6264.4, 50.462, 0.000! !END!
612!X = 305.2, 6264.4, 56.144, 0.000! !END!
613!X = 305.3, 6264.4, 57.153, 0.000! !END!
614!X = 305.4, 6264.4, 50.264, 0.000! !END!
615!X = 305.5, 6264.4, 46.361, 0.000! !END!
616!X = 301.5, 6264.5, 37.086, 0.000! !END!
617!X = 301.6, 6264.5, 34.961, 0.000! !END!
618!X = 301.7, 6264.5, 32.545, 0.000! !END!

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619!X = 301.8, 6264.5, 29.987, 0.000! !END!
620!X = 301.9, 6264.5, 27.622, 0.000! !END!
621!X = 302.0, 6264.5, 26.642, 0.000! !END!
622!X = 302.1, 6264.5, 25.860, 0.000! !END!
623!X = 302.2, 6264.5, 25.275, 0.000! !END!
624!X = 302.3, 6264.5, 24.738, 0.000! !END!
625!X = 302.4, 6264.5, 24.546, 0.000! !END!
626!X = 302.5, 6264.5, 24.192, 0.000! !END!
627!X = 302.6, 6264.5, 24.141, 0.000! !END!
628!X = 302.7, 6264.5, 26.048, 0.000! !END!
629!X = 302.8, 6264.5, 29.925, 0.000! !END!
630!X = 302.9, 6264.5, 32.114, 0.000! !END!
631!X = 303.0, 6264.5, 30.006, 0.000! !END!
632!X = 303.1, 6264.5, 27.649, 0.000! !END!
633!X = 303.2, 6264.5, 26.235, 0.000! !END!
634!X = 303.3, 6264.5, 25.757, 0.000! !END!
635!X = 303.4, 6264.5, 25.604, 0.000! !END!
636!X = 303.5, 6264.5, 25.569, 0.000! !END!
637!X = 303.6, 6264.5, 26.521, 0.000! !END!
638!X = 303.7, 6264.5, 24.238, 0.000! !END!
639!X = 303.8, 6264.5, 26.928, 0.000! !END!
640!X = 303.9, 6264.5, 26.920, 0.000! !END!
641!X = 304.0, 6264.5, 26.750, 0.000! !END!
642!X = 304.1, 6264.5, 28.173, 0.000! !END!
643!X = 304.2, 6264.5, 28.830, 0.000! !END!
644!X = 304.3, 6264.5, 29.478, 0.000! !END!
645!X = 304.4, 6264.5, 30.890, 0.000! !END!
646!X = 304.5, 6264.5, 33.099, 0.000! !END!
647!X = 304.6, 6264.5, 37.421, 0.000! !END!
648!X = 304.7, 6264.5, 38.618, 0.000! !END!
649!X = 304.8, 6264.5, 37.370, 0.000! !END!
650!X = 304.9, 6264.5, 38.732, 0.000! !END!
651!X = 305.0, 6264.5, 41.415, 0.000! !END!
652!X = 305.1, 6264.5, 46.563, 0.000! !END!
653!X = 305.2, 6264.5, 53.269, 0.000! !END!
654!X = 305.3, 6264.5, 57.973, 0.000! !END!

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655!X = 305.4, 6264.5, 55.053, 0.000! !END!
656!X = 305.5, 6264.5, 48.609, 0.000! !END!
657!X = 301.5, 6264.6, 36.566, 0.000! !END!
658!X = 301.6, 6264.6, 33.737, 0.000! !END!
659!X = 301.7, 6264.6, 30.938, 0.000! !END!
660!X = 301.8, 6264.6, 30.050, 0.000! !END!
661!X = 301.9, 6264.6, 28.990, 0.000! !END!
662!X = 302.0, 6264.6, 27.127, 0.000! !END!
663!X = 302.1, 6264.6, 25.419, 0.000! !END!
664!X = 302.2, 6264.6, 24.264, 0.000! !END!
665!X = 302.3, 6264.6, 23.845, 0.000! !END!
666!X = 302.4, 6264.6, 23.694, 0.000! !END!
667!X = 302.5, 6264.6, 23.251, 0.000! !END!
668!X = 302.6, 6264.6, 24.040, 0.000! !END!
669!X = 302.7, 6264.6, 25.016, 0.000! !END!
670!X = 302.8, 6264.6, 28.292, 0.000! !END!
671!X = 302.9, 6264.6, 31.148, 0.000! !END!
672!X = 303.0, 6264.6, 28.563, 0.000! !END!
673!X = 303.1, 6264.6, 26.486, 0.000! !END!
674!X = 303.2, 6264.6, 26.030, 0.000! !END!
675!X = 303.3, 6264.6, 24.226, 0.000! !END!
676!X = 303.4, 6264.6, 25.371, 0.000! !END!
677!X = 303.5, 6264.6, 25.738, 0.000! !END!
678!X = 303.6, 6264.6, 22.170, 0.000! !END!
679!X = 303.7, 6264.6, 27.317, 0.000! !END!
680!X = 303.8, 6264.6, 26.309, 0.000! !END!
681!X = 303.9, 6264.6, 26.554, 0.000! !END!
682!X = 304.0, 6264.6, 27.860, 0.000! !END!
683!X = 304.1, 6264.6, 30.137, 0.000! !END!
684!X = 304.2, 6264.6, 31.018, 0.000! !END!
685!X = 304.3, 6264.6, 31.873, 0.000! !END!
686!X = 304.4, 6264.6, 33.471, 0.000! !END!
687!X = 304.5, 6264.6, 35.362, 0.000! !END!
688!X = 304.6, 6264.6, 40.481, 0.000! !END!
689!X = 304.7, 6264.6, 46.372, 0.000! !END!
690!X = 304.8, 6264.6, 40.772, 0.000! !END!

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691!X = 304.9, 6264.6, 42.902, 0.000! !END!
692!X = 305.0, 6264.6, 45.136, 0.000! !END!
693!X = 305.1, 6264.6, 50.450, 0.000! !END!
694!X = 305.2, 6264.6, 56.430, 0.000! !END!
695!X = 305.3, 6264.6, 57.415, 0.000! !END!
696!X = 305.4, 6264.6, 55.607, 0.000! !END!
697!X = 305.5, 6264.6, 53.877, 0.000! !END!
698!X = 301.5, 6264.7, 36.758, 0.000! !END!
699!X = 301.6, 6264.7, 34.201, 0.000! !END!
700!X = 301.7, 6264.7, 32.832, 0.000! !END!
701!X = 301.8, 6264.7, 31.693, 0.000! !END!
702!X = 301.9, 6264.7, 28.983, 0.000! !END!
703!X = 302.0, 6264.7, 27.050, 0.000! !END!
704!X = 302.1, 6264.7, 24.665, 0.000! !END!
705!X = 302.2, 6264.7, 24.296, 0.000! !END!
706!X = 302.3, 6264.7, 23.625, 0.000! !END!
707!X = 302.4, 6264.7, 23.494, 0.000! !END!
708!X = 302.5, 6264.7, 23.468, 0.000! !END!
709!X = 302.6, 6264.7, 23.341, 0.000! !END!
710!X = 302.7, 6264.7, 24.742, 0.000! !END!
711!X = 302.8, 6264.7, 27.585, 0.000! !END!
712!X = 302.9, 6264.7, 29.770, 0.000! !END!
713!X = 303.0, 6264.7, 27.579, 0.000! !END!
714!X = 303.1, 6264.7, 25.644, 0.000! !END!
715!X = 303.2, 6264.7, 25.030, 0.000! !END!
716!X = 303.3, 6264.7, 24.832, 0.000! !END!
717!X = 303.4, 6264.7, 23.519, 0.000! !END!
718!X = 303.5, 6264.7, 24.156, 0.000! !END!
719!X = 303.6, 6264.7, 27.899, 0.000! !END!
720!X = 303.7, 6264.7, 28.671, 0.000! !END!
721!X = 303.8, 6264.7, 26.064, 0.000! !END!
722!X = 303.9, 6264.7, 31.374, 0.000! !END!
723!X = 304.0, 6264.7, 33.958, 0.000! !END!
724!X = 304.1, 6264.7, 33.804, 0.000! !END!
725!X = 304.2, 6264.7, 33.921, 0.000! !END!
726!X = 304.3, 6264.7, 36.481, 0.000! !END!

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727!X = 304.4, 6264.7, 37.921, 0.000! !END!
728!X = 304.5, 6264.7, 38.038, 0.000! !END!
729!X = 304.6, 6264.7, 41.033, 0.000! !END!
730!X = 304.7, 6264.7, 50.364, 0.000! !END!
731!X = 304.8, 6264.7, 46.196, 0.000! !END!
732!X = 304.9, 6264.7, 48.894, 0.000! !END!
733!X = 305.0, 6264.7, 54.149, 0.000! !END!
734!X = 305.1, 6264.7, 57.750, 0.000! !END!
735!X = 305.2, 6264.7, 59.583, 0.000! !END!
736!X = 305.3, 6264.7, 54.783, 0.000! !END!
737!X = 305.4, 6264.7, 49.874, 0.000! !END!
738!X = 305.5, 6264.7, 51.790, 0.000! !END!
739!X = 301.5, 6264.8, 41.046, 0.000! !END!
740!X = 301.6, 6264.8, 36.599, 0.000! !END!
741!X = 301.7, 6264.8, 35.558, 0.000! !END!
742!X = 301.8, 6264.8, 32.498, 0.000! !END!
743!X = 301.9, 6264.8, 29.236, 0.000! !END!
744!X = 302.0, 6264.8, 27.060, 0.000! !END!
745!X = 302.1, 6264.8, 25.120, 0.000! !END!
746!X = 302.2, 6264.8, 24.556, 0.000! !END!
747!X = 302.3, 6264.8, 23.651, 0.000! !END!
748!X = 302.4, 6264.8, 22.923, 0.000! !END!
749!X = 302.5, 6264.8, 23.077, 0.000! !END!
750!X = 302.6, 6264.8, 22.731, 0.000! !END!
751!X = 302.7, 6264.8, 24.666, 0.000! !END!
752!X = 302.8, 6264.8, 27.246, 0.000! !END!
753!X = 302.9, 6264.8, 29.089, 0.000! !END!
754!X = 303.0, 6264.8, 25.998, 0.000! !END!
755!X = 303.1, 6264.8, 24.168, 0.000! !END!
756!X = 303.2, 6264.8, 24.290, 0.000! !END!
757!X = 303.3, 6264.8, 24.205, 0.000! !END!
758!X = 303.4, 6264.8, 24.702, 0.000! !END!
759!X = 303.5, 6264.8, 25.636, 0.000! !END!
760!X = 303.6, 6264.8, 26.273, 0.000! !END!
761!X = 303.7, 6264.8, 32.083, 0.000! !END!
762!X = 303.8, 6264.8, 33.360, 0.000! !END!

Odour and Air Quality Impact Assessment Report

763!X = 303.9, 6264.8, 32.631, 0.000! !END!
764!X = 304.0, 6264.8, 34.955, 0.000! !END!
765!X = 304.1, 6264.8, 37.973, 0.000! !END!
766!X = 304.2, 6264.8, 37.045, 0.000! !END!
767!X = 304.3, 6264.8, 40.412, 0.000! !END!
768!X = 304.4, 6264.8, 47.459, 0.000! !END!
769!X = 304.5, 6264.8, 43.362, 0.000! !END!
770!X = 304.6, 6264.8, 44.046, 0.000! !END!
771!X = 304.7, 6264.8, 53.191, 0.000! !END!
772!X = 304.8, 6264.8, 53.275, 0.000! !END!
773!X = 304.9, 6264.8, 52.931, 0.000! !END!
774!X = 305.0, 6264.8, 54.792, 0.000! !END!
775!X = 305.1, 6264.8, 53.878, 0.000! !END!
776!X = 305.2, 6264.8, 52.637, 0.000! !END!
777!X = 305.3, 6264.8, 49.102, 0.000! !END!
778!X = 305.4, 6264.8, 46.954, 0.000! !END!
779!X = 305.5, 6264.8, 51.433, 0.000! !END!
780!X = 301.5, 6264.9, 43.473, 0.000! !END!
781!X = 301.6, 6264.9, 38.130, 0.000! !END!
782!X = 301.7, 6264.9, 35.195, 0.000! !END!
783!X = 301.8, 6264.9, 32.674, 0.000! !END!
784!X = 301.9, 6264.9, 30.189, 0.000! !END!
785!X = 302.0, 6264.9, 27.215, 0.000! !END!
786!X = 302.1, 6264.9, 25.275, 0.000! !END!
787!X = 302.2, 6264.9, 24.168, 0.000! !END!
788!X = 302.3, 6264.9, 24.455, 0.000! !END!
789!X = 302.4, 6264.9, 23.277, 0.000! !END!
790!X = 302.5, 6264.9, 22.364, 0.000! !END!
791!X = 302.6, 6264.9, 22.299, 0.000! !END!
792!X = 302.7, 6264.9, 23.899, 0.000! !END!
793!X = 302.8, 6264.9, 26.254, 0.000! !END!
794!X = 302.9, 6264.9, 26.697, 0.000! !END!
795!X = 303.0, 6264.9, 24.718, 0.000! !END!
796!X = 303.1, 6264.9, 23.337, 0.000! !END!
797!X = 303.2, 6264.9, 23.596, 0.000! !END!
798!X = 303.3, 6264.9, 24.296, 0.000! !END!

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799!X = 303.4, 6264.9, 24.198, 0.000! !END!
800!X = 303.5, 6264.9, 25.508, 0.000! !END!
801!X = 303.6, 6264.9, 33.826, 0.000! !END!
802!X = 303.7, 6264.9, 38.251, 0.000! !END!
803!X = 303.8, 6264.9, 41.049, 0.000! !END!
804!X = 303.9, 6264.9, 40.723, 0.000! !END!
805!X = 304.0, 6264.9, 39.776, 0.000! !END!
806!X = 304.1, 6264.9, 42.532, 0.000! !END!
807!X = 304.2, 6264.9, 40.889, 0.000! !END!
808!X = 304.3, 6264.9, 42.441, 0.000! !END!
809!X = 304.4, 6264.9, 50.000, 0.000! !END!
810!X = 304.5, 6264.9, 51.197, 0.000! !END!
811!X = 304.6, 6264.9, 51.210, 0.000! !END!
812!X = 304.7, 6264.9, 51.385, 0.000! !END!
813!X = 304.8, 6264.9, 49.181, 0.000! !END!
814!X = 304.9, 6264.9, 48.396, 0.000! !END!
815!X = 305.0, 6264.9, 49.048, 0.000! !END!
816!X = 305.1, 6264.9, 47.357, 0.000! !END!
817!X = 305.2, 6264.9, 45.513, 0.000! !END!
818!X = 305.3, 6264.9, 44.743, 0.000! !END!
819!X = 305.4, 6264.9, 45.359, 0.000! !END!
820!X = 305.5, 6264.9, 49.092, 0.000! !END!
821!X = 301.5, 6265.0, 42.694, 0.000! !END!
822!X = 301.6, 6265.0, 38.804, 0.000! !END!
823!X = 301.7, 6265.0, 35.272, 0.000! !END!
824!X = 301.8, 6265.0, 32.595, 0.000! !END!
825!X = 301.9, 6265.0, 30.360, 0.000! !END!
826!X = 302.0, 6265.0, 27.813, 0.000! !END!
827!X = 302.1, 6265.0, 25.681, 0.000! !END!
828!X = 302.2, 6265.0, 24.036, 0.000! !END!
829!X = 302.3, 6265.0, 23.352, 0.000! !END!
830!X = 302.4, 6265.0, 23.128, 0.000! !END!
831!X = 302.5, 6265.0, 21.285, 0.000! !END!
832!X = 302.6, 6265.0, 21.858, 0.000! !END!
833!X = 302.7, 6265.0, 23.645, 0.000! !END!
834!X = 302.8, 6265.0, 24.155, 0.000! !END!

835!X = 302.9, 6265.0, 23.793, 0.000! !END!
 836!X = 303.0, 6265.0, 23.412, 0.000! !END!
 837!X = 303.1, 6265.0, 23.497, 0.000! !END!
 838!X = 303.2, 6265.0, 21.137, 0.000! !END!
 839!X = 303.3, 6265.0, 24.768, 0.000! !END!
 840!X = 303.4, 6265.0, 25.463, 0.000! !END!
 841!X = 303.5, 6265.0, 26.482, 0.000! !END!
 842!X = 303.6, 6265.0, 31.831, 0.000! !END!
 843!X = 303.7, 6265.0, 36.532, 0.000! !END!
 844!X = 303.8, 6265.0, 40.780, 0.000! !END!
 845!X = 303.9, 6265.0, 44.032, 0.000! !END!
 846!X = 304.0, 6265.0, 44.423, 0.000! !END!
 847!X = 304.1, 6265.0, 43.384, 0.000! !END!
 848!X = 304.2, 6265.0, 43.598, 0.000! !END!
 849!X = 304.3, 6265.0, 46.216, 0.000! !END!
 850!X = 304.4, 6265.0, 52.701, 0.000! !END!
 851!X = 304.5, 6265.0, 52.547, 0.000! !END!
 852!X = 304.6, 6265.0, 50.982, 0.000! !END!
 853!X = 304.7, 6265.0, 51.005, 0.000! !END!
 854!X = 304.8, 6265.0, 45.241, 0.000! !END!
 855!X = 304.9, 6265.0, 43.384, 0.000! !END!
 856!X = 305.0, 6265.0, 43.143, 0.000! !END!
 857!X = 305.1, 6265.0, 42.195, 0.000! !END!
 858!X = 305.2, 6265.0, 43.146, 0.000! !END!
 859!X = 305.3, 6265.0, 44.560, 0.000! !END!
 860!X = 305.4, 6265.0, 46.832, 0.000! !END!
 861!X = 305.5, 6265.0, 48.855, 0.000! !END!
 862!X = 301.5, 6265.1, 51.112, 0.000! !END!
 863!X = 301.6, 6265.1, 43.081, 0.000! !END!
 864!X = 301.7, 6265.1, 37.126, 0.000! !END!
 865!X = 301.8, 6265.1, 32.609, 0.000! !END!
 866!X = 301.9, 6265.1, 30.263, 0.000! !END!
 867!X = 302.0, 6265.1, 27.777, 0.000! !END!
 868!X = 302.1, 6265.1, 25.151, 0.000! !END!
 869!X = 302.2, 6265.1, 24.122, 0.000! !END!
 870!X = 302.3, 6265.1, 23.620, 0.000! !END!

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871!X = 302.4, 6265.1, 22.618, 0.000! !END!
872!X = 302.5, 6265.1, 22.606, 0.000! !END!
873!X = 302.6, 6265.1, 22.606, 0.000! !END!
874!X = 302.7, 6265.1, 23.193, 0.000! !END!
875!X = 302.8, 6265.1, 23.926, 0.000! !END!
876!X = 302.9, 6265.1, 23.575, 0.000! !END!
877!X = 303.0, 6265.1, 24.977, 0.000! !END!
878!X = 303.1, 6265.1, 20.095, 0.000! !END!
879!X = 303.2, 6265.1, 25.048, 0.000! !END!
880!X = 303.3, 6265.1, 26.848, 0.000! !END!
881!X = 303.4, 6265.1, 26.069, 0.000! !END!
882!X = 303.5, 6265.1, 27.278, 0.000! !END!
883!X = 303.6, 6265.1, 30.423, 0.000! !END!
884!X = 303.7, 6265.1, 33.611, 0.000! !END!
885!X = 303.8, 6265.1, 37.207, 0.000! !END!
886!X = 303.9, 6265.1, 42.230, 0.000! !END!
887!X = 304.0, 6265.1, 43.231, 0.000! !END!
888!X = 304.1, 6265.1, 40.624, 0.000! !END!
889!X = 304.2, 6265.1, 41.511, 0.000! !END!
890!X = 304.3, 6265.1, 46.613, 0.000! !END!
891!X = 304.4, 6265.1, 52.005, 0.000! !END!
892!X = 304.5, 6265.1, 45.378, 0.000! !END!
893!X = 304.6, 6265.1, 44.410, 0.000! !END!
894!X = 304.7, 6265.1, 44.212, 0.000! !END!
895!X = 304.8, 6265.1, 41.780, 0.000! !END!
896!X = 304.9, 6265.1, 40.467, 0.000! !END!
897!X = 305.0, 6265.1, 41.113, 0.000! !END!
898!X = 305.1, 6265.1, 41.790, 0.000! !END!
899!X = 305.2, 6265.1, 43.833, 0.000! !END!
900!X = 305.3, 6265.1, 45.240, 0.000! !END!
901!X = 305.4, 6265.1, 45.716, 0.000! !END!
902!X = 305.5, 6265.1, 46.373, 0.000! !END!
903!X = 301.5, 6265.2, 46.525, 0.000! !END!
904!X = 301.6, 6265.2, 41.136, 0.000! !END!
905!X = 301.7, 6265.2, 36.988, 0.000! !END!
906!X = 301.8, 6265.2, 35.026, 0.000! !END!

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907!X = 301.9, 6265.2, 30.939, 0.000! !END!
908!X = 302.0, 6265.2, 28.373, 0.000! !END!
909!X = 302.1, 6265.2, 25.658, 0.000! !END!
910!X = 302.2, 6265.2, 24.239, 0.000! !END!
911!X = 302.3, 6265.2, 23.349, 0.000! !END!
912!X = 302.4, 6265.2, 22.882, 0.000! !END!
913!X = 302.5, 6265.2, 22.056, 0.000! !END!
914!X = 302.6, 6265.2, 22.040, 0.000! !END!
915!X = 302.7, 6265.2, 22.151, 0.000! !END!
916!X = 302.8, 6265.2, 22.703, 0.000! !END!
917!X = 302.9, 6265.2, 22.171, 0.000! !END!
918!X = 303.0, 6265.2, 23.123, 0.000! !END!
919!X = 303.1, 6265.2, 25.284, 0.000! !END!
920!X = 303.2, 6265.2, 23.168, 0.000! !END!
921!X = 303.3, 6265.2, 27.534, 0.000! !END!
922!X = 303.4, 6265.2, 24.984, 0.000! !END!
923!X = 303.5, 6265.2, 28.360, 0.000! !END!
924!X = 303.6, 6265.2, 37.843, 0.000! !END!
925!X = 303.7, 6265.2, 34.803, 0.000! !END!
926!X = 303.8, 6265.2, 35.426, 0.000! !END!
927!X = 303.9, 6265.2, 38.314, 0.000! !END!
928!X = 304.0, 6265.2, 40.816, 0.000! !END!
929!X = 304.1, 6265.2, 38.887, 0.000! !END!
930!X = 304.2, 6265.2, 41.197, 0.000! !END!
931!X = 304.3, 6265.2, 43.892, 0.000! !END!
932!X = 304.4, 6265.2, 43.813, 0.000! !END!
933!X = 304.5, 6265.2, 41.562, 0.000! !END!
934!X = 304.6, 6265.2, 43.246, 0.000! !END!
935!X = 304.7, 6265.2, 46.074, 0.000! !END!
936!X = 304.8, 6265.2, 48.588, 0.000! !END!
937!X = 304.9, 6265.2, 40.120, 0.000! !END!
938!X = 305.0, 6265.2, 50.944, 0.000! !END!
939!X = 305.1, 6265.2, 51.316, 0.000! !END!
940!X = 305.2, 6265.2, 51.884, 0.000! !END!
941!X = 305.3, 6265.2, 50.584, 0.000! !END!
942!X = 305.4, 6265.2, 51.811, 0.000! !END!

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943!X = 305.5, 6265.2, 52.179, 0.000! !END!
944!X = 301.5, 6265.3, 48.105, 0.000! !END!
945!X = 301.6, 6265.3, 40.436, 0.000! !END!
946!X = 301.7, 6265.3, 37.718, 0.000! !END!
947!X = 301.8, 6265.3, 37.006, 0.000! !END!
948!X = 301.9, 6265.3, 32.653, 0.000! !END!
949!X = 302.0, 6265.3, 29.971, 0.000! !END!
950!X = 302.1, 6265.3, 26.976, 0.000! !END!
951!X = 302.2, 6265.3, 24.684, 0.000! !END!
952!X = 302.3, 6265.3, 23.442, 0.000! !END!
953!X = 302.4, 6265.3, 22.871, 0.000! !END!
954!X = 302.5, 6265.3, 22.355, 0.000! !END!
955!X = 302.6, 6265.3, 22.268, 0.000! !END!
956!X = 302.7, 6265.3, 20.722, 0.000! !END!
957!X = 302.8, 6265.3, 22.179, 0.000! !END!
958!X = 302.9, 6265.3, 21.760, 0.000! !END!
959!X = 303.0, 6265.3, 22.155, 0.000! !END!
960!X = 303.1, 6265.3, 29.507, 0.000! !END!
961!X = 303.2, 6265.3, 23.570, 0.000! !END!
962!X = 303.3, 6265.3, 23.940, 0.000! !END!
963!X = 303.4, 6265.3, 24.087, 0.000! !END!
964!X = 303.5, 6265.3, 24.676, 0.000! !END!
965!X = 303.6, 6265.3, 25.342, 0.000! !END!
966!X = 303.7, 6265.3, 25.878, 0.000! !END!
967!X = 303.8, 6265.3, 28.916, 0.000! !END!
968!X = 303.9, 6265.3, 32.307, 0.000! !END!
969!X = 304.0, 6265.3, 37.190, 0.000! !END!
970!X = 304.1, 6265.3, 37.578, 0.000! !END!
971!X = 304.2, 6265.3, 38.715, 0.000! !END!
972!X = 304.3, 6265.3, 39.886, 0.000! !END!
973!X = 304.4, 6265.3, 39.697, 0.000! !END!
974!X = 304.5, 6265.3, 37.186, 0.000! !END!
975!X = 304.6, 6265.3, 35.044, 0.000! !END!
976!X = 304.7, 6265.3, 36.829, 0.000! !END!
977!X = 304.8, 6265.3, 38.215, 0.000! !END!
978!X = 304.9, 6265.3, 37.792, 0.000! !END!

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979!X = 305.0, 6265.3, 39.554, 0.000! !END!
980!X = 305.1, 6265.3, 40.910, 0.000! !END!
981!X = 305.2, 6265.3, 43.174, 0.000! !END!
982!X = 305.3, 6265.3, 46.025, 0.000! !END!
983!X = 305.4, 6265.3, 49.053, 0.000! !END!
984!X = 305.5, 6265.3, 49.793, 0.000! !END!
985!X = 301.5, 6265.4, 42.482, 0.000! !END!
986!X = 301.6, 6265.4, 39.037, 0.000! !END!
987!X = 301.7, 6265.4, 35.756, 0.000! !END!
988!X = 301.8, 6265.4, 34.105, 0.000! !END!
989!X = 301.9, 6265.4, 30.902, 0.000! !END!
990!X = 302.0, 6265.4, 29.345, 0.000! !END!
991!X = 302.1, 6265.4, 27.572, 0.000! !END!
992!X = 302.2, 6265.4, 25.883, 0.000! !END!
993!X = 302.3, 6265.4, 26.213, 0.000! !END!
994!X = 302.4, 6265.4, 22.772, 0.000! !END!
995!X = 302.5, 6265.4, 22.442, 0.000! !END!
996!X = 302.6, 6265.4, 22.289, 0.000! !END!
997!X = 302.7, 6265.4, 21.952, 0.000! !END!
998!X = 302.8, 6265.4, 22.035, 0.000! !END!
999!X = 302.9, 6265.4, 23.508, 0.000! !END!
1000!X = 303.0, 6265.4, 21.156, 0.000! !END!
1001!X = 303.1, 6265.4, 25.904, 0.000! !END!
1002!X = 303.2, 6265.4, 23.065, 0.000! !END!
1003!X = 303.3, 6265.4, 24.500, 0.000! !END!
1004!X = 303.4, 6265.4, 28.139, 0.000! !END!
1005!X = 303.5, 6265.4, 29.905, 0.000! !END!
1006!X = 303.6, 6265.4, 30.565, 0.000! !END!
1007!X = 303.7, 6265.4, 32.970, 0.000! !END!
1008!X = 303.8, 6265.4, 33.972, 0.000! !END!
1009!X = 303.9, 6265.4, 36.831, 0.000! !END!
1010!X = 304.0, 6265.4, 35.408, 0.000! !END!
1011!X = 304.1, 6265.4, 34.329, 0.000! !END!
1012!X = 304.2, 6265.4, 34.628, 0.000! !END!
1013!X = 304.3, 6265.4, 35.986, 0.000! !END!
1014!X = 304.4, 6265.4, 35.053, 0.000! !END!

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1015!X= 304.5, 6265.4, 35.014, 0.000! !END!
1016!X= 304.6, 6265.4, 36.950, 0.000! !END!
1017!X= 304.7, 6265.4, 38.889, 0.000! !END!
1018!X= 304.8, 6265.4, 37.884, 0.000! !END!
1019!X= 304.9, 6265.4, 38.747, 0.000! !END!
1020!X= 305.0, 6265.4, 39.583, 0.000! !END!
1021!X= 305.1, 6265.4, 39.501, 0.000! !END!
1022!X= 305.2, 6265.4, 41.970, 0.000! !END!
1023!X= 305.3, 6265.4, 43.217, 0.000! !END!
1024!X= 305.4, 6265.4, 45.248, 0.000! !END!
1025!X= 305.5, 6265.4, 47.992, 0.000! !END!
1026!X= 301.5, 6265.5, 41.121, 0.000! !END!
1027!X= 301.6, 6265.5, 37.353, 0.000! !END!
1028!X= 301.7, 6265.5, 36.264, 0.000! !END!
1029!X= 301.8, 6265.5, 33.369, 0.000! !END!
1030!X= 301.9, 6265.5, 40.247, 0.000! !END!
1031!X= 302.0, 6265.5, 35.766, 0.000! !END!
1032!X= 302.1, 6265.5, 29.703, 0.000! !END!
1033!X= 302.2, 6265.5, 26.058, 0.000! !END!
1034!X= 302.3, 6265.5, 25.603, 0.000! !END!
1035!X= 302.4, 6265.5, 25.502, 0.000! !END!
1036!X= 302.5, 6265.5, 24.020, 0.000! !END!
1037!X= 302.6, 6265.5, 22.647, 0.000! !END!
1038!X= 302.7, 6265.5, 21.782, 0.000! !END!
1039!X= 302.8, 6265.5, 21.591, 0.000! !END!
1040!X= 302.9, 6265.5, 21.027, 0.000! !END!
1041!X= 303.0, 6265.5, 21.662, 0.000! !END!
1042!X= 303.1, 6265.5, 22.282, 0.000! !END!
1043!X= 303.2, 6265.5, 24.753, 0.000! !END!
1044!X= 303.3, 6265.5, 25.999, 0.000! !END!
1045!X= 303.4, 6265.5, 27.956, 0.000! !END!
1046!X= 303.5, 6265.5, 30.217, 0.000! !END!
1047!X= 303.6, 6265.5, 32.825, 0.000! !END!
1048!X= 303.7, 6265.5, 36.823, 0.000! !END!
1049!X= 303.8, 6265.5, 38.578, 0.000! !END!
1050!X= 303.9, 6265.5, 37.042, 0.000! !END!

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1051!X= 304.0, 6265.5, 33.657, 0.000! !END!
1052!X= 304.1, 6265.5, 33.142, 0.000! !END!
1053!X= 304.2, 6265.5, 33.753, 0.000! !END!
1054!X= 304.3, 6265.5, 33.424, 0.000! !END!
1055!X= 304.4, 6265.5, 34.083, 0.000! !END!
1056!X= 304.5, 6265.5, 35.347, 0.000! !END!
1057!X= 304.6, 6265.5, 36.014, 0.000! !END!
1058!X= 304.7, 6265.5, 37.610, 0.000! !END!
1059!X= 304.8, 6265.5, 39.499, 0.000! !END!
1060!X= 304.9, 6265.5, 39.305, 0.000! !END!
1061!X= 305.0, 6265.5, 39.979, 0.000! !END!
1062!X= 305.1, 6265.5, 41.390, 0.000! !END!
1063!X= 305.2, 6265.5, 40.540, 0.000! !END!
1064!X= 305.3, 6265.5, 42.854, 0.000! !END!
1065!X= 305.4, 6265.5, 45.076, 0.000! !END!
1066!X= 305.5, 6265.5, 44.840, 0.000! !END!
1067!X= 301.5, 6265.6, 41.255, 0.000! !END!
1068!X= 301.6, 6265.6, 38.142, 0.000! !END!
1069!X= 301.7, 6265.6, 40.048, 0.000! !END!
1070!X= 301.8, 6265.6, 31.719, 0.000! !END!
1071!X= 301.9, 6265.6, 30.200, 0.000! !END!
1072!X= 302.0, 6265.6, 30.241, 0.000! !END!
1073!X= 302.1, 6265.6, 35.571, 0.000! !END!
1074!X= 302.2, 6265.6, 28.076, 0.000! !END!
1075!X= 302.3, 6265.6, 29.571, 0.000! !END!
1076!X= 302.4, 6265.6, 21.998, 0.000! !END!
1077!X= 302.5, 6265.6, 22.039, 0.000! !END!
1078!X= 302.6, 6265.6, 21.712, 0.000! !END!
1079!X= 302.7, 6265.6, 21.963, 0.000! !END!
1080!X= 302.8, 6265.6, 20.605, 0.000! !END!
1081!X= 302.9, 6265.6, 20.560, 0.000! !END!
1082!X= 303.0, 6265.6, 21.959, 0.000! !END!
1083!X= 303.1, 6265.6, 22.421, 0.000! !END!
1084!X= 303.2, 6265.6, 23.702, 0.000! !END!
1085!X= 303.3, 6265.6, 25.437, 0.000! !END!
1086!X= 303.4, 6265.6, 27.172, 0.000! !END!

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1087!X= 303.5, 6265.6, 28.658, 0.000! !END!
1088!X= 303.6, 6265.6, 30.868, 0.000! !END!
1089!X= 303.7, 6265.6, 34.108, 0.000! !END!
1090!X= 303.8, 6265.6, 36.370, 0.000! !END!
1091!X= 303.9, 6265.6, 34.311, 0.000! !END!
1092!X= 304.0, 6265.6, 32.271, 0.000! !END!
1093!X= 304.1, 6265.6, 32.606, 0.000! !END!
1094!X= 304.2, 6265.6, 32.750, 0.000! !END!
1095!X= 304.3, 6265.6, 32.787, 0.000! !END!
1096!X= 304.4, 6265.6, 33.654, 0.000! !END!
1097!X= 304.5, 6265.6, 35.773, 0.000! !END!
1098!X= 304.6, 6265.6, 37.523, 0.000! !END!
1099!X= 304.7, 6265.6, 39.702, 0.000! !END!
1100!X= 304.8, 6265.6, 42.134, 0.000! !END!
1101!X= 304.9, 6265.6, 43.793, 0.000! !END!
1102!X= 305.0, 6265.6, 42.328, 0.000! !END!
1103!X= 305.1, 6265.6, 44.047, 0.000! !END!
1104!X= 305.2, 6265.6, 44.771, 0.000! !END!
1105!X= 305.3, 6265.6, 42.899, 0.000! !END!
1106!X= 305.4, 6265.6, 43.322, 0.000! !END!
1107!X= 305.5, 6265.6, 44.388, 0.000! !END!
1108!X= 301.5, 6265.7, 36.759, 0.000! !END!
1109!X= 301.6, 6265.7, 33.680, 0.000! !END!
1110!X= 301.7, 6265.7, 37.389, 0.000! !END!
1111!X= 301.8, 6265.7, 33.207, 0.000! !END!
1112!X= 301.9, 6265.7, 34.745, 0.000! !END!
1113!X= 302.0, 6265.7, 35.083, 0.000! !END!
1114!X= 302.1, 6265.7, 32.308, 0.000! !END!
1115!X= 302.2, 6265.7, 28.236, 0.000! !END!
1116!X= 302.3, 6265.7, 24.300, 0.000! !END!
1117!X= 302.4, 6265.7, 19.618, 0.000! !END!
1118!X= 302.5, 6265.7, 21.738, 0.000! !END!
1119!X= 302.6, 6265.7, 19.614, 0.000! !END!
1120!X= 302.7, 6265.7, 19.199, 0.000! !END!
1121!X= 302.8, 6265.7, 21.249, 0.000! !END!
1122!X= 302.9, 6265.7, 18.831, 0.000! !END!

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1123!X= 303.0, 6265.7, 21.438, 0.000! !END!
1124!X= 303.1, 6265.7, 21.857, 0.000! !END!
1125!X= 303.2, 6265.7, 23.134, 0.000! !END!
1126!X= 303.3, 6265.7, 24.999, 0.000! !END!
1127!X= 303.4, 6265.7, 26.592, 0.000! !END!
1128!X= 303.5, 6265.7, 28.366, 0.000! !END!
1129!X= 303.6, 6265.7, 30.438, 0.000! !END!
1130!X= 303.7, 6265.7, 32.510, 0.000! !END!
1131!X= 303.8, 6265.7, 33.203, 0.000! !END!
1132!X= 303.9, 6265.7, 31.268, 0.000! !END!
1133!X= 304.0, 6265.7, 30.971, 0.000! !END!
1134!X= 304.1, 6265.7, 31.737, 0.000! !END!
1135!X= 304.2, 6265.7, 30.169, 0.000! !END!
1136!X= 304.3, 6265.7, 32.358, 0.000! !END!
1137!X= 304.4, 6265.7, 33.562, 0.000! !END!
1138!X= 304.5, 6265.7, 35.817, 0.000! !END!
1139!X= 304.6, 6265.7, 40.006, 0.000! !END!
1140!X= 304.7, 6265.7, 45.285, 0.000! !END!
1141!X= 304.8, 6265.7, 48.299, 0.000! !END!
1142!X= 304.9, 6265.7, 48.685, 0.000! !END!
1143!X= 305.0, 6265.7, 46.304, 0.000! !END!
1144!X= 305.1, 6265.7, 46.641, 0.000! !END!
1145!X= 305.2, 6265.7, 47.883, 0.000! !END!
1146!X= 305.3, 6265.7, 47.070, 0.000! !END!
1147!X= 305.4, 6265.7, 47.959, 0.000! !END!
1148!X= 305.5, 6265.7, 47.277, 0.000! !END!
1149!X= 301.5, 6265.8, 34.870, 0.000! !END!
1150!X= 301.6, 6265.8, 31.855, 0.000! !END!
1151!X= 301.7, 6265.8, 32.025, 0.000! !END!
1152!X= 301.8, 6265.8, 31.142, 0.000! !END!
1153!X= 301.9, 6265.8, 29.466, 0.000! !END!
1154!X= 302.0, 6265.8, 29.573, 0.000! !END!
1155!X= 302.1, 6265.8, 28.867, 0.000! !END!
1156!X= 302.2, 6265.8, 26.422, 0.000! !END!
1157!X= 302.3, 6265.8, 23.552, 0.000! !END!
1158!X= 302.4, 6265.8, 18.560, 0.000! !END!

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1159!X= 302.5, 6265.8, 21.324, 0.000! !END!
1160!X= 302.6, 6265.8, 20.158, 0.000! !END!
1161!X= 302.7, 6265.8, 21.347, 0.000! !END!
1162!X= 302.8, 6265.8, 21.299, 0.000! !END!
1163!X= 302.9, 6265.8, 19.162, 0.000! !END!
1164!X= 303.0, 6265.8, 20.742, 0.000! !END!
1165!X= 303.1, 6265.8, 21.962, 0.000! !END!
1166!X= 303.2, 6265.8, 24.291, 0.000! !END!
1167!X= 303.3, 6265.8, 26.669, 0.000! !END!
1168!X= 303.4, 6265.8, 27.506, 0.000! !END!
1169!X= 303.5, 6265.8, 28.479, 0.000! !END!
1170!X= 303.6, 6265.8, 30.322, 0.000! !END!
1171!X= 303.7, 6265.8, 31.991, 0.000! !END!
1172!X= 303.8, 6265.8, 31.035, 0.000! !END!
1173!X= 303.9, 6265.8, 30.136, 0.000! !END!
1174!X= 304.0, 6265.8, 30.577, 0.000! !END!
1175!X= 304.1, 6265.8, 31.055, 0.000! !END!
1176!X= 304.2, 6265.8, 31.616, 0.000! !END!
1177!X= 304.3, 6265.8, 33.087, 0.000! !END!
1178!X= 304.4, 6265.8, 36.470, 0.000! !END!
1179!X= 304.5, 6265.8, 39.803, 0.000! !END!
1180!X= 304.6, 6265.8, 41.132, 0.000! !END!
1181!X= 304.7, 6265.8, 44.218, 0.000! !END!
1182!X= 304.8, 6265.8, 45.645, 0.000! !END!
1183!X= 304.9, 6265.8, 45.927, 0.000! !END!
1184!X= 305.0, 6265.8, 46.420, 0.000! !END!
1185!X= 305.1, 6265.8, 49.654, 0.000! !END!
1186!X= 305.2, 6265.8, 52.350, 0.000! !END!
1187!X= 305.3, 6265.8, 52.633, 0.000! !END!
1188!X= 305.4, 6265.8, 52.007, 0.000! !END!
1189!X= 305.5, 6265.8, 52.563, 0.000! !END!
1190!X= 301.5, 6265.9, 35.104, 0.000! !END!
1191!X= 301.6, 6265.9, 32.262, 0.000! !END!
1192!X= 301.7, 6265.9, 28.562, 0.000! !END!
1193!X= 301.8, 6265.9, 27.777, 0.000! !END!
1194!X= 301.9, 6265.9, 27.144, 0.000! !END!

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1195!X= 302.0, 6265.9, 25.985, 0.000! !END!
1196!X= 302.1, 6265.9, 26.166, 0.000! !END!
1197!X= 302.2, 6265.9, 23.696, 0.000! !END!
1198!X= 302.3, 6265.9, 21.383, 0.000! !END!
1199!X= 302.4, 6265.9, 21.334, 0.000! !END!
1200!X= 302.5, 6265.9, 20.783, 0.000! !END!
1201!X= 302.6, 6265.9, 20.275, 0.000! !END!
1202!X= 302.7, 6265.9, 20.866, 0.000! !END!
1203!X= 302.8, 6265.9, 20.112, 0.000! !END!
1204!X= 302.9, 6265.9, 20.621, 0.000! !END!
1205!X= 303.0, 6265.9, 21.682, 0.000! !END!
1206!X= 303.1, 6265.9, 23.333, 0.000! !END!
1207!X= 303.2, 6265.9, 25.508, 0.000! !END!
1208!X= 303.3, 6265.9, 27.601, 0.000! !END!
1209!X= 303.4, 6265.9, 29.585, 0.000! !END!
1210!X= 303.5, 6265.9, 29.798, 0.000! !END!
1211!X= 303.6, 6265.9, 31.823, 0.000! !END!
1212!X= 303.7, 6265.9, 32.820, 0.000! !END!
1213!X= 303.8, 6265.9, 29.815, 0.000! !END!
1214!X= 303.9, 6265.9, 29.707, 0.000! !END!
1215!X= 304.0, 6265.9, 30.088, 0.000! !END!
1216!X= 304.1, 6265.9, 30.449, 0.000! !END!
1217!X= 304.2, 6265.9, 31.303, 0.000! !END!
1218!X= 304.3, 6265.9, 34.104, 0.000! !END!
1219!X= 304.4, 6265.9, 37.395, 0.000! !END!
1220!X= 304.5, 6265.9, 40.294, 0.000! !END!
1221!X= 304.6, 6265.9, 41.787, 0.000! !END!
1222!X= 304.7, 6265.9, 41.734, 0.000! !END!
1223!X= 304.8, 6265.9, 40.714, 0.000! !END!
1224!X= 304.9, 6265.9, 41.117, 0.000! !END!
1225!X= 305.0, 6265.9, 43.177, 0.000! !END!
1226!X= 305.1, 6265.9, 47.109, 0.000! !END!
1227!X= 305.2, 6265.9, 48.940, 0.000! !END!
1228!X= 305.3, 6265.9, 51.811, 0.000! !END!
1229!X= 305.4, 6265.9, 56.007, 0.000! !END!
1230!X= 305.5, 6265.9, 57.834, 0.000! !END!

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1231!X= 301.5, 6266.0, 39.218, 0.000! !END!
1232!X= 301.6, 6266.0, 38.860, 0.000! !END!
1233!X= 301.7, 6266.0, 32.079, 0.000! !END!
1234!X= 301.8, 6266.0, 27.809, 0.000! !END!
1235!X= 301.9, 6266.0, 26.235, 0.000! !END!
1236!X= 302.0, 6266.0, 23.851, 0.000! !END!
1237!X= 302.1, 6266.0, 23.718, 0.000! !END!
1238!X= 302.2, 6266.0, 20.950, 0.000! !END!
1239!X= 302.3, 6266.0, 19.621, 0.000! !END!
1240!X= 302.4, 6266.0, 19.941, 0.000! !END!
1241!X= 302.5, 6266.0, 20.718, 0.000! !END!
1242!X= 302.6, 6266.0, 20.210, 0.000! !END!
1243!X= 302.7, 6266.0, 21.122, 0.000! !END!
1244!X= 302.8, 6266.0, 20.813, 0.000! !END!
1245!X= 302.9, 6266.0, 21.718, 0.000! !END!
1246!X= 303.0, 6266.0, 22.301, 0.000! !END!
1247!X= 303.1, 6266.0, 23.674, 0.000! !END!
1248!X= 303.2, 6266.0, 25.883, 0.000! !END!
1249!X= 303.3, 6266.0, 28.632, 0.000! !END!
1250!X= 303.4, 6266.0, 30.696, 0.000! !END!
1251!X= 303.5, 6266.0, 31.820, 0.000! !END!
1252!X= 303.6, 6266.0, 32.429, 0.000! !END!
1253!X= 303.7, 6266.0, 31.605, 0.000! !END!
1254!X= 303.8, 6266.0, 28.866, 0.000! !END!
1255!X= 303.9, 6266.0, 28.555, 0.000! !END!
1256!X= 304.0, 6266.0, 28.923, 0.000! !END!
1257!X= 304.1, 6266.0, 29.550, 0.000! !END!
1258!X= 304.2, 6266.0, 32.150, 0.000! !END!
1259!X= 304.3, 6266.0, 34.880, 0.000! !END!
1260!X= 304.4, 6266.0, 37.347, 0.000! !END!
1261!X= 304.5, 6266.0, 37.886, 0.000! !END!
1262!X= 304.6, 6266.0, 38.075, 0.000! !END!
1263!X= 304.7, 6266.0, 37.831, 0.000! !END!
1264!X= 304.8, 6266.0, 37.372, 0.000! !END!
1265!X= 304.9, 6266.0, 41.000, 0.000! !END!
1266!X= 305.0, 6266.0, 44.302, 0.000! !END!

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1267!X= 305.1, 6266.0, 45.300, 0.000! !END!
1268!X= 305.2, 6266.0, 45.700, 0.000! !END!
1269!X= 305.3, 6266.0, 47.470, 0.000! !END!
1270!X= 305.4, 6266.0, 52.992, 0.000! !END!
1271!X= 305.5, 6266.0, 59.806, 0.000! !END!
1272!X= 301.5, 6266.1, 37.780, 0.000! !END!
1273!X= 301.6, 6266.1, 32.795, 0.000! !END!
1274!X= 301.7, 6266.1, 32.277, 0.000! !END!
1275!X= 301.8, 6266.1, 29.428, 0.000! !END!
1276!X= 301.9, 6266.1, 26.451, 0.000! !END!
1277!X= 302.0, 6266.1, 25.474, 0.000! !END!
1278!X= 302.1, 6266.1, 20.879, 0.000! !END!
1279!X= 302.2, 6266.1, 20.634, 0.000! !END!
1280!X= 302.3, 6266.1, 21.025, 0.000! !END!
1281!X= 302.4, 6266.1, 19.123, 0.000! !END!
1282!X= 302.5, 6266.1, 20.098, 0.000! !END!
1283!X= 302.6, 6266.1, 19.833, 0.000! !END!
1284!X= 302.7, 6266.1, 20.345, 0.000! !END!
1285!X= 302.8, 6266.1, 20.970, 0.000! !END!
1286!X= 302.9, 6266.1, 21.237, 0.000! !END!
1287!X= 303.0, 6266.1, 22.329, 0.000! !END!
1288!X= 303.1, 6266.1, 23.757, 0.000! !END!
1289!X= 303.2, 6266.1, 25.716, 0.000! !END!
1290!X= 303.3, 6266.1, 28.649, 0.000! !END!
1291!X= 303.4, 6266.1, 30.677, 0.000! !END!
1292!X= 303.5, 6266.1, 32.429, 0.000! !END!
1293!X= 303.6, 6266.1, 32.230, 0.000! !END!
1294!X= 303.7, 6266.1, 29.501, 0.000! !END!
1295!X= 303.8, 6266.1, 27.006, 0.000! !END!
1296!X= 303.9, 6266.1, 28.704, 0.000! !END!
1297!X= 304.0, 6266.1, 28.977, 0.000! !END!
1298!X= 304.1, 6266.1, 30.153, 0.000! !END!
1299!X= 304.2, 6266.1, 32.226, 0.000! !END!
1300!X= 304.3, 6266.1, 34.579, 0.000! !END!
1301!X= 304.4, 6266.1, 35.212, 0.000! !END!
1302!X= 304.5, 6266.1, 35.842, 0.000! !END!

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1303!X= 304.6, 6266.1, 34.691, 0.000! !END!
1304!X= 304.7, 6266.1, 35.379, 0.000! !END!
1305!X= 304.8, 6266.1, 38.219, 0.000! !END!
1306!X= 304.9, 6266.1, 41.896, 0.000! !END!
1307!X= 305.0, 6266.1, 43.528, 0.000! !END!
1308!X= 305.1, 6266.1, 41.755, 0.000! !END!
1309!X= 305.2, 6266.1, 44.337, 0.000! !END!
1310!X= 305.3, 6266.1, 47.158, 0.000! !END!
1311!X= 305.4, 6266.1, 51.673, 0.000! !END!
1312!X= 305.5, 6266.1, 57.375, 0.000! !END!
1313!X= 301.5, 6266.2, 39.163, 0.000! !END!
1314!X= 301.6, 6266.2, 33.773, 0.000! !END!
1315!X= 301.7, 6266.2, 34.969, 0.000! !END!
1316!X= 301.8, 6266.2, 30.384, 0.000! !END!
1317!X= 301.9, 6266.2, 28.036, 0.000! !END!
1318!X= 302.0, 6266.2, 27.119, 0.000! !END!
1319!X= 302.1, 6266.2, 28.630, 0.000! !END!
1320!X= 302.2, 6266.2, 22.431, 0.000! !END!
1321!X= 302.3, 6266.2, 20.478, 0.000! !END!
1322!X= 302.4, 6266.2, 18.260, 0.000! !END!
1323!X= 302.5, 6266.2, 19.494, 0.000! !END!
1324!X= 302.6, 6266.2, 19.927, 0.000! !END!
1325!X= 302.7, 6266.2, 20.269, 0.000! !END!
1326!X= 302.8, 6266.2, 20.410, 0.000! !END!
1327!X= 302.9, 6266.2, 20.853, 0.000! !END!
1328!X= 303.0, 6266.2, 22.066, 0.000! !END!
1329!X= 303.1, 6266.2, 23.414, 0.000! !END!
1330!X= 303.2, 6266.2, 25.735, 0.000! !END!
1331!X= 303.3, 6266.2, 27.959, 0.000! !END!
1332!X= 303.4, 6266.2, 30.179, 0.000! !END!
1333!X= 303.5, 6266.2, 32.326, 0.000! !END!
1334!X= 303.6, 6266.2, 31.062, 0.000! !END!
1335!X= 303.7, 6266.2, 28.542, 0.000! !END!
1336!X= 303.8, 6266.2, 28.487, 0.000! !END!
1337!X= 303.9, 6266.2, 26.804, 0.000! !END!
1338!X= 304.0, 6266.2, 28.894, 0.000! !END!

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1339!X= 304.1, 6266.2, 31.848, 0.000! !END!
1340!X= 304.2, 6266.2, 31.733, 0.000! !END!
1341!X= 304.3, 6266.2, 31.416, 0.000! !END!
1342!X= 304.4, 6266.2, 31.687, 0.000! !END!
1343!X= 304.5, 6266.2, 32.363, 0.000! !END!
1344!X= 304.6, 6266.2, 33.305, 0.000! !END!
1345!X= 304.7, 6266.2, 34.721, 0.000! !END!
1346!X= 304.8, 6266.2, 37.757, 0.000! !END!
1347!X= 304.9, 6266.2, 40.497, 0.000! !END!
1348!X= 305.0, 6266.2, 39.534, 0.000! !END!
1349!X= 305.1, 6266.2, 40.584, 0.000! !END!
1350!X= 305.2, 6266.2, 43.123, 0.000! !END!
1351!X= 305.3, 6266.2, 47.294, 0.000! !END!
1352!X= 305.4, 6266.2, 51.472, 0.000! !END!
1353!X= 305.5, 6266.2, 56.764, 0.000! !END!
1354!X= 301.5, 6266.3, 38.156, 0.000! !END!
1355!X= 301.6, 6266.3, 35.245, 0.000! !END!
1356!X= 301.7, 6266.3, 32.146, 0.000! !END!
1357!X= 301.8, 6266.3, 31.821, 0.000! !END!
1358!X= 301.9, 6266.3, 32.475, 0.000! !END!
1359!X= 302.0, 6266.3, 35.058, 0.000! !END!
1360!X= 302.1, 6266.3, 30.065, 0.000! !END!
1361!X= 302.2, 6266.3, 23.631, 0.000! !END!
1362!X= 302.3, 6266.3, 20.177, 0.000! !END!
1363!X= 302.4, 6266.3, 19.727, 0.000! !END!
1364!X= 302.5, 6266.3, 19.492, 0.000! !END!
1365!X= 302.6, 6266.3, 19.882, 0.000! !END!
1366!X= 302.7, 6266.3, 20.452, 0.000! !END!
1367!X= 302.8, 6266.3, 20.724, 0.000! !END!
1368!X= 302.9, 6266.3, 22.205, 0.000! !END!
1369!X= 303.0, 6266.3, 22.346, 0.000! !END!
1370!X= 303.1, 6266.3, 22.946, 0.000! !END!
1371!X= 303.2, 6266.3, 25.210, 0.000! !END!
1372!X= 303.3, 6266.3, 27.008, 0.000! !END!
1373!X= 303.4, 6266.3, 31.483, 0.000! !END!
1374!X= 303.5, 6266.3, 30.407, 0.000! !END!

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1375!X= 303.6, 6266.3, 28.135, 0.000! !END!
1376!X= 303.7, 6266.3, 26.186, 0.000! !END!
1377!X= 303.8, 6266.3, 26.176, 0.000! !END!
1378!X= 303.9, 6266.3, 27.410, 0.000! !END!
1379!X= 304.0, 6266.3, 29.323, 0.000! !END!
1380!X= 304.1, 6266.3, 29.174, 0.000! !END!
1381!X= 304.2, 6266.3, 28.473, 0.000! !END!
1382!X= 304.3, 6266.3, 29.668, 0.000! !END!
1383!X= 304.4, 6266.3, 30.445, 0.000! !END!
1384!X= 304.5, 6266.3, 30.598, 0.000! !END!
1385!X= 304.6, 6266.3, 32.907, 0.000! !END!
1386!X= 304.7, 6266.3, 34.744, 0.000! !END!
1387!X= 304.8, 6266.3, 36.487, 0.000! !END!
1388!X= 304.9, 6266.3, 37.012, 0.000! !END!
1389!X= 305.0, 6266.3, 38.572, 0.000! !END!
1390!X= 305.1, 6266.3, 40.846, 0.000! !END!
1391!X= 305.2, 6266.3, 43.786, 0.000! !END!
1392!X= 305.3, 6266.3, 47.877, 0.000! !END!
1393!X= 305.4, 6266.3, 51.413, 0.000! !END!
1394!X= 305.5, 6266.3, 58.703, 0.000! !END!
1395!X= 301.5, 6266.4, 40.568, 0.000! !END!
1396!X= 301.6, 6266.4, 36.851, 0.000! !END!
1397!X= 301.7, 6266.4, 36.199, 0.000! !END!
1398!X= 301.8, 6266.4, 36.476, 0.000! !END!
1399!X= 301.9, 6266.4, 34.625, 0.000! !END!
1400!X= 302.0, 6266.4, 35.220, 0.000! !END!
1401!X= 302.1, 6266.4, 30.725, 0.000! !END!
1402!X= 302.2, 6266.4, 22.119, 0.000! !END!
1403!X= 302.3, 6266.4, 19.990, 0.000! !END!
1404!X= 302.4, 6266.4, 19.026, 0.000! !END!
1405!X= 302.5, 6266.4, 17.051, 0.000! !END!
1406!X= 302.6, 6266.4, 19.860, 0.000! !END!
1407!X= 302.7, 6266.4, 20.594, 0.000! !END!
1408!X= 302.8, 6266.4, 21.809, 0.000! !END!
1409!X= 302.9, 6266.4, 21.986, 0.000! !END!
1410!X= 303.0, 6266.4, 22.214, 0.000! !END!

Odour and Air Quality Impact Assessment Report

1411!X= 303.1, 6266.4, 22.635, 0.000! !END!
1412!X= 303.2, 6266.4, 23.203, 0.000! !END!
1413!X= 303.3, 6266.4, 25.086, 0.000! !END!
1414!X= 303.4, 6266.4, 26.998, 0.000! !END!
1415!X= 303.5, 6266.4, 26.807, 0.000! !END!
1416!X= 303.6, 6266.4, 26.073, 0.000! !END!
1417!X= 303.7, 6266.4, 25.288, 0.000! !END!
1418!X= 303.8, 6266.4, 25.715, 0.000! !END!
1419!X= 303.9, 6266.4, 26.209, 0.000! !END!
1420!X= 304.0, 6266.4, 31.385, 0.000! !END!
1421!X= 304.1, 6266.4, 33.421, 0.000! !END!
1422!X= 304.2, 6266.4, 28.142, 0.000! !END!
1423!X= 304.3, 6266.4, 29.297, 0.000! !END!
1424!X= 304.4, 6266.4, 30.627, 0.000! !END!
1425!X= 304.5, 6266.4, 31.996, 0.000! !END!
1426!X= 304.6, 6266.4, 32.505, 0.000! !END!
1427!X= 304.7, 6266.4, 33.641, 0.000! !END!
1428!X= 304.8, 6266.4, 34.612, 0.000! !END!
1429!X= 304.9, 6266.4, 36.470, 0.000! !END!
1430!X= 305.0, 6266.4, 39.299, 0.000! !END!
1431!X= 305.1, 6266.4, 42.669, 0.000! !END!
1432!X= 305.2, 6266.4, 45.961, 0.000! !END!
1433!X= 305.3, 6266.4, 49.110, 0.000! !END!
1434!X= 305.4, 6266.4, 53.783, 0.000! !END!
1435!X= 305.5, 6266.4, 53.937, 0.000! !END!
1436!X= 301.5, 6266.5, 40.255, 0.000! !END!
1437!X= 301.6, 6266.5, 35.293, 0.000! !END!
1438!X= 301.7, 6266.5, 35.099, 0.000! !END!
1439!X= 301.8, 6266.5, 35.399, 0.000! !END!
1440!X= 301.9, 6266.5, 33.166, 0.000! !END!
1441!X= 302.0, 6266.5, 31.354, 0.000! !END!
1442!X= 302.1, 6266.5, 27.333, 0.000! !END!
1443!X= 302.2, 6266.5, 22.133, 0.000! !END!
1444!X= 302.3, 6266.5, 19.267, 0.000! !END!
1445!X= 302.4, 6266.5, 18.694, 0.000! !END!
1446!X= 302.5, 6266.5, 19.407, 0.000! !END!

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1447!X= 302.6, 6266.5, 21.685, 0.000! !END!
1448!X= 302.7, 6266.5, 20.613, 0.000! !END!
1449!X= 302.8, 6266.5, 20.723, 0.000! !END!
1450!X= 302.9, 6266.5, 22.083, 0.000! !END!
1451!X= 303.0, 6266.5, 21.483, 0.000! !END!
1452!X= 303.1, 6266.5, 21.812, 0.000! !END!
1453!X= 303.2, 6266.5, 22.537, 0.000! !END!
1454!X= 303.3, 6266.5, 23.800, 0.000! !END!
1455!X= 303.4, 6266.5, 24.352, 0.000! !END!
1456!X= 303.5, 6266.5, 24.567, 0.000! !END!
1457!X= 303.6, 6266.5, 24.615, 0.000! !END!
1458!X= 303.7, 6266.5, 25.004, 0.000! !END!
1459!X= 303.8, 6266.5, 25.185, 0.000! !END!
1460!X= 303.9, 6266.5, 25.680, 0.000! !END!
1461!X= 304.0, 6266.5, 26.350, 0.000! !END!
1462!X= 304.1, 6266.5, 28.629, 0.000! !END!
1463!X= 304.2, 6266.5, 29.254, 0.000! !END!
1464!X= 304.3, 6266.5, 30.491, 0.000! !END!
1465!X= 304.4, 6266.5, 31.547, 0.000! !END!
1466!X= 304.5, 6266.5, 32.785, 0.000! !END!
1467!X= 304.6, 6266.5, 33.036, 0.000! !END!
1468!X= 304.7, 6266.5, 32.498, 0.000! !END!
1469!X= 304.8, 6266.5, 34.810, 0.000! !END!
1470!X= 304.9, 6266.5, 37.605, 0.000! !END!
1471!X= 305.0, 6266.5, 40.872, 0.000! !END!
1472!X= 305.1, 6266.5, 43.512, 0.000! !END!
1473!X= 305.2, 6266.5, 44.266, 0.000! !END!
1474!X= 305.3, 6266.5, 45.443, 0.000! !END!
1475!X= 305.4, 6266.5, 46.333, 0.000! !END!
1476!X= 305.5, 6266.5, 47.611, 0.000! !END!
1477!X= 301.5, 6266.6, 38.170, 0.000! !END!
1478!X= 301.6, 6266.6, 32.096, 0.000! !END!
1479!X= 301.7, 6266.6, 30.580, 0.000! !END!
1480!X= 301.8, 6266.6, 30.434, 0.000! !END!
1481!X= 301.9, 6266.6, 34.699, 0.000! !END!
1482!X= 302.0, 6266.6, 30.837, 0.000! !END!

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1483!X =	302.1,	6266.6,	23.216,	0.000! !END!
1484!X =	302.2,	6266.6,	20.362,	0.000! !END!
1485!X =	302.3,	6266.6,	18.113,	0.000! !END!
1486!X =	302.4,	6266.6,	18.705,	0.000! !END!
1487!X =	302.5,	6266.6,	18.482,	0.000! !END!
1488!X =	302.6,	6266.6,	20.009,	0.000! !END!
1489!X =	302.7,	6266.6,	19.081,	0.000! !END!
1490!X =	302.8,	6266.6,	19.885,	0.000! !END!
1491!X =	302.9,	6266.6,	19.608,	0.000! !END!
1492!X =	303.0,	6266.6,	21.159,	0.000! !END!
1493!X =	303.1,	6266.6,	22.018,	0.000! !END!
1494!X =	303.2,	6266.6,	22.869,	0.000! !END!
1495!X =	303.3,	6266.6,	23.315,	0.000! !END!
1496!X =	303.4,	6266.6,	23.841,	0.000! !END!
1497!X =	303.5,	6266.6,	23.973,	0.000! !END!
1498!X =	303.6,	6266.6,	24.186,	0.000! !END!
1499!X =	303.7,	6266.6,	24.108,	0.000! !END!
1500!X =	303.8,	6266.6,	25.054,	0.000! !END!
1501!X =	303.9,	6266.6,	25.848,	0.000! !END!
1502!X =	304.0,	6266.6,	27.705,	0.000! !END!
1503!X =	304.1,	6266.6,	29.082,	0.000! !END!
1504!X =	304.2,	6266.6,	31.112,	0.000! !END!
1505!X =	304.3,	6266.6,	32.391,	0.000! !END!
1506!X =	304.4,	6266.6,	32.664,	0.000! !END!
1507!X =	304.5,	6266.6,	33.539,	0.000! !END!
1508!X =	304.6,	6266.6,	34.129,	0.000! !END!
1509!X =	304.7,	6266.6,	34.576,	0.000! !END!
1510!X =	304.8,	6266.6,	35.585,	0.000! !END!
1511!X =	304.9,	6266.6,	37.262,	0.000! !END!
1512!X =	305.0,	6266.6,	39.294,	0.000! !END!
1513!X =	305.1,	6266.6,	39.878,	0.000! !END!
1514!X =	305.2,	6266.6,	40.932,	0.000! !END!
1515!X =	305.3,	6266.6,	44.330,	0.000! !END!
1516!X =	305.4,	6266.6,	47.139,	0.000! !END!
1517!X =	305.5,	6266.6,	48.341,	0.000! !END!
1518!X =	301.5,	6266.7,	36.941,	0.000! !END!

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1519!X= 301.6, 6266.7, 33.700, 0.000! !END!
1520!X= 301.7, 6266.7, 29.380, 0.000! !END!
1521!X= 301.8, 6266.7, 27.904, 0.000! !END!
1522!X= 301.9, 6266.7, 32.667, 0.000! !END!
1523!X= 302.0, 6266.7, 28.435, 0.000! !END!
1524!X= 302.1, 6266.7, 20.962, 0.000! !END!
1525!X= 302.2, 6266.7, 18.403, 0.000! !END!
1526!X= 302.3, 6266.7, 18.291, 0.000! !END!
1527!X= 302.4, 6266.7, 17.066, 0.000! !END!
1528!X= 302.5, 6266.7, 19.811, 0.000! !END!
1529!X= 302.6, 6266.7, 20.213, 0.000! !END!
1530!X= 302.7, 6266.7, 20.100, 0.000! !END!
1531!X= 302.8, 6266.7, 20.455, 0.000! !END!
1532!X= 302.9, 6266.7, 21.201, 0.000! !END!
1533!X= 303.0, 6266.7, 22.149, 0.000! !END!
1534!X= 303.1, 6266.7, 22.453, 0.000! !END!
1535!X= 303.2, 6266.7, 22.331, 0.000! !END!
1536!X= 303.3, 6266.7, 22.820, 0.000! !END!
1537!X= 303.4, 6266.7, 23.133, 0.000! !END!
1538!X= 303.5, 6266.7, 23.461, 0.000! !END!
1539!X= 303.6, 6266.7, 23.925, 0.000! !END!
1540!X= 303.7, 6266.7, 24.434, 0.000! !END!
1541!X= 303.8, 6266.7, 25.210, 0.000! !END!
1542!X= 303.9, 6266.7, 26.296, 0.000! !END!
1543!X= 304.0, 6266.7, 28.114, 0.000! !END!
1544!X= 304.1, 6266.7, 28.645, 0.000! !END!
1545!X= 304.2, 6266.7, 32.625, 0.000! !END!
1546!X= 304.3, 6266.7, 36.064, 0.000! !END!
1547!X= 304.4, 6266.7, 36.537, 0.000! !END!
1548!X= 304.5, 6266.7, 35.820, 0.000! !END!
1549!X= 304.6, 6266.7, 36.718, 0.000! !END!
1550!X= 304.7, 6266.7, 36.302, 0.000! !END!
1551!X= 304.8, 6266.7, 36.721, 0.000! !END!
1552!X= 304.9, 6266.7, 37.220, 0.000! !END!
1553!X= 305.0, 6266.7, 36.966, 0.000! !END!
1554!X= 305.1, 6266.7, 38.591, 0.000! !END!

Odour and Air Quality Impact Assessment Report

1555!X= 305.2, 6266.7, 41.557, 0.000! !END!
1556!X= 305.3, 6266.7, 45.273, 0.000! !END!
1557!X= 305.4, 6266.7, 48.433, 0.000! !END!
1558!X= 305.5, 6266.7, 49.714, 0.000! !END!
1559!X= 301.5, 6266.8, 32.770, 0.000! !END!
1560!X= 301.6, 6266.8, 31.427, 0.000! !END!
1561!X= 301.7, 6266.8, 27.887, 0.000! !END!
1562!X= 301.8, 6266.8, 25.275, 0.000! !END!
1563!X= 301.9, 6266.8, 30.200, 0.000! !END!
1564!X= 302.0, 6266.8, 26.278, 0.000! !END!
1565!X= 302.1, 6266.8, 20.004, 0.000! !END!
1566!X= 302.2, 6266.8, 18.160, 0.000! !END!
1567!X= 302.3, 6266.8, 19.007, 0.000! !END!
1568!X= 302.4, 6266.8, 19.240, 0.000! !END!
1569!X= 302.5, 6266.8, 19.422, 0.000! !END!
1570!X= 302.6, 6266.8, 19.545, 0.000! !END!
1571!X= 302.7, 6266.8, 20.061, 0.000! !END!
1572!X= 302.8, 6266.8, 20.351, 0.000! !END!
1573!X= 302.9, 6266.8, 21.018, 0.000! !END!
1574!X= 303.0, 6266.8, 21.583, 0.000! !END!
1575!X= 303.1, 6266.8, 22.033, 0.000! !END!
1576!X= 303.2, 6266.8, 21.949, 0.000! !END!
1577!X= 303.3, 6266.8, 22.273, 0.000! !END!
1578!X= 303.4, 6266.8, 22.574, 0.000! !END!
1579!X= 303.5, 6266.8, 23.604, 0.000! !END!
1580!X= 303.6, 6266.8, 22.927, 0.000! !END!
1581!X= 303.7, 6266.8, 26.663, 0.000! !END!
1582!X= 303.8, 6266.8, 26.566, 0.000! !END!
1583!X= 303.9, 6266.8, 28.900, 0.000! !END!
1584!X= 304.0, 6266.8, 29.339, 0.000! !END!
1585!X= 304.1, 6266.8, 29.880, 0.000! !END!
1586!X= 304.2, 6266.8, 32.248, 0.000! !END!
1587!X= 304.3, 6266.8, 36.281, 0.000! !END!
1588!X= 304.4, 6266.8, 38.888, 0.000! !END!
1589!X= 304.5, 6266.8, 39.876, 0.000! !END!
1590!X= 304.6, 6266.8, 41.596, 0.000! !END!

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1591!X= 304.7, 6266.8, 40.535, 0.000! !END!
1592!X= 304.8, 6266.8, 39.326, 0.000! !END!
1593!X= 304.9, 6266.8, 38.631, 0.000! !END!
1594!X= 305.0, 6266.8, 39.170, 0.000! !END!
1595!X= 305.1, 6266.8, 39.885, 0.000! !END!
1596!X= 305.2, 6266.8, 38.530, 0.000! !END!
1597!X= 305.3, 6266.8, 41.306, 0.000! !END!
1598!X= 305.4, 6266.8, 43.476, 0.000! !END!
1599!X= 305.5, 6266.8, 44.230, 0.000! !END!
1600!X= 301.5, 6266.9, 35.375, 0.000! !END!
1601!X= 301.6, 6266.9, 27.969, 0.000! !END!
1602!X= 301.7, 6266.9, 27.121, 0.000! !END!
1603!X= 301.8, 6266.9, 23.949, 0.000! !END!
1604!X= 301.9, 6266.9, 26.900, 0.000! !END!
1605!X= 302.0, 6266.9, 25.474, 0.000! !END!
1606!X= 302.1, 6266.9, 18.709, 0.000! !END!
1607!X= 302.2, 6266.9, 18.837, 0.000! !END!
1608!X= 302.3, 6266.9, 18.769, 0.000! !END!
1609!X= 302.4, 6266.9, 19.106, 0.000! !END!
1610!X= 302.5, 6266.9, 19.081, 0.000! !END!
1611!X= 302.6, 6266.9, 19.270, 0.000! !END!
1612!X= 302.7, 6266.9, 20.082, 0.000! !END!
1613!X= 302.8, 6266.9, 20.283, 0.000! !END!
1614!X= 302.9, 6266.9, 21.088, 0.000! !END!
1615!X= 303.0, 6266.9, 21.151, 0.000! !END!
1616!X= 303.1, 6266.9, 21.262, 0.000! !END!
1617!X= 303.2, 6266.9, 21.597, 0.000! !END!
1618!X= 303.3, 6266.9, 21.919, 0.000! !END!
1619!X= 303.4, 6266.9, 22.591, 0.000! !END!
1620!X= 303.5, 6266.9, 22.811, 0.000! !END!
1621!X= 303.6, 6266.9, 25.886, 0.000! !END!
1622!X= 303.7, 6266.9, 28.494, 0.000! !END!
1623!X= 303.8, 6266.9, 30.933, 0.000! !END!
1624!X= 303.9, 6266.9, 33.292, 0.000! !END!
1625!X= 304.0, 6266.9, 32.144, 0.000! !END!
1626!X= 304.1, 6266.9, 32.064, 0.000! !END!

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1627!X= 304.2, 6266.9, 32.998, 0.000! !END!
1628!X= 304.3, 6266.9, 34.220, 0.000! !END!
1629!X= 304.4, 6266.9, 36.842, 0.000! !END!
1630!X= 304.5, 6266.9, 39.607, 0.000! !END!
1631!X= 304.6, 6266.9, 43.626, 0.000! !END!
1632!X= 304.7, 6266.9, 45.766, 0.000! !END!
1633!X= 304.8, 6266.9, 44.016, 0.000! !END!
1634!X= 304.9, 6266.9, 39.569, 0.000! !END!
1635!X= 305.0, 6266.9, 41.543, 0.000! !END!
1636!X= 305.1, 6266.9, 45.379, 0.000! !END!
1637!X= 305.2, 6266.9, 45.743, 0.000! !END!
1638!X= 305.3, 6266.9, 41.921, 0.000! !END!
1639!X= 305.4, 6266.9, 43.406, 0.000! !END!
1640!X= 305.5, 6266.9, 44.607, 0.000! !END!
1641!X= 301.5, 6267.0, 30.873, 0.000! !END!
1642!X= 301.6, 6267.0, 28.768, 0.000! !END!
1643!X= 301.7, 6267.0, 27.477, 0.000! !END!
1644!X= 301.8, 6267.0, 24.509, 0.000! !END!
1645!X= 301.9, 6267.0, 21.828, 0.000! !END!
1646!X= 302.0, 6267.0, 23.828, 0.000! !END!
1647!X= 302.1, 6267.0, 20.606, 0.000! !END!
1648!X= 302.2, 6267.0, 18.721, 0.000! !END!
1649!X= 302.3, 6267.0, 18.473, 0.000! !END!
1650!X= 302.4, 6267.0, 18.668, 0.000! !END!
1651!X= 302.5, 6267.0, 19.077, 0.000! !END!
1652!X= 302.6, 6267.0, 18.763, 0.000! !END!
1653!X= 302.7, 6267.0, 19.334, 0.000! !END!
1654!X= 302.8, 6267.0, 19.875, 0.000! !END!
1655!X= 302.9, 6267.0, 20.443, 0.000! !END!
1656!X= 303.0, 6267.0, 20.605, 0.000! !END!
1657!X= 303.1, 6267.0, 21.133, 0.000! !END!
1658!X= 303.2, 6267.0, 21.165, 0.000! !END!
1659!X= 303.3, 6267.0, 21.784, 0.000! !END!
1660!X= 303.4, 6267.0, 22.640, 0.000! !END!
1661!X= 303.5, 6267.0, 24.809, 0.000! !END!
1662!X= 303.6, 6267.0, 28.690, 0.000! !END!

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1663!X= 303.7, 6267.0, 29.128, 0.000! !END!
1664!X= 303.8, 6267.0, 31.859, 0.000! !END!
1665!X= 303.9, 6267.0, 34.395, 0.000! !END!
1666!X= 304.0, 6267.0, 35.138, 0.000! !END!
1667!X= 304.1, 6267.0, 34.827, 0.000! !END!
1668!X= 304.2, 6267.0, 35.073, 0.000! !END!
1669!X= 304.3, 6267.0, 35.342, 0.000! !END!
1670!X= 304.4, 6267.0, 38.461, 0.000! !END!
1671!X= 304.5, 6267.0, 40.318, 0.000! !END!
1672!X= 304.6, 6267.0, 42.058, 0.000! !END!
1673!X= 304.7, 6267.0, 47.274, 0.000! !END!
1674!X= 304.8, 6267.0, 46.637, 0.000! !END!
1675!X= 304.9, 6267.0, 42.350, 0.000! !END!
1676!X= 305.0, 6267.0, 44.129, 0.000! !END!
1677!X= 305.1, 6267.0, 47.670, 0.000! !END!
1678!X= 305.2, 6267.0, 48.987, 0.000! !END!
1679!X= 305.3, 6267.0, 46.392, 0.000! !END!
1680!X= 305.4, 6267.0, 47.600, 0.000! !END!
1681!X= 305.5, 6267.0, 46.356, 0.000! !END!
```

a

Data for each receptor are treated as a separate input subgroup
and therefore must end with an input group terminator.

b

Receptor height above ground is optional. If no value is entered,
the receptor is placed on the ground.

c

Receptors can be assigned using group names provided in 20b. If no
group names are used (NRGRP=0) then the default assignment name X
must be used.