Industrial Compliance Solutions Ltd

Title:	**Resource Consent Variation Application and Assessment of Effects on the Environment**
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1 Introduction

1.1 Overview of application

Resene Paints Ltd (Resene) owns and operates a solvent paint manufacturing plant located at the intersection of Fergusson Drive and Montgomery Crescent, Upper Hutt. The solvent paint manufacturing plant was established in 1965. An upgrade to the facility in 2014 resulted in the replacement of the old dust collection system with a new cartridge filtration system and increased stack height for the discharge. The main contaminants of concern are discharges to air of particular matter and volatile organic compounds (VOCs).

The site currently holds a resource consent, issued by Greater Wellington Regional Council (GWRC), authorising the discharge to air from its solvent based paints manufacturing operation.

Results from emission testing to date have shown that levels of VOCs discharged from the site during the summer months is higher than the limit allow for in the current resource consent. This is due to the impact increased temperatures have on the solvents vapour pressure. It was found that the vapour pressure increased between 78% and 133% during this period of elevated temperatures. The increase in vapour pressure has resulted in an increase in solvent vapours during normal production and an increase in VOCs emissions from the site.

Resene seek limited variation to the Upper Hutt site's consent for one of the 15 conditions within the current consent (WGN160337). The change sought is an increase in the discharge limit for VOCs.

The environmental assessment of the proposal shows that any potential adverse effects on the environment resulting from the proposed variations are still less than minor. The assessment modelling shows the effects of air discharges would be the same as the existing operation.

It is therefore appropriate for the activity to be considered as a variation under section 127 of the RMA because solvent paint plant operation:

- is within the scope of Resene's existing consents for the site;
- is not a fundamentally different activity; and
- it does not have materially different adverse effects to the existing plant operation.

The overall assessment is that the effects of the proposed variations to allow an increase in the VOCs discharge limit:

- meet the statutory criteria of s127 of the RMA;
- are the same and have less than minor effects on the environment or any potentially affected person;
- do not fall within the statutory criteria for public or limited notification;
- are consistent with all relevant statutory planning documents; and
- meet the sustainable management purpose of the RMA.

On that basis, variations to the existing consent condition to allow Resene to operate its solvent paint manufacturing plant at a higher VOCs discharge limit can be considered and granted by GWRC without notification.

1.2 Applicant and property details

Applicant	Resene Paints Ltd
Owner of application site	Resene Paints Ltd
Site address / map reference	1036 Fergusson Drive, Upper Hutt
Site area	2.0805 ha
Legal description	Pt Lot 5 DP 21941
Regional Council / Plans	Greater Wellington Regional Plan
Address for service during consent processing	Industrial compliance solutions 21 Taylor Terrace St Andrews Hamilton 3200 Attention: Brent Kennedy
Address for service during consent implementation and invoicing	Resene Paints Ltd 32 50 Vogel Street Naenae Lower Hutt Attention: Greg Wilkins

We attach copies of the application forms in Appendix A and a copy of the relevant Certificate of Title in Appendix B.

2 Environmental setting

2.1 Site location

The Resene solvent paint manufacturing facility is located on a site owned by Resene at the corner of Fergusson Drive and Montgomery Crescent, Upper Hutt. The site is zoned business industrial area on the operative city of Upper Hutt District plan (UHDP). Specific activities are not scheduled in the UHDP therefore in order for Resene activities to be a permitted activity in this area it needs to meet all the permitted activity criteria conditions. As the site has been established for a significant period of time, the activities may be allowed by existing use rights.

The nature of it is and the surrounding area is a mix of commercial and industrial business and some residential housing as detailed in Figure 2-1.

Figure 2-1: Location of Resene Paints (red site boundary) **Copyright Google Maps 2014**

The buildings on site are steel portal frame construction clad with a mix of long run cargo steel sheets and fibre cement sheets dating from the 1960s to early 2000s. A map of the site layout is presented in Appendix C.

2.2 Sensitivity of receiving environment

The nature of activities in the surrounding area is a mix of commercial, industrial and residential. To the east and south east of the Resene site there is a mix of industrial and commercial operations, including large warehousing and manufacturing, which are considered to have a low to moderate sensitivity to discharges to air.

Residential dwellings are generally considered sensitive to discharges to air. The closest residential dwellings to the site are located across the road (Fergusson Drive) and on the western boundary of the

site. The site wind rose suggests that there is a relatively low frequency (less than 10%) of winds from the south and east, which would tend to direct the site's emissions towards these residential houses. Downwind of the predominant wind directions (north westerly and northerlies winds), the closest residential houses are located approximately 200 m away from the site on elevated terrain (Kingsley Heights).

There are six main categories of land use located within approximately 1 km of the Resene site. Each of these categories has its own associated amenity standard and inherent sensitivity to odour.

- Residential;
- Rural residential;
- Industrial;
- Commercial/business;
- Recreational; and
- Rural.

The Ministry for the Environment (MfE) developed and published a good practice guide for odour assessment and management, entitled "Good practice guide for assessing and managing odour in New Zealand" (MfE 2003). The good practice guide discusses the relative sensitivity of the range of different land uses. Relative issues concerning the classifications of sensitivity of the receiving environment surrounding the Resene site are detailed in the following table.

Table 2-1: Sensitivity of land uses

Land use types	Reason for classification
Residential	People of high sensitivity to odours can be exposed. People can be present at all times of day and night, both indoors and outdoors. Visitors to the area who are unfamiliar with an odour are likely to raise awareness of a problem. In cases of mixed land uses, where the residences are present with industry, the use may be judged to have the same sensitivity as residential depending on the circumstances. This zone is assumed to be of high sensitivity to odour
Rural residential	Lower population density, therefore less opportunity for exposure to odour. People of high sensitivity can be exposed at all times of the day and night. Rural-type background odours may be present but are usually lower intensity than in a rural zone. Residents tend to work in cities and return home at night or weekends and may not be desensitised to rural-type odours. Can be sensitive to non-rural-type odours (e.g. rendering plant or landfill odours). Overall high or low sensitivity, depending on the circumstances of the particular area. This zone is assumed to be of high sensitivity to odour
Industrial	A mix of odours is generally tolerated in industrial zones, as long as the intensity is not severe.

	People in these areas tend to be adults in good health and are more likely to tolerate some odour without finding it to be objectionable or offensive, particularly if the odour is associated with their employment (and source of income). Odours emitted from ground level sources tend to produce the greatest effects at night, when the occupancy of an industrial zone is low or nil, therefore the opportunity for exposure is low. This zone is assumed to be of low sensitivity to odour
Commercial/business	Similar in sensitivity to the high-density residential area, as it affects people of all ages and health status. Hospitals and schools tend to be land uses where people expect better-than-average air quality. Depending on the mix of development, human occupation may be low at night, which can moderate the sensitivity slightly, particularly if dispersion from the odour source is poorest at night. This zone is assumed to be of high sensitivity to odour
Recreational/reserves	People tend to be more aware of air quality when undertaking outdoor activities and exercise, and sensitivity is heightened. People of all ages and health status can be present. People are more likely to be present during the day but events can also be held at night. People are often visitors from other parts of the city or country who are more likely to be sensitive to odours they are not used to. Sports fields may be moderately sensitive and need to be considered on a case-by-case basis. This zone is assumed to be of high sensitivity to odour
Rural	Low population density means low opportunity for exposure to odour. People living in and visiting rural areas generally have a high tolerance for rural-type odours. May be highly sensitive to non-rural type odours (e.g. rendering plant or landfill odours). This zone is assumed to be of low to moderate sensitivity to odour

2.3 Meteorology and topography

The site is located at the northern end of Upper Hut, which is located approximately 20 km inland from the Wellington harbour. A wind rose for the site, generated by computer modelling, is shown in Section 4.3.2. The wind rose shows that the predominant wind direction at the site is north-west, followed by westerlies.

The site experiences calm conditions for an estimated 70 hours per year, although a comparison with data from Wallaceville (approximately 1.5km south-west of the site) suggests that the frequency of calms may be higher. Upper Hutt experiences temperature inversions during periods of limited cloud cover and calm conditions (e.g. cool nights and mornings throughout late autumn to early spring). These conditions can limit the dispersion of contaminants that are emitted from sources at low elevations above the ground (such as domestic heating) and can be associated with higher background levels of air pollution.

The topography surrounding the immediate site (within the modelling domain) is elevated terrain to the south and southwest of the site. The land to the north of the site slopes gently away towards the Hutt River, which is located approximately 600 m from the site.

2.4 Existing air quality

The primary urban air contaminants are fine particulates (PM_{10}), nitrogen dioxide (NO_2) and carbon monoxide (CO), which are related to fuel combustion in motor vehicles, for domestic heating and industrial activities.

Air quality monitoring for PM10 undertaken by the GWRC at one location in Upper Hutt indicates that the Upper Hutt airshed complies with the air quality standards for PM_{10} and is not considered polluted under the National Environmental Standards for Air Quality.

GWRC continuously measures CO and NO_2 levels in Upper Hutt (Savage Park site). This indicator shows that CO and NO_2 levels in Upper Hutt are typically within the excellent or good air quality categories for most of the year.

The Resene site is located close to a residential area and therefore domestic heating emissions are a significant local source of air pollution. The main impact on local air quality in the vicinity of the site is expected to be a mix of diesel vehicle emissions from trucks using local roads to access the industrial facilities and warehouses, and residential sources.

2.5 Other sources of odour in the area

There are several neighbouring businesses activities which have the potential to generate odour. GWRC has received of odour complaints from the Mountbatten Grove area related to solvent odour.

However, after investigation by GWRC, there have been no odour complaints which were attributed to the Resene's operation since the plant started operation in 1965.

3 Site activities and discharges to air

3.1 Introduction

The paint manufacturing process is a batch process and comprises of three key steps:

- Batching of raw materials;
- Mixing process; and
- Packaging of the finished product.

The raw material batching process involves the collection of the correct quantities of raw material from the warehouse based on the product recipe. Once this is completed the raw materials are passed over to the mixing staff who then follow the mixing instructions on the recipe. On completion of the mixing process, samples are sent to the laboratory for testing against product specifications. Once a batch is passed by the laboratory it is then packaged into the desired pack sizes.

3.1.1 Ventilation System

The site ventilation system services the main manufacturing areas and has been recently ungraded (2014) to improve ventilation efficiency. It consists of a series of passive roof vents discharging directly to the atmosphere, and an active ducted system. The active system extracts fumes, dust and air from key locations around the manufacturing area, such as raw material preparation areas, mixing vats, and packaging stations. The extracted fumes, dust and air are directed through a series of ducts to the cartridge filter, located at the rear of the manufacturing building (Figure 3-1).

Table 3-1 below summarises the source of discharges to air at the site included in the air dispersion modelling study.

Table 3-1: Emission sources

Emission Source	Source Type	Potential contaminants	Comments
Cartridge Filter discharge	Stack	PM_{10} Volatile Organic Compounds (VOCs)	Continuous discharge during normal plant operation

3.1.2 Cartridge Filter

Resene has installed a new cartridge filtration system to replace the existing dust box system. The cartridge filter provides high level filtration efficiency for the removal of particulate matter. The design also incorporates a vertical stack discharging at 12 metres above ground level which results in improved dispersion of the exhaust gases.

The system has been supplied by Egmont Air and consists of a horizontal cartridge dust collector with a rated airflow of 14,650 m^3/hr. 32 High efficiency Class A cartridges are used in the system giving the system an average dust loading of 0.25m^3 per week (filtration efficiency >95%).

Figure 3-1: Cartridge filter and discharge stack

3.1.3 Hours of operation

The site can operate 24 hours a day, 7 days a week over the entire year except for scheduled maintenance shut down periods. Major servicing and maintenance is undertaken during these periods.

The assessment of emissions using atmospheric dispersion modelling assumes that the plant operates 24 hours per day, 365 days per year and continuously discharges contaminants to air over that period.

3.2 Discharges to air

There is a single stack emission source at the Resene facility. The stack discharges all the extracted air from the manufacturing processes and buildings.

The manufacture of solvent based paints generates a number of contaminants. The contaminants of concern are particulates and VOCs. The results of stack emission testing undertaken by Source Testing New Zealand Ltd (STNZ) have been used to determine representative emission rates for the cartridge filter stack. Four sets of emission testing have been averaged and the standard deviation determined. The average, plus three standard deviation has been used to determine the upper limit concentration of VOCs.

Emission rates of PM_{10}, and VOCs have been calculated using data supplied by the equipment manufacture and the upper limit concentrations of emission testing undertaken on the cartridge filter stack.

The emissions levels have been based on the filtration system operating at 24 hours a day and 365 days a year. The average airflow velocity in the stack has been measured at 28.2 m/s at 39.7°C, based on information collected during emission testing.

Table 3-2: Cartridge filter updated emissions rates

Contaminant	**Stack concentration (mg/m^3)**	**Emission Rate (g/s)**	**Emission rate source**
PM_{10}	<10	0.03914	Based on supplier information
VOCs			
Toluene	340.6349	1.33327	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
1,3-Dichloropropane	2.3214	0.00909	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
Chlorobenzene	0.1329	0.00052	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
Ethylbenzene	386.0908	1.51118	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
m-, p-xylene	476.3615	1.86451	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
o-xylene	127.7365	0.49997	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
iso-propylbenzene (cumene)	3.2542	0.01274	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
n-propylbenzene	6.4017	0.02506	Based on emission testing results. Average plus 3 x SD based on all testing results to date.

1,3,5-Trimethylbenzene	15.2060	0.05952	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
1,2,4-Trimethylbenzene	42.8439	0.16769	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
sec-butylbenzene	0.5515	0.00216	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
4-iso-propyltoluene (p-cymene)	0.4950	0.00194	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
n-butylbenzene	0.5389	0.00211	Based on emission testing results. Average plus 3 x SD based on all testing results to date.
MIBK (methyl isobutyl ketone)	3.8253	0.01497	Based on emission testing results. Average plus 3 x SD based on all testing results to date.

4 Approach to assessment

4.1 Overview

This section describes the approach that has been used to assess the emissions to air from the site.

Air quality assessment criteria have been adopted for the relevant contaminants, being PM_{10} and VOCs. Atmospheric dispersion modelling has been used to predict the potential ground level concentrations of these contaminants as a result of the discharges to air from the Resene plant. The results, including consideration of likely background concentrations, have been compared to ambient air quality criteria to assess the potential effects on human health and the environment.

4.2 Air quality assessment criteria

The Ministry for the Environment's Good Practice Guide for Assessing Discharges to Air from Industry recommends the following priority order for the selection of published air quality criteria:

- National Environmental Standards for Air Quality (NESAQ);
- National Ambient Air Quality Guidelines (AAQG);
- Regional Objectives, such as the Wellington Regional Ambient Air Quality Guidelines (RAAQG) that have been incorporated into the Greater Wellington Regional Plans; and
- WHO Air Quality Guidelines (WHO)

Table 4-1: Air quality assessment criteria

Contaminant	Concentration	Time average	Source[1]
Particulate matter (PM_{10})	50 µg/m^3 20 µg/m^3	24-hour Annual	NESAQ AAQG RAAQG

[1] Note: Where the same assessment criterion is adopted by more than one source, only the highest priority source is identified

Specific VOC compounds that were detected during emission testing of the cartridge filter exhaust were; toluene, 1,3-dichloropropane, chlorobenzene, ethylbenzene, m-, p-xylene ,o-xylene, iso-propylbenzene (cumene), n-propylbenzene, 1,3,5-trimethylbenzene ,1,2,4-trimethylbenzene ,sec-butylbenzene, 4-iso-propyltoluene (p-cymene), n-butylbenzene, and MIBK (methyl isobutyl ketone).

Air quality assessment criteria for all the VOC compounds have been obtained from the following international sources:

- US EPA Reference Concentrations (RfC);
- Ontario Ministry of the Environment Ambient Air Quality Criteria (AAQC); and
- Texas Commission on Environmental Quality (TCEQ) Effects Screening Levels.

The air quality assessment criteria for VOCs adopted for this assessment are shown in Table 4-2.

Table 4-2: Air quality assessment criteria for VOCs

Pollutant	Concentration (µg/m³)	Time average	Source
Toluene	1880 (odour) 5000	1 hour Annual average	TCEQ ESL US EPA RfC
1,3-Dichloropropane	45 4.5	1 hour Annual	TCEQ ESL TCEQ ESL
Chlorobenzene	460 46	1 hour Annual	TCEQ ESL TCEQ ESL
Ethyl benzene	2,000 (odour) 1,000 1000	1 hour 24 hour Annual	TCEQ ESL Ontario US EPA RfC
o, m & p xylene	3700 (odour) 730 100	1 hour 24 hour Annual average	TCEQ ESL Ontario US EPA RfC
iso-propylbenzene (cumene)	500 (odour) 400	1 hour Annual	TCEQ ESL US EPA RfC
n-propylbenzene	500 (odour) 400	1 hour Annual	TCEQ ESL US EPA RfC
1,3,5-Trimethylbenzene	1250 220 125	1 hour 24 hour Annual	TCEQ ESL Ontario TCEQ ESL
1,2,4-Trimethylbenzene	1250 220 125	1 hour 24 hour Annual	TCEQ ESL Ontario TCEQ ESL
sec-butylbenzene	2740 274	1 hour Annual	TCEQ ESL TCEQ ESL
4-iso-propyltoluene (p-cymene)	2745 275	1 hour Annual	TCEQ ESL TCEQ ESL
n-butylbenzene	2740 274	1 hour Annual	TCEQ ESL TCEQ ESL
MIBK (methyl isobutyl ketone)	2050 1200 (odour) 3000	1 hour 24 hour Annual	TCEQ ESL Ontario US EPA RfC

4.3 Dispersion modelling

4.3.1 Model selection

Air dispersion modelling has been carried out using the CALPUFF non-steady state puff dispersion model. CALPUFF is recommended by the Ministry for the Environment[1] for situations where complex terrain has an influence on the dispersion of pollutants.

For this application, the primary advantage of CALPUFF over alternative Gaussian dispersion models (such as AUSPLUME) is its ability to simulate diffusion of pollutants under calm conditions. Other potential advantages of CALPUFF, such as 3-dimensionally varying meteorology, are likely to be less important because the effects of the discharges to air from the site will be very localised.

4.3.2 Meteorology

Air dispersion modelling requires good meteorological information that is representative of dispersion conditions near the emission sources. For this assessment a meteorological modelling input file for CALPUFF was constructed for 2011 using the associated meteorological modelling programme CALMET (v5.726).

In order to provide a sound basis for developing a meteorological data set for dispersion modelling using CALPUFF, meteorological measurements from six sites were used, for the period January 2011 to December 2011.

The data was sourced from the following sites:

- Paraparaumu airport meteorological station operated by the Metservice;
- Wallaceville meteorological station operated by NIWA;
- Baring Head meteorological station operated by NIWA;
- Martinborough meteorological station operated by NIWA;
- Wellington – Kelburn meteorological station operated by the Metservice; and
- Masterton airport meteorological station meteorological station operated by the Metservice.

One-hour average data from these sites were incorporated into the CALMET model.

CALMET's upper air input data requirements were derived using the TAPM v4 ('The Air Pollution Model') meteorological model. A three dimensional wind field (3D.DAT), larger than the CALMET domain, was generated from the TAPM data using the CALTAPM processor.

4.3.2.1 TAPM setup

TAPM was developed by Commonwealth Scientific and Industrial Research Organisation (CSIRO) and is a sophisticated meteorological and air dispersion modelling computer model. It consists of coupled diagnostic meteorological and air pollution components that predict the air flows important to local scale air pollution, such as sea breezes, against a background of larger scale synoptic meteorological patterns (Hurley, 1999).

[1] Good Practice Guide for Atmospheric Dispersion Modelling, Ministry for the Environment, 2004.

One of the primary functions of the TAPM model's design is the provision of high quality meteorological data for dispersion models where suitable onsite information is not available. TAPM incorporates a prognostic meteorological component that solves the fundamental fluid dynamic and scalar transport equations. Using historical synoptic scale meteorological analyses in conjunction with local land use and terrain information, TAPM can produce realistic and high quality meteorological inputs for a number of air pollutant dispersion modelling systems including CALMET. Validation studies show that TAPM can accurately predict localised meteorological conditions.

TAPM was run using a 25x25x30 grid with nested grids of 30km, 10km and 3km. The upper air data was extracted from the 3km nested grid (Table 4-3).

The meteorological dataset was developed using four different grids centred near the site.

Table 4-3: Grid characteristics for TAPM

Grids	Number of Cells	Size of the grid spacing	Extent of the grid
Outer grid	Rectangular : 25 x 25	Δx = Δy = 30 000 m	750 km x 750 km
Intermediate grid	Rectangular : 25 x 25	Δx = Δy = 10 000 m	250 km x 250 km
Inner most grid	Rectangular : 25 x 25	Δx = Δy = 3 000 m	75 km x 75 km

The CSIRO recommend that for TAPM the ratio of grid spacing from one nest to another be in the range 2 to 4, as this has been found to optimise both model run time and numerical noise generated in the nesting regions. That recommendation has been used in this study.

4.3.2.2 CALMET setup

CALMET is the meteorological model component of the CALPUFF model and is used to develop 3D wind fields for use in CALPUFF. For this assessment CALMET has used the following data sources:

- Local surface meteorological data;
- Terrain and land use data; and
- Upper air data developed using TAPM.

Meteorological grid points were defined every 250m in the north-south and east-west directions in the 50 x 50 km meteorological model domain. The centre of the CALMET modelling grid was 1775000, 5446000 (NZTM coordinates).

Variations of dispersion conditions with height were modelled using 11 vertical levels with grid points at 20m, 40m, 80m, 160m, 320m, 640m, 1000m, 1500m, 2000m, 2500m, and 3000m above ground level.

Near the surface (<80 m) a greater weighting was given to wind speed and direction observations from the six meteorological monitoring site than to the wind field predicted by TAPM.

4.3.2.3 Modelling outputs

The predicted wind speed and wind direction frequency distribution extracted from the CALMET meteorological input file at the grid point closest to the proposed site is shown Figure 4-1 and Figure 4-2.

The predicted CALMET wind speed and direction frequencies at the model's grid point closest to the Resene site were similar to those for the measured data at the Wallaceville meteorological site. The wind roses for the Resene site do indicate a higher frequency of predominance of north-westerly wind flows for 2011 years. This would be due to the channelling effect of elevated terrain to the north of the site.

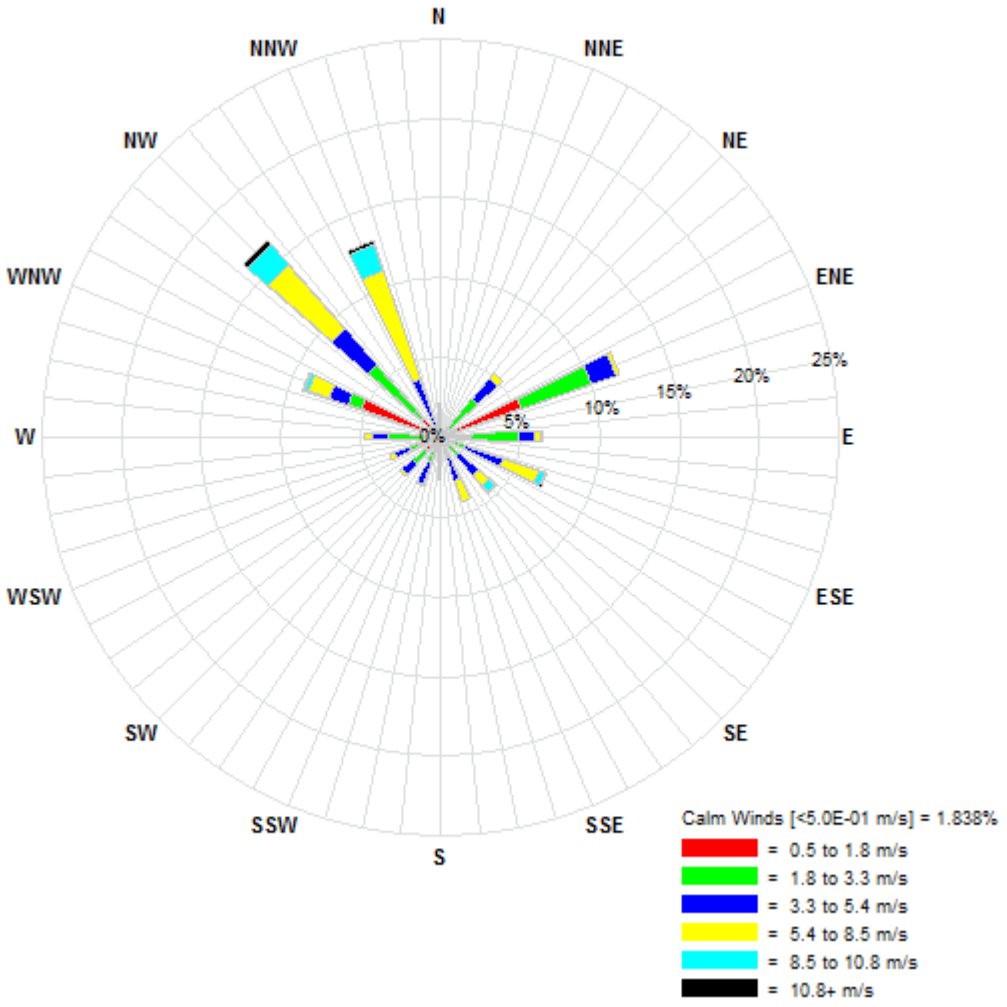


Figure 4-1: Resene Site Windrose

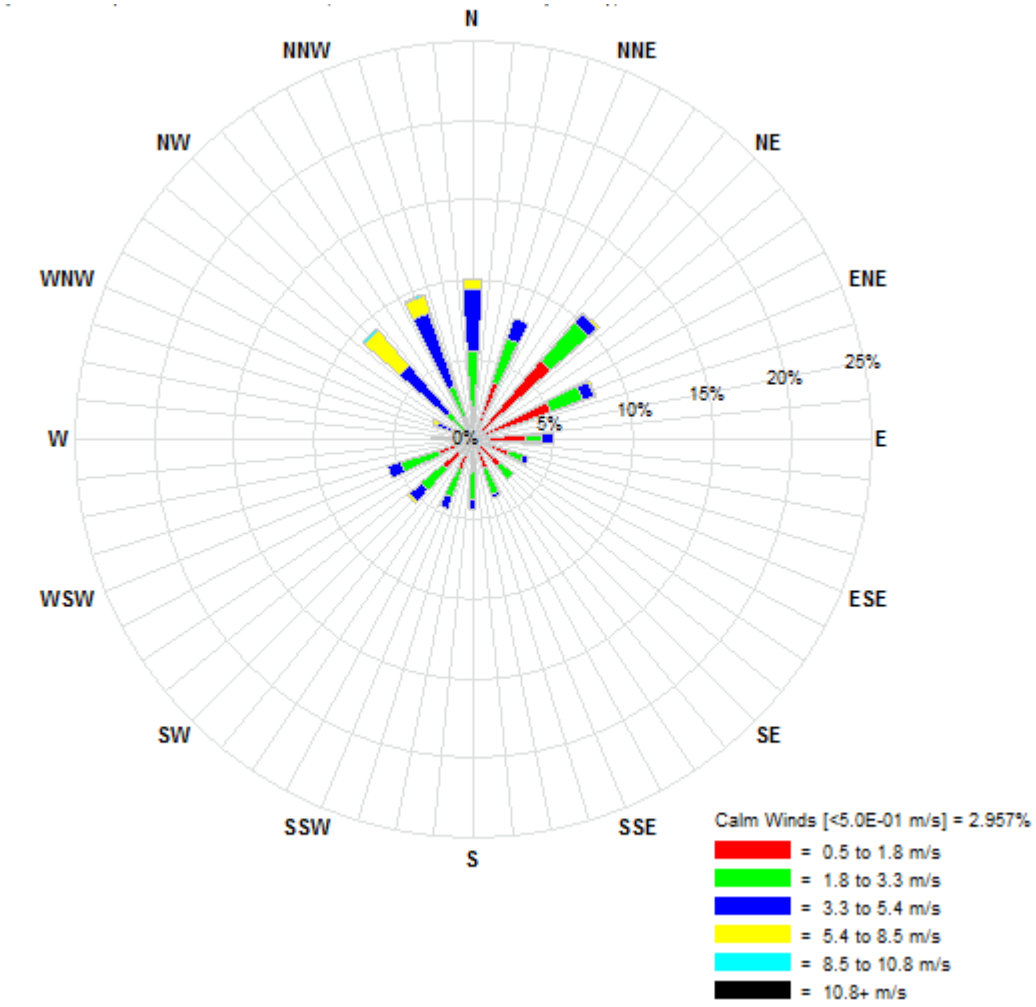


Figure 4-2: Wallaceville Meteorological Site Windrose

4.3.3 Terrain

Terrain effects have been incorporated into the dispersion model by using a coarse CALMET meteorological model grid (with grid points located every 250m) to model the channelling effect of terrain on local wind flows, and by using CALPUFF's partial plume path adjustment method. CALPUFF's partial plume path adjustment method reduces the effective height of the emission plume above ground level as it travels over elevated terrain features. The amount by which the plume is uplifted by terrain is a function of atmospheric stability.

Terrain heights were defined using a cartesian receptor grid network with receptor points spaced every 50m for a 4 km x 4 km area surround the site. Ground elevations used DEM data generated by Industrial Compliance Solutions using Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Map (GDEM) worldwide elevation data.

4.3.4 CALPUFF model settings

4.3.4.1 Modelling Domain

A modelling domain of 4 x 4 km (16 km^2) has been used for the air dispersion predictions. The topography to the west of the site is reasonably flat, with hills to the east of the site. A 50 metre gridded receptor data file has been incorporated in the model.

4.3.4.2 Dispersion modelling parameters

CALPUFF dispersion modelling parameters selected for the assessment are listed below:

- Dispersion coefficients calculated internally from micrometeorological variables
- Transitional plume rise modelled
- The PDF (probability density function) method used for sigma-z convective boundary layer
- Partial plume penetration of mixed layers for area and point source.

4.3.4.3 Building wake effects

Airflow around buildings can create zones of strong turbulence and downward mixing on the lee side of a building (Figure 4-3). This effect is known as building downwash. In such cases, the entrainment of exhaust gases released by short stacks or rooftop vents in the wake of a building can result in much higher ground-level concentrations close to the source than the model would otherwise predict. A well-designed stack can minimise building downwash effects.

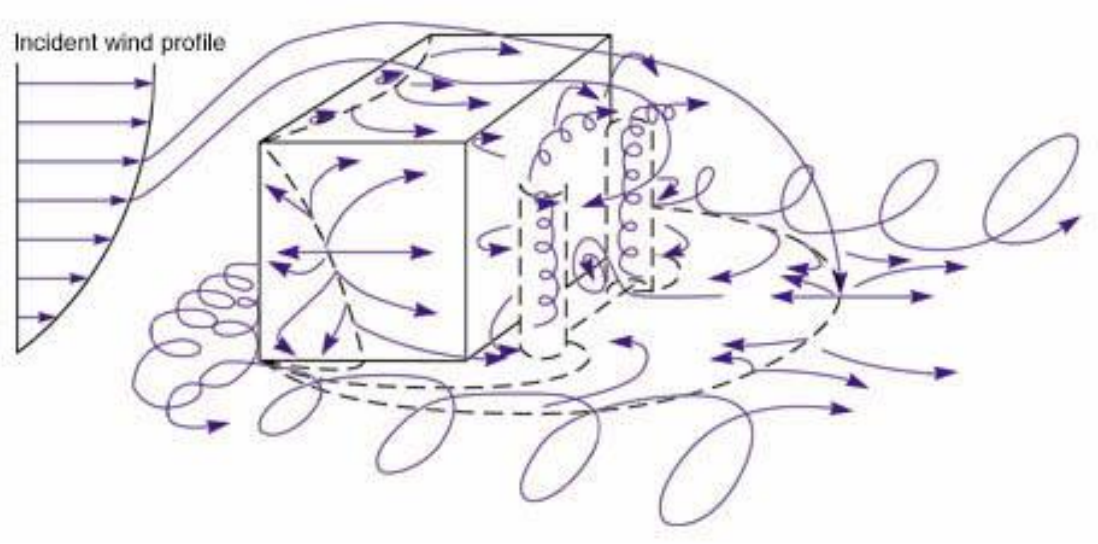


Figure 4-3: Schema of the turbulence created behind a building

For this assessment, the Plume Rise Model Enhancements (PRIME) has been used to simulate building downwash effects. This is the method recommended in the Ministry for the Environment Good Practice Guide for Dispersion Modelling (MfE, 2004).

4.3.4.4 Building dimensions

The layout of the site buildings and locations of the major discharge point were taken from plans provided by Resene. The dimensions of site buildings included in this modelling study are detailed in Table 4-4 below.

Table 4-4: Buildings details

Building	Length (m)	Width (m)	Height (m)	Base Elevation (m)
B1	30	12	3	58
B2	20	16	7	58
B3	23	9	3	58
B4	35	2	6	60
B5	27.3	13	10	60
B6	11	8	4	61

These dimensions are processed in the Building Profile Input Program (BPIP) algorithm to generate a file of equivalent cross-building widths for each wind direction. The BPIP output file is presented in Appendix D.

4.3.4.5 Source parameters

The physical conditions of the sources and the mass emission rates for each contaminant have been incorporated into the CALPUFF model to enable environmental effects of the discharges to be evaluated.

Table 4-5 presents the physical parameters of the major discharge point on site. Table 3-1 and Table 3-2 in Section 3 set out the mass emissions of contaminants modelled.

Table 4-5: Source physical parameters

Source	Diameter (m)	Height (m)	Efflux Velocity (m/s)	Temperature (°C)
Cartridge Filter Stack	0.45	12	28.1	16

4.3.5 Presentation of model results

Outputs from the modelling study are summarised in Section 4 below and plotted as isopleths (Appendix E). Isopleth diagrams link up equal concentrations over the modelling domain in the same way as contour lines of equal elevations are presented on a topographical map or isobars on a weather map. However, for isopleth diagrams, the concentrations are the highest concentrations that occur over the time span of the meteorological data used (in this case 12 months). The highest concentrations at different locations are often related to different meteorological conditions and therefore commonly do not occur at a similar time.

5 Assessment of quality effects

5.1 Introduction

The following assessment identifies and assesses the types of effects that may arise from the proposed increase in the VOCs discharge limit and compares them to the existing activities and consents. This assessment also outlines the measures that Resene proposes to avoid, remedy or mitigate any potential adverse effects on the environment.

5.2 Effects on air quality

5.2.1 Overview

The dispersion modelling shows that maximum ground level concentrations (MGLC) (beyond the site boundary) for all contaminants and averaging periods occur beyond the southern site boundary for all averaging periods. The location of these highest concentrations reflects the impact of the elevated terrain to the south of the site. As a result, maximum ground level concentrations fall away rapidly with distance from the site as the downwash effect reduces.

Worst case meteorological conditions for the site are during moderate to high wind speeds when the wind is blowing across widest point of the building, which will result in the greatest downwash effect.

5.2.2 Particulate matter (PM_{10})

The maximum ground level concentrations (MGLC) of PM_{10} predicted beyond the site boundary as a result of emissions from the site are shown in Table 5-1. Concentration contour plots are shown in Appendix E. There is a small increase in the modelled 24hr MGLC for PM_{10} and a slight decrease in the annual MGLC. This is due the changes in the stack velocity and discharge temperature. There has been no increase in the discharge concentrations of PM_{10} from the site.

Table 5-1: Predicted MGLC for PM_{10}

Pollutant	MGLC - 2010 (µg/m³) – Initial Modelling Assessment	Updated Modelling Assessment		Assessment criterion (µg/m³)
		MGLC - 2010 (µg/m³)	% of assessment criteria	
PM_{10} (24 hour)	5.5	7.5	15	50
PM_{10} (Annual)	0.9	0.8	4	20

5.2.3 Volatile Organic Compounds

VOCs are a group of compounds with differing potential effects. As described in 3.2, the VOC compounds that were detected during emission testing of the cartridge filter stack were; toluene, 1,3-dichloropropane, chlorobenzene, ethylbenzene, m-, p-xylene ,o-xylene, iso-propylbenzene (cumene), n-propylbenzene, 1,3,5-trimethylbenzene ,1,2,4-trimethylbenzene ,sec-butylbenzene, 4-iso-propyltoluene (p-cymene), n-butylbenzene, and MIBK (methyl isobutyl ketone).

The highest predicted MGLC of VOCs at any location beyond the site boundary as a result of the updated emissions from the Resene facility are shown in Table 5-2. Concentration contour plots are shown in Appendix E. The results from the initial modelling assessment are presented in the table to show the effect of the increase in VOCs emissions from the site.

Table 5-2: Predicted MGLC for VOCs

Pollutant	**MGLC (µg/m³) – Initial Modelling Assessment**	**Updated Modelling Assessment**		**Assessment criterion (µg/m³)**
		MGLC (µg/m³)	**% of assessment criteria**	
Toluene	75 2.7	660 27.2	35.1 0.5	1880 (1 hour - odour) 5000 (annual)
1,3-Dichloropropane	0.51 0.018	4.5 0.185	10 4.1	45 (1 hour) 4.5 (annual)
Chlorobenzene	0.0294 0.0011	0.258 0.011	0.06 0.02	460 (1 hour) 46 (annual)
Ethyl benzene	85 29 3.1	748.2 291.0 30.8	37.4 29.1 3.1	2000 (1 hour - odour) 1000 (24 hour) 1000 (annual)
m, p & o xylene	132 45.2 4.82	1170.6 455.3 10.2	31.6 62.4 10.2	3700 (1 hour - odour) 730 (24 hour) 100 (annual)
iso-propylbenzene (cumene)	0.71 0.026	6.3 0.26	1.3 0.06	500 (1 hour - odour) 400 (annual)
n-propylbenzene	1.4 0.051	12.4 0.51	2.5 0.13	500 (1 hour - odour) 400 (annual)
1,3,5-Trimethylbenzene	3.3 1.14 0.122	29.5 11.5 1.2	2.4 5.2 4.8	1250 (1hour) 220 (24 hour) 125 (annual)
1,2,4-Trimethylbenzene	9.4 3.2 0.34	83.0 32.3 3.4	6.6 14.7 2.7	1250 (1hour) 220 (24 hour) 125 (annual)
sec-butylbenzene	0.124 0.0045	1.1 0.04	0.04 0.015	2740 (1 hour) 274 (annual)
4-iso-propyltoluene (p-cymene)	0.106 0.0039	0.959 0.040	0.035 0.015	2745 (1 hour) 275 (annual)
n-butylbenzene	0.118 0.0043	1.04 0.043	0.04 0.016	2740 (1 hour) 274 (annual)
MIBK (methyl isobutyl ketone)	0.836 0.285 0.031	7.4 2.9 0.31	0.36 0.24 0.01	2050 (1 hour) 1200 (24 hour - odour) 3000 (annual)

The predicted highest MGLC of total VOCs from the initial assessment were orders of magnitude below the relevant air assessment criteria. Results from the updated modelling show that VOCs are still below the assessment criteria threshold for both odour and health effects. On this basis, the effects of VOC emissions on human health are assessed as being negligible.

Although still less than minor in effect, the updated MGLCs are up to 10 times higher than the results obtained in the resource consent application.

Current testing VOCs results are significantly different than the initial testing data collected for the resource consent application. The original data set was collected in the July 2014 (winter) when temperatures within the plant and receiving environment were low. At the time the effect of seasonal temperature variations was not accounted for in the modelling assessment due to a lack of reliable sampling data.

A detailed investigation of the site operations and production procedures was also undertaken, which concluded that there have been no significant changes to the overall manufacturing process which could influence the levels of VOCs being discharged. It was then determined that the likely cause to the increase levels of VOCs observed in emission testing results was temperature.

As more sampling data has become available, a better understanding of the effects of seasonal temperature variation has been developed.

This has been supported by observations made by the plant manager, which indicated that, the temperatures within the plant during the emission testing periods have been significantly higher than previous years.

When these temperature increases are considered in relation to the solvents vapour pressure, it was found that the vapour pressure increased between 78% and 133%. This increase in vapour pressure will result in an increase in solvent vapours during normal production and the resulting increase in VOC emissions.

These increased levels have been used to develop worst case VOCs emission rates which have been used in the updated modelling assessment. This is likely to overestimate the MGCLs of VOCs and provide a level of conservatism in the assessment conclusions.

5.2.4 Discussion of potential for odour effects

VOC emissions can also give rise to odours, and the site has the potential to be a source of odours that could give rise to offensive or objectionable effects if not managed correctly. The modelled MGLC results presented in the table above (Table 5-2), are below the assessment criteria for both health effects and odour effects.

There were no odours detected outside the plant during site visits that were carried out to gather information for the preparation of this report. There were also no reported odour complainants to site.

The site is not aware of any odour complaints received by GWRC which can be attributed to the Resene site.

During a site visit by GWRC compliance officers, it was noted that they detected solvent odours on site, however they did not consider them to be offensive or objectionable.

On this basis, the effects of odour from the site are considered negligible.

6 Mitigation and monitoring

6.1 Monitoring

Currently annual emission testing is undertaken on the cartridge filter stack. There are no proposed changes to this requirement.

6.2 Maintenance

A maintenance register is currently kept. The cartridge filter is inspected by an appropriately qualified engineer on an annual basis.

The document will record the dates of inspections and maintenance, and details of the repairs/maintenance undertaken and will be made available to Greater Wellington Regional Council upon request.

6.3 Complaints register

A complaints register is currently maintained by the site manager. This will note any complaints received related to discharges from the operation of the facility. It will also record any remedial actions taken to address such concerns/complaints. This register will be made available to Greater Wellington Regional Council should they request to see it.

The record of complaints includes the following:

- Type and time of complaint;
- Name and address of the complainants (if provided);
- Location at which the problem was observed;
- The response made by the consent holder and the likely cause of the problem;
- Action taken to mitigate the issue and prevent a reoccurrence.

7 Statutory assessment

7.1 RMA assessment

7.1.1 Section 127 of the RMA

Section 127 of the RMA allows the holder of a resource consent to apply to the consent authority for a change or cancellation of a condition of a consent. That section states:

"127 - Change or cancellation of consent condition on application by consent holder –

(1) The holder of a resource consent may apply to a consent authority for a change or cancellation of a condition of the consent [other than any condition as to the duration of the consent].

(3) Sections 88 to 121 apply, with all necessary modifications, as if –

(a) the application was an application for a resource consent for a discretionary activity; and

(b) the references to a resource consent and to the activity were references only to the change or cancellation of a condition and the effects of the change or cancellation respectively.

(4) For the purposes of determining who is adversely affected by the change or cancellation, the consent authority must consider, in particular, every person who –

(a) made a submission on the original application; and

(b) may be affected by the change or cancellation."

Consent authorities must compare any differences and adverse effects likely to follow from the varied proposal compared to those of the original activity. If the variation results in an activity that is fundamentally different, or one having materially different adverse effects, or one that seeks to expand the original activity, then the application should be treated as new.

The minor changes to the conditions sought by Resene will allow an activity that is fundamentally the same to, and within the scope of, the existing consented activities. Table 5-2 in Section 5 compares the existing VOCs limits and proposed consent VOCs limit and highlights the similarities and differences in the environmental effects. The assessments in this report demonstrate that the scale, character and environmental effects of the activity would remain the same, similar or be reduced should the consent be changed to allow it. Therefore, it is appropriate for GWRC to consider this application under s127 of the RMA.

Pursuant to section 127(3)(a), this application to vary conditions of consent is to be processed as a discretionary activity. It is only the effects of the proposed change that are relevant considerations. Similarly, when determining any adversely affected parties, it is only the effects of the change of a condition of consent which can be taken into account.

7.1.2 Section 104 of the RMA

Section 104 of the RMA sets out the matters to which a consent authority must have regard to, subject to Part 2 of the RMA, when considering an application for resource consent. These are:

- Any actual and potential effects on the environment of allowing the activity; and
- Any relevant provisions of:
- National environmental standards;
- National policy statement;
- New Zealand coastal policy statement;
- Regional policy statement or proposed regional policy statement;
- Plan or proposed plan; and
- Any other matter the consent authority considers relevant and reasonably necessary to determine the application.

7.1.3 Part 2 of the RMA

Part 2 of the RMA (Sections 5 to 8) sets out the purpose and principles of the Act. The purpose of the RMA is to promote the sustainable management of natural and physical resources.

We consider that the discharges to air from the Resene facility are consistent with the purpose of the RMA, primarily because the facility provides for the economic well-being of the community while avoiding adverse effects on the environment adverse effects on the environment.

7.1.4 National Environmental Standards

The following aspects of the National Environmental Standards for Air Quality are relevant to this application:

- • Regulation 13, which sets ambient air quality standards for PM_{10};
- • Regulation 17, which set out restrictions on granting consent for discharge of PM_{10} under certain circumstances; and
- • Regulation 20, which sets out restrictions on granting consent for discharges of CO, NOx and VOCs under certain circumstances.

Regulation 17 prescribes that an application for discharge to air of PM_{10} must be declined if it is likely to cause the concentration of PM_{10} in the airshed to breach its ambient air quality standard.

Regulation 20 prescribes that an application for discharges to air of CO, NOx or VOCs must be declined if it is likely to cause the concentration of CO, NOx or ozone in the airshed to breach its ambient air quality standard, and the source is likely to be a principal source of that gas in the airshed.

As outlined in Section 5.3 of this report, the ambient air quality standards for PM_{10} will not be breached as a result of the proposed discharges to air from the Resene facility. The facility is also not a principal source of CO, NOx or VOCs in the airshed.

Therefore, this application is consistent with the requirements of Regulations 13, 17and 20, and the National Environmental Standards for Air Quality and do not restrict the granting of this consent.

7.2 Greater Wellington Policy Statement

The Regional Air Quality Management Plan for the Wellington Region is fully operative. It provides objectives, policies and methods (including rules and assessment criteria) for managing air quality throughout the Greater Wellington region.

Objectives and policies regarding air quality are detailed in Section 4.1 and 4.2 of the RAQMP, respectively. An assessment of the application against the relevant objectives and policies of the RAQMP is set out in Table 7-1.

Table 7-1: Objectives and policies assessment - RAQMP

Objective and policies of the Regional Air Quality Management Plan for the Wellington Region	**Comment**
Objective 4.1.1: High quality air in the Region is maintained and protected, degraded air is enhanced, and there is no significant deterioration in ambient air quality in any part of the Region.	The site is located in the Industrial zone (under the operative Upper Hutt City District Plan) to the north of Upper Hutt City within the Upper Hutt Airshed. The Upper Hutt Airshed is not defined as a polluted airshed under the NESAQ. Overall, air quality in the airshed needs to be maintained and enhanced, however the effect of the discharges to air that are the subject of this application are minor and have negligible effect on air quality in the airshed.
Objective 4.1.2: Discharges to air in the Region are managed in a way, or at a rate which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while ensuring that adverse effects, including any adverse effects on: • local ambient air quality; • human health; • amenity values; • resources or values of significance to tangata whenua; • the quality of ecosystems, water, and soil; and • the global atmosphere; are avoided, remedied or mitigated.	Cumulative effects of discharges to air on ambient air quality beyond the boundary of the site do not: present more than a minor threat to the health of humans, flora and fauna cause odour that is objectionable to the extent that it causes an adverse effect result in levels of suspended or deposited particulate matter that are objectionable to the extent that they cause adverse effects have a significant adverse effect on visibility cause accelerated corrosion of structures Cumulative effects of air discharges are within the relevant guidelines and will result in potential effects which are minor.

	There is expected to be no significant adverse on the identified taonga such as air, ancestral lands, water and waahi tapu.
Policy 4.2.1: To have regard to the Regional Ambient Air Quality Guidelines in Appendix 2, in managing the Region's air resource.	The use of a cartridge filter for the removal of particulate matter is consider industry best practice and is also considered to be the practicable option.
Policy 4.2.2: To adopt the indicators specified in Appendix 2 as the principal ambient air quality indicators for air quality in the Wellington Region.	The use of a cartridge filter for the removal of particulate matter is consider industry best practice and is also considered to be the practicable option.
Policy 4.2.4: To avoid, remedy or mitigate any adverse effect of the discharge of contaminants to air that is noxious, dangerous, offensive, or objectionable.	Management of any adverse effects of the activity are noted in Section 6
Policy 4.2.6: To ensure that any measures adopted to avoid, remedy or mitigate the effects of discharges of contaminants to air, take account of the sensitivity of alternative receiving environments (e.g., water or soil).	The application for the existing manufacturing operation will not affect the existing amenity of the area, or the recreational use of air, land or water.
Policy 4.2.7: To avoid, remedy or mitigate the adverse effects of the discharge of contaminants to air on amenity values.	The application for the existing manufacturing operation will not affect the existing amenity of the area, or the recreational use of air, land or water
Policy 4.2.9: To give particular consideration, where relevant, to the following matters when assessing an application for a resource consent to discharge contaminants to air: (1) the volume, composition and characteristics of the discharge, including the maximum ground level concentration of significant contaminants in the discharge, especially hazardous contaminants identified in Appendix 1 and any contaminants listed in Appendix 2; (2) the frequency, intensity, duration, offensiveness, location and time of the discharge; (3) the potential for the discharge to be reduced at source, and in particular, the desirability of minimising the emission of any of the "Hazardous Air Contaminants" identified in Appendix 1; (4) any actual or potential effects of the discharge on human health and safety; (5) any actual or potential effects of the discharge on amenity values, including any effects of odour or particulate matter arising from the discharge;	The discharges to air from the Resene process are a discretionary activity, and this assessment has regard to the following matters: (a) The effects of hazardous air pollutants, including VOCs, has been considered. The RAAQG are identified in Section 4.2 and the effects of discharges to air from the site are considered against these criteria in Section 5.3 (b) The discharges from the site will not give rise to any offensive or objectionable effects of odour, dust or particulate. There are no discharges of smoke or ash, or any visible discharges from the site. (c) Relevant international air quality guidelines have been adopted where appropriate. (d) The effects of discharges to air have been assessed as no less than minor. There is expected to be no significant adverse effects on values of tangata whenua as Kaitiaki

(6) any actual or potential effects of the discharge on resources or values of significance to tangata whenua; (7) any actual or potential effects of the discharge on the health and functioning of ecosystems, plants and animals, including indigenous ecosystems and plants and animals of commercial significance; (8) any actual or potential effects of the discharge on other environmental media; (9) any actual or potential effects on the global atmosphere; (10) any cumulative effects which may arise over time or in combination with other effects; (11) any effects of low probability but high potential impact; (12) any positive effects arising from activities associated with the discharge; and (13) any other relevant matters.	(e) The application does not result in any increase in the discharges into air of greenhouse gases and ozone depleting substances. (f) The sensitivity of the receiving environment is considered in Section 2.3. (g) Cumulative effects of the site discharges and other background sources have been considered in the assessment. (h) This assessment conforms to the recommendations of the relevant Ministry for the Environmental Good Practice Guides, as identified in the report.

7.3 The Proposed Natural Resources Plan

The Proposed Natural Resources Plan (PNRP) for the Wellington Region was approved by GWRC for public notification on 31 July 2015. It combines coastal and regional plans, as well as incorporating regulatory and non-regulatory methods. An assessment of the application against the relevant objectives and policies of the proposed plan is also required.

Objectives and policies regarding air quality are detailed in Section 3.8 and 4.7 of the PNRP, respectively. An assessment of the application against the relevant objectives and policies of the PNRP is set out in Table 7-2

Table 7-2: Objectives and policies assessment - PNRP

Objective and policies of the Proposed Natural Resources Plan for the Wellington Region	**Comment**
Objective O39: Ambient air quality is maintained or improved to the acceptable category or better in Schedule L1 (ambient air).	The site is located in the Industrial zone (under the operative Upper Hutt City District Plan) to the north of Upper Hutt City within the Upper Hutt Airshed. The Upper Hutt Airshed is not defined as a polluted airshed under the NESAQ. Overall, air quality in the airshed needs to be maintained or improved, however the effect of the discharges to air that are the subject of this application are minor and have negligible effect on air quality in the airshed.
Objective O40: Human health, property, and the environment are protected from the adverse effects of point source discharges of air pollutants.	Cumulative effects of discharges to air on ambient air quality beyond the boundary of the site do not:

	• present more than a minor threat to the health of humans, flora and fauna; and • cause adverse effects on property. Cumulative effects of air discharges are within the relevant guidelines and will result in potential effects which are less than minor. There is expected to be no significant adverse on the identified taonga such as air, ancestral lands, water and waahi tapu.
Objective O41: The adverse effects of odour, smoke and dust on amenity values and people's well-being are reduced.	Cumulative effects of discharges to air on ambient air quality beyond the boundary of the site do not: • cause odour that is objectionable to the extent that it causes an adverse effect; and • result in levels of suspended or deposited particulate matter that are objectionable to the extent that they cause adverse effects;
Policy P52: Managing ambient air quality Ambient air quality shall be managed to protect human health and safety by: (a) maintaining the acceptable category or better identified in Schedule L1 (ambient air) for the specific contaminants, and (b) improving unacceptable or poor ambient air quality to at least the acceptable category or better identified in Schedule L1 (ambient air), and (c) managing the discharge of other contaminants so that the adverse effects on human health, including cumulative adverse effects, are minimised.	Management of any adverse effects of the activity are noted in Section 6
Policy P55: Managing air amenity Air quality amenity in urban, rural and the coastal marine areas shall be managed to minimise offensive or objectionable odour, smoke and particulate matter, fumes, ash and visible emissions.	The application for the existing manufacturing operation will not affect the existing amenity of the area, or the recreational use of air, land or water. Improvements to emission control system will result in a reduction in emissions.
Policy P58: Industrial discharges Industrial point source discharges and fugitive emissions into air will be minimised by using good management practices.	The use of a cartridge filter for the removal of particulate matter is consider industry best practice and is also considered to be the most practicable option.
Policy P59: Industrial point source discharges The significant adverse effects from industrial point source discharges of hazardous air pollutants beyond the boundary of the property where the	The use of a cartridge filter for the removal of particulate matter is consider industry best practice and is also considered to be the most practicable option.

discharge is occurring, including any noxious or dangerous effects on human health or the environment, shall be avoided.	
Policy P61: National Environmental Standards for Air Quality When considering a resource consent application for a discharge into air in a polluted airshed, including the Masterton Urban Airshed (shown on Map 25), the Wellington Regional Council shall give effect to the National Environmental Standard for Air Quality by allowing the offsetting of new discharges of PM_{10} if the ground level concentrations exceed 2.5µg of PM_{10}/m^3 of air. The offsets shall be: (a) for new discharges into air or when discharges from existing consented activities increase, and (b) calculated on an annual mass emissions basis and be offset on a one to one annual mass emissions basis, and (c) calculated as close as practicable to where the effect of the discharge occurs, and (d) for the duration of the consent, and (e) treated as having the same health effects irrespective of the source of the PM_{10}, and (f) required in a polluted airshed, including the Masterton Urban Airshed (shown on Map 25) until the airshed achieves five years without any breach of the National Environmental Standard for Air Quality for PM_{10}, and (g) only for a point source discharge and will not consider fugitive emissions, and (h) only for PM_{10}. Note: For the purposes of this policy offsetting has the same meaning as in the National Environmental Standard for Air Quality for PM_{10}.	The adverse effects from the application have been assessed to be inconsequential and determined to not compromise the region's ability to meet the NESAQ or Wellington Regional Air Quality Targets. The Upper Hutt air shed where the plant is located is not classified as a polluted airshed.

7.4 Notification and potentially affected parties

7.4.1 Public notification

Section 95A of the RMA is relevant when a consent authority is considering whether a consent application should be considered with or without public notification. In summary, a consent authority may at its discretion publicly notify an application, and must publicly notify it if:

a) It decides (under Section 95D) that the activity will have or is likely to have adverse effects on the environment that are more than minor; or

b) The applicant requests public notification of the application; or

c) A rule or national environmental standard requires public notification of the application.

In addition, a consent authority may publicly notify an application if it decides that special circumstances exist in relation to the application.

Having regards to these tests, the following points are noted:

d) An assessment of effects on the environment is provided in Section 5 of this report. This assessment concludes that the adverse effects on the environment are likely to be less than minor;

e) The applicant does not request public notification of the application;

f) There is no rule or national environmental standard that requires public notification of this application; and

g) No special circumstances are considered to exist in relation to the application.

Based on the assessment provided in the sections above, we consider that this proposal meets the tests of the RMA to be processed without public notification.

7.4.2 Potentially affected persons

Section 95B of the RMA requires that if a consent authority does not publicly notify an application for a resource consent, it must decide if there are any affected persons (95E) or affected order holders (95F) in relation to the activity.

Under section 95B, the consent authority must give limited notification of the application to any affected person or affected order holder, unless (in the case of affected persons) a rule or national environmental standard precludes limited notification of the application.

Section 95E states that a consent authority must consider a person to be an affected person if the activity's adverse effects on the person are minor or more than minor (but not less than minor). A consent authority must not consider a person affected if they have provided written approval to the proposal.

Having regard to these requirements, we consider that there are no potentially affected party.

7.4.3 Section 95 conclusions

The proposed increase in the VOCs discharge limit will not have adverse effects on the environment that are more than minor. Therefore, we request that the application be processed without public notification.

8 Overview of proposed changes to condition

Resense Upper Hutt site has fifteen existing consents that govern the discharge to air activities.

Table 8-1 sets out the conditions sought to be changed under s127 and the proposed wording of the varied conditions.

Table 8-1: Proposed Condition Wording

Conditions	Existing Wording	Proposed Wording
Air Discharge Consent – Permit WGN160337 [34175]		
Condition 8	*"Notwithstanding conditions 1 and 3, discharges to air relating to the exercise of this consent shall not exceed the following concentrations from the paint production plant extraction systems as measured at the monitoring position on the stack:* • *Total particulate: 10 mg/m3 (at STP, dry gas basis)* • *Total VOCs (expressed as Toluene): 150 mg/m3 (at STP, dry gas basis)* *The concentration shall be determined according to the requirements defined in condition 9 of this consent.".*	*"Notwithstanding conditions 1 and 3, discharges to air relating to the exercise of this consent shall not exceed the following concentrations from the paint production plant extraction systems as measured at the monitoring position on the stack:* • *Total particulate: 10 mg/m3 (at STP, dry gas basis)* • *Total VOCs (expressed as Toluene): ~~150~~ 1200 mg/m3 (at STP, dry gas basis)* *The concentration shall be determined according to the requirements defined in condition 9 of this consent.".*

9 Conclusions

This AEE report has been prepared to accompany the application by Resene to vary conditions of the existing resource consent for discharge of contaminants to air from the existing solvent paint manufacturing activities located at the corner of Fergusson Drive and Montgomery Crescent, Upper Hutt.

The air pollutants considered in this study are particulate matter (PM_{10}) and Volatile Organic Compounds (VOCs) from the manufacture of solvent based paints. These contaminants are emitted from the cartridge filter stack.

In order to evaluate the potential effects of discharges to air from the site, atmospheric dispersion modelling has been undertaken by Industrial Compliance Solutions using CALPUFF. The modelling has considered the effects of terrain as well as building downwash effects.

Due to the lack of local upper air observations meteorological data set for the dispersion modelling study has been developed using observations from the following climate stations and outputs from the TAPM model.

- Paraparaumu airport meteorological station;
- Wallaceville meteorological station;
- Baring Head meteorological station;
- Martinborough meteorological station;
- Wellington – Kelburn meteorological station; and
- Masterton airport meteorological station meteorological station.

Updated emission rates used in the study were based on the results of all stack testing undertaken by Source Testing New Zealand Ltd on the cartridge filter stack for Resene.

Ground level concentrations have been predicted for a 4 km x 4 km modelling domain with a 50 metre grid resolution. The predicted ground level concentrations, including background, are well below the relevant air quality assessment criteria for PM_{10} and VOCs. These results have been compared to the modelling results from the original AEE report.

The effects of these discharges on air quality are assessed as being less than minor. Therefore, increasing the VOCs limit in condition 8, from 150 mg/m^3 (at STP, dry gas basis) to 1200 mg/m^3 (at STP, dry gas basis) expressed as toluene, will result in a less than minor effect on the receiving environment.

The discharges to air from the site are considered to be consistent with the Resource Management Act 1991, the National Environmental Standards for Air Quality, and the relevant objectives and policies of the Operative and Proposed Greater Wellington Regional Policy Statements and the Greater Wellington Regional Plan.

Report prepared by:

Brent Kennedy
Principal Scientist

Appendix A Applications forms

Appendix B Certificate of title

COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Search Copy

R.W. Muir
Registrar-General
of Land

Part-Cancelled

Identifier	**WN16A/1139**
Land Registration District	**Wellington**
Date Issued	20 May 1976

Prior References
WN911/21

Estate	Fee Simple
Area	2.1058 hectares more or less
Legal Description	Part Lot 5 Deposited Plan 21941

Proprietors
Resene Paints Limited

Interests

457988 Notice imposing Building Line Restriction

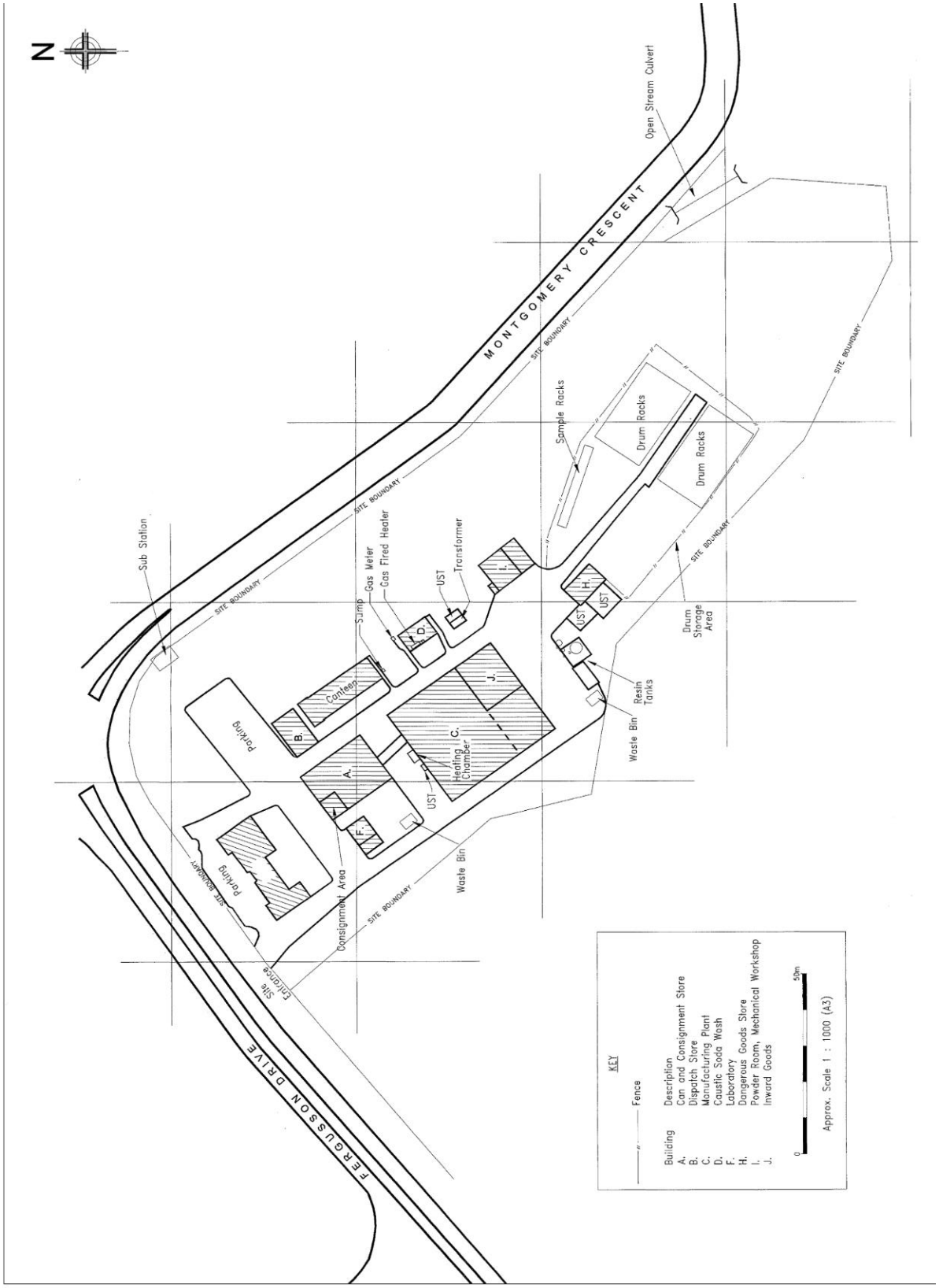
Subject to transformer and electricity rights (in gross) over part in favour of Vector Wellington Electricity Network Limited created by Transfer 210886.1 - 5.11.1976 at 1.50 pm

B194399.1 Gazette Notice (1991 p2942) acquiring parts of the within land (244 square metres, 8 square metres and 2 square metres) hatched black hereon and shown marked A, B and C respectively on SO 36474 for road and shall vest in The Upper Hutt City Council - 19.9.1991 at 10.36 am

Transaction Id *47324704*
Client Reference *acuebillaz001*

Search Copy Dated 24/06/16 3:15 pm, Page 1 of 1
Register Only

Appendix C Site plan



Appendix D BPIP output file

```
BPIP PRIME buildings coordinates 15001 Resene updated 120115

                    BPIP (Dated: 04274)
 DATE :  5/ 12/2014
 TIME :  8:47:48
 BPIP PRIME buildings coordinates 15001 Resene updated 120115

 ============================
 BPIP PROCESSING INFORMATION:
 ============================

   The p  flag has been set for preparing downwash related data
          for a model run utilizing the PRIME algorithm.

   Inputs entered in METERS      will be converted to meters using
    a conversion factor of    1.0000.  Output will be in meters.

   The UTMP variable is set to UTMY.  The input is assumed to be in
     UTM coordinates.  BPIP will move the UTM origin to the first pair of
     UTM coordinates read.  The UTM coordinates of the new origin will
     be subtracted from all the other UTM coordinates entered to form
     this new local coordinate system.

   The new local coordinates will be displayed in parentheses just below
     the UTM coordinates they represent.

   Plant north is set to   0.00 degrees with respect to True North.

 ==============
 INPUT SUMMARY:
 ==============

 Number of buildings to be processed :   6


 B1       has 1 tier(s) with a base elevation of   58.00 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF     CORNER   COORDINATES
  NAME   NUMBER   NUMBER  HEIGHT  CORNERS       X          Y

 B1         1       1     3.00    12
                                  1774815.63  5445807.51 meters
                               (       0.00        0.00) meters
                                  1774820.48  5445811.14 meters
                               (       4.84        3.63) meters
                                  1774821.28  5445810.54 meters
                               (       5.65        3.03) meters
                                  1774834.80  5445819.82 meters
                               (      19.17       12.31) meters
                                  1774834.20  5445820.63 meters
                               (      18.56       13.11) meters
                                  1774839.64  5445824.26 meters
                               (      24.01       16.75) meters
                                  1774846.71  5445814.17 meters
                               (      31.07        6.66) meters
                                  1774835.41  5445806.50 meters
```

(19.77 -1.01) meters
1774833.59 5445808.72 meters
(17.96 1.21) meters
1774826.53 5445803.88 meters
(10.90 -3.63) meters
1774828.14 5445801.06 meters
(12.51 -6.46) meters
1774822.49 5445797.22 meters
(6.86 -10.29) meters

B2 has 1 tier(s) with a base elevation of 58.00 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER	COORDINATES X	Y
B2	1	2	7.00	4			
						1774844.08	5445792.18 meters
					(	28.45	-15.33) meters
						1774857.40	5445800.85 meters
					(	41.76	-6.66) meters
						1774868.90	5445785.12 meters
					(	53.27	-22.40) meters
						1774855.38	5445776.04 meters
					(	39.75	-31.47) meters

B3 has 1 tier(s) with a base elevation of 58.00 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER	COORDINATES X	Y
B3	1	3	3.00	4			
						1774870.31	5445795.81 meters
					(	54.68	-11.70) meters
						1774877.58	5445801.06 meters
					(	61.94	-6.46) meters
						1774890.89	5445782.49 meters
					(	75.26	-25.02) meters
						1774883.43	5445777.45 meters
					(	67.79	-30.06) meters

B4 has 1 tier(s) with a base elevation of 60.00 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER	COORDINATES X	Y
B4	1	4	6.00	4			
						1774848.52	5445759.49 meters
					(	32.89	-48.02) meters
						1774874.15	5445776.44 meters
					(	58.51	-31.07) meters
						1774893.72	5445749.20 meters
					(	78.08	-58.31) meters
						1774868.70	5445731.04 meters
					(	53.06	-76.47) meters

B5 has 1 tier(s) with a base elevation of 60.00 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER	COORDINATES X	Y
B5	1	5	3.00	4			
						1774907.15	5445747.25 meters
					(	91.52	-60.26) meters

```
                    1774914.75  5445753.12 meters
                (      99.11      -54.40) meters
                    1774922.08  5445743.12 meters
                (     106.44      -64.39) meters
                    1774914.35  5445736.99 meters
                (      98.72      -70.52) meters

B6      has 1 tier(s) with a base elevation of   61.00 METERS
BUILDING  TIER  BLDG-TIER  TIER   NO. OF     CORNER   COORDINATES
 NAME   NUMBER   NUMBER  HEIGHT  CORNERS       X          Y

B6        1       6      4.00     4
                    1774910.09  5445729.80 meters
                (      94.45      -77.71) meters
                    1774918.35  5445723.40 meters
                (     102.71      -84.11) meters
                    1774914.08  5445717.41 meters
                (      98.45      -90.10) meters
                    1774905.82  5445724.07 meters
                (      90.19      -83.44) meters

Number of stacks to be processed :   1

             STACK          STACK   COORDINATES
STACK NAME    BASE  HEIGHT         X          Y

S1          60.00   12.00 METERS
                      1774877.47  5445736.21 meters
                  (      61.84      -71.30) meters

  No stacks have been detected as being atop any structures.

              Overall GEP Summary Table
                 (Units: meters)

StkNo:  1  Stk Name:S1       Stk Ht:  12.00 Prelim. GEP Stk.Ht:   65.00
        GEP:  BH:   6.00  PBW:   30.91           *Eqn1 Ht:   15.00
      *adjusted for a Stack-Building elevation difference of    0.00
 No. of Tiers affecting Stk:  1  Direction occurred:  144.50
  Bldg-Tier nos. contributing to GEP:   4


              Summary By Direction Table
                 (Units:  meters)

Dominate stand alone tiers:


Drtcn:  10.00

StkNo:  1  Stk Name:S1                        Stack Ht:   12.00
           GEP:  BH:   6.00  PBW:  30.91   *Equation 1 Ht:   15.00
   Single tier MAX:  BH:   6.00  PBW:  46.29  PBL:  45.65  *Wake Effect Ht:   15.00
   Relative Coordinates of Projected Width Mid-point: XADJ:   -6.61  YADJ:    9.41

      *adjusted for a Stack-Building elevation difference of    0.00
          BldNo:  4  Bld Name:B4       TierNo:  1

Drtcn:  20.00
```

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.99 PBL: 44.52 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -7.86 YADJ: 12.17

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 30.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 44.28 PBL: 42.04 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -8.86 YADJ: 14.57

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 40.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 41.24 PBL: 38.28 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -9.60 YADJ: 16.52

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 50.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 36.93 PBL: 33.35 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -10.04 YADJ: 17.98

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 60.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 36.59 PBL: 33.99 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -13.43 YADJ: 18.21

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 70.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 40.80 PBL: 38.95 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -19.24 YADJ: 18.54

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 80.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 43.76 PBL: 42.72 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -24.47 YADJ: 18.32

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 90.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.40 PBL: 45.19 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -28.95 YADJ: 17.53

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 100.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.65 PBL: 46.29 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -32.55 YADJ: 16.21

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 110.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 44.52 PBL: 45.99 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -35.17 YADJ: 14.40

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 120.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 42.04 PBL: 44.28 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -36.71 YADJ: 12.16

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 130.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 38.28 PBL: 41.24 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -37.14 YADJ: 9.54

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 140.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 33.35 PBL: 36.93 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -36.44 YADJ: 6.63

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 150.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 33.99 PBL: 36.59 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -36.50 YADJ: 3.57

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 160.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 38.95 PBL: 40.80 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -38.94 YADJ: 0.23

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 170.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 42.72 PBL: 43.76 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -40.20 YADJ: -3.11

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 180.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.19 PBL: 45.40 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -40.23 YADJ: -6.35

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 190.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 46.29 PBL: 45.65 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -39.04 YADJ: -9.41

*adjusted for a Stack-Building elevation difference of 0.00

BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 200.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.99 PBL: 44.52 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -36.66 YADJ: -12.17

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 210.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 44.28 PBL: 42.04 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -33.18 YADJ: -14.57

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 220.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 41.24 PBL: 38.28 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -28.68 YADJ: -16.52

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 230.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 36.93 PBL: 33.35 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -23.31 YADJ: -17.98

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 240.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 36.59 PBL: 33.99 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -20.56 YADJ: -18.21

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 250.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 40.80 PBL: 38.95 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -19.71 YADJ: -18.54

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 260.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 43.76 PBL: 42.72 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -18.25 YADJ: -18.32

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 270.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.40 PBL: 45.19 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -16.24 YADJ: -17.53

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 280.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.65 PBL: 46.29 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -13.74 YADJ: -16.21

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 290.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 44.52 PBL: 45.99 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -10.82 YADJ: -14.40

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 300.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 42.04 PBL: 44.28 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -7.57 YADJ: -12.16

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 310.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 38.28 PBL: 41.24 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -4.09 YADJ: -9.54

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 320.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 33.35 PBL: 36.93 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -0.49 YADJ: -6.63

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 330.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 33.99 PBL: 36.59 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -0.09 YADJ: -3.57

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 340.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 38.95 PBL: 40.80 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -1.85 YADJ: -0.23

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 350.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 42.72 PBL: 43.76 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -3.57 YADJ: 3.11

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Drtcn: 360.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
Single tier MAX: BH: 6.00 PBW: 45.19 PBL: 45.40 *Wake Effect Ht: 15.00
Relative Coordinates of Projected Width Mid-point: XADJ: -5.17 YADJ: 6.35

*adjusted for a Stack-Building elevation difference of 0.00
BldNo: 4 Bld Name:B4 TierNo: 1

Dominant combined buildings:

Drtcn: 10.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 20.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 30.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 40.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 50.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 60.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 70.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 80.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 90.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 100.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 110.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 120.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 130.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 140.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 150.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 160.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 170.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 180.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 190.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 200.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 210.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 220.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 230.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 240.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 250.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 260.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 270.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 280.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 290.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 300.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 310.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 320.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 330.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 340.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 350.00

StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Drtcn: 360.00

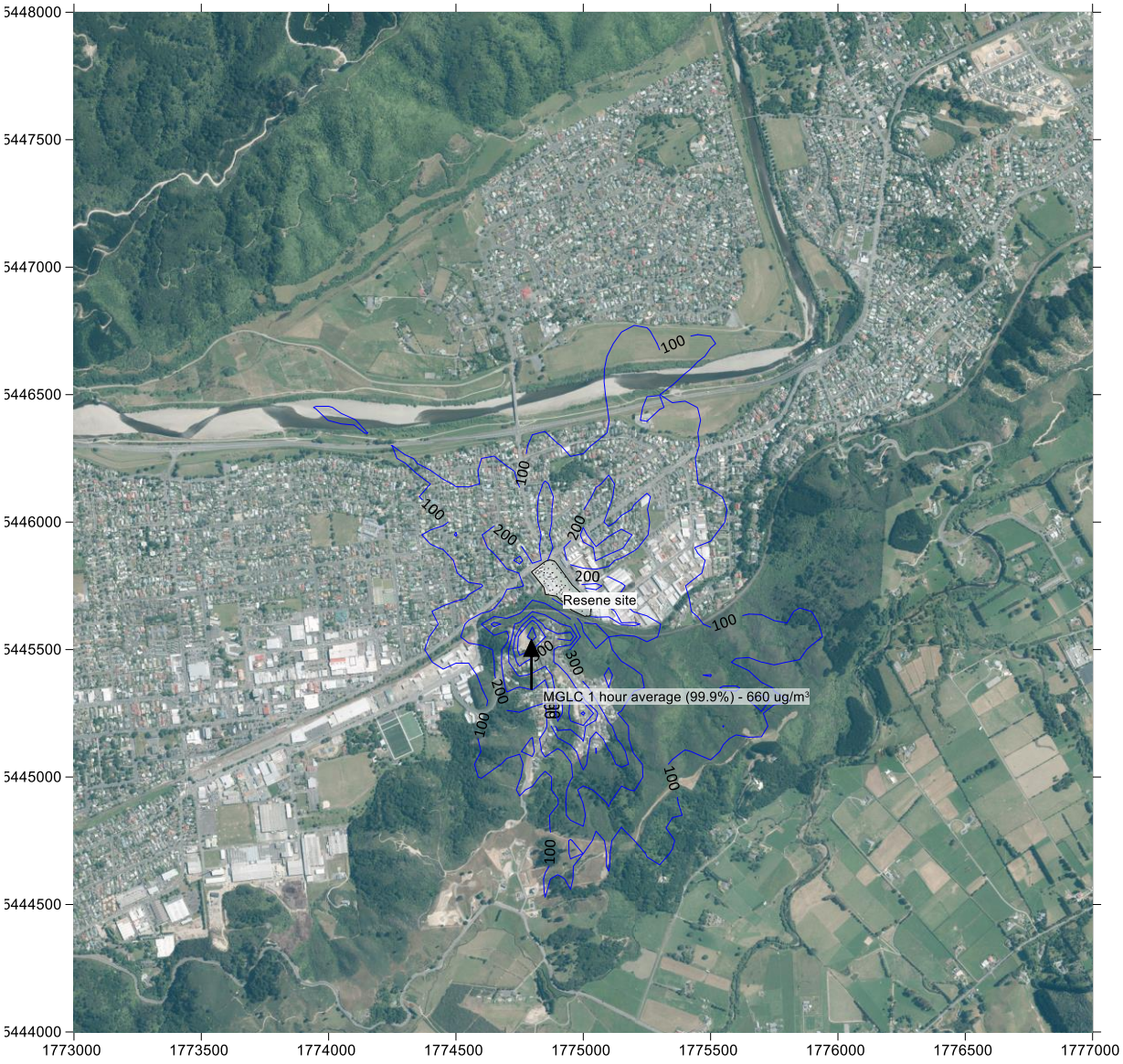
StkNo: 1 Stk Name:S1 Stack Ht: 12.00
GEP: BH: 6.00 PBW: 30.91 *Equation 1 Ht: 15.00
No combined tiers affect this stack for this direction.

Appendix E Concentration contour plots

Resene Paints Limited

Air Quality Study - Updated
CALPUFF Concentration Contours

MGLC Toluene (ug/m^3 - 1 hour average (99.9%))



Resene Paints Limited

Air Quality Study - Updated
CALPUFF Concentration Contours

MGLC Ethyl benzene (ug/m^3 - 24 hour average)