

Report

Drury Project-Air Quality Management Assessment

Prepared for Stevenson Group Ltd (Client)

By Beca Infrastructure Ltd (Beca)

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Approved by	Tracey Haszard		16/12/10
on behalf of	Beca Infrastructure Ltd		

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Executive Summary

The concept for the Drury South Business project (DSBP) represents a significant potential for industrial land development, comprising approximately 223ha of Group 1 business land. This assessment considers the proposed development and its potential effect on air quality as a result of a change in land use due to the district plan changes and MUL amendment.

Proposed land uses within the development are predominantly Group 1 Business and in terms of employee numbers, wholesale trade related activities will be most significant but are not expected to include activities with significant discharges to air. The next highest land use proportion in terms of employees is "food manufacturing (other than meat and dairy)". This category includes a wide range of activities which might include for example: commercial bakeries, fruit and vegetable processing, coffee roasters etc.

A small proportion of the development has been allocated to Group 2 activities which are less likely to discharge contaminants to air. It is also recognised that Group 2 activities are likely to be more sensitive to air quality impacts than Group 1 and the layout of the development is designed to group and locate these land uses to minimise reverse sensitivity issues.

Mitigation of the potential effects of the DSBP on air quality has been a key consideration in the concept design. The concept layout has defined a number of different land use zones in order to locate compatible land uses together and minimise potential reverse sensitivity issues. The concept layout has been used as the basis for the Drury South Structure Plan and associated industrial rezoning which is proposed to be included in the Papakura and Franklin District Plans by plan change.

To minimise the impact of the emissions of air contaminants from industrial activities on sensitive receiving environments, separation or 'buffer distances' have been allowed for in identifying within the proposed district plan changes a light industrial zone to buffer the proposed "heavy" Industrial 4 zone from the surrounding more sensitive rural activities. Buffer distances between industrial activities and sensitive receptors are recommended in the "*Guidelines for separation distances*" South Australian Environmental Protection Agency, 2007 and these have been applied in developing the DSBP concept and structure plan, and the proposed district plan changes. The activity lists within the Papakura and Franklin District Plan industrial zones to be applied within the DSBP have been reviewed and are appropriate in air quality terms.

The proposed site is currently within a Rural Air Quality Management Area (AQMA) in the Auckland Regional Plan: Air, Land and Water (ARP:ALW). This type of AQMA is designed to maintain current levels of amenity while enabling 'rural' activities. Industrial Air Quality Management Areas apply to specific industrial areas within the Metropolitan Urban Limits. It is considered that a change from the existing Rural Air Quality Management Area to an Industrial Air Quality Management Area will be required for the project to be considered consistent with the policies of the ARP: ALW. The requested change to the ARP:ALW to include the DSBP area within the Industrial Air Quality Management Area is therefore appropriate.

1 Introduction

The Drury South Business Project (DSBP) proposes the development of approximately 223 Ha of 'Land Extensive Business Activity' land (within a total study area of around 361 Ha), which is anticipated to provide employment for approximately 6,880 people when fully developed (around 2025-30). The project is located in the Drury basin, to the east of the State Highway 1 Motorway (SH1), between Drury interchange in the north, and Ramarama interchange in the south. The DSBP area lies within the Franklin Ward of the Auckland Council and across the boundary between the Papakura and Franklin District Plan areas. Drury Quarry is located at the base of the Hunua foothills on the eastern edge of the project area, with the Quarry Zone extending into the project area. Figure 1 shows the location of the project.

The DSBP responds to the following strategic imperatives:

- n The regional significance of Stevenson Drury Quarry (as a substantial aggregate resource with in excess of 150 years of aggregate resource remaining) and the need to manage the impact of reverse sensitivity pressure from adjoining sites and vehicle movements.
- n An objective established by the former Papakura District Council to provide further capacity for local employment and business growth through the establishment of a 'construction cluster'.¹
- n The shortage of business land in the Auckland region, particularly for industrial business including manufacturing, wholesale trade, construction, transport and storage.

As the DSBP area is currently zoned for rural purposes, plan changes to the Papakura and Franklin District Plans are required for the project to proceed. Because the DSBP area lies outside of Auckland's metropolitan urban limits (MUL) an amendment to the MUL through a change to the Regional Policy Statement will be required to allow the district plan changes to proceed. The amendment to the MUL in turn requires an application for a stormwater network discharge consent (NDC). The land required for key public infrastructure including roads, stormwater management and public open space is anticipated to be secured through a Notice of Requirement (designation) process to ensure the timely and coordinated implementation of these infrastructure components. These Notices of Requirement would need to be initiated by Auckland Council, Auckland Transport and NZTA as the relevant requiring authorities. This report forms one part of the overall suite of documents that inform those planning processes.

¹ Papakura District Council, Economic Development Strategy (2007)

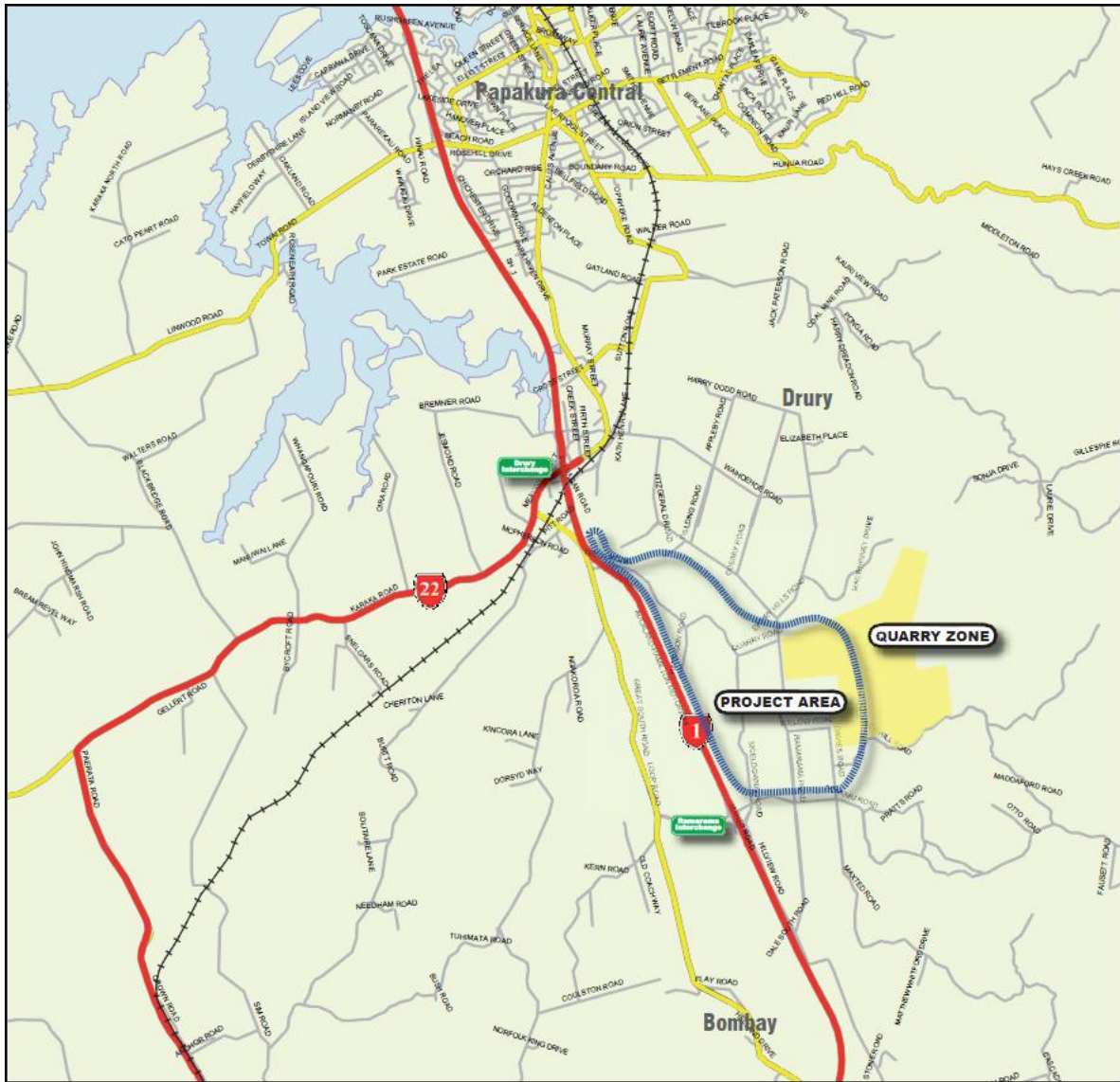


Figure 1 Location of Drury South Business Project

1.1 Purpose of this Report

The purpose of this assessment is to consider the proposed rezoning and its potential effect on air quality as a result of a change in land use.

The scope of this assessment is to consider the following:

- n Potential effects of discharges to air from industrial or manufacturing activities likely to establish in the DSBP.
- n Potential air quality implications of changes in traffic distribution and vehicle numbers as a result of the DSBP.

This document also sets out to describe how land use compatibility and reverse sensitivity issues have been taken into consideration in the development of the DSBP concept layout.

Due to the concept nature of the Drury South Structure Plan, this assessment is at a strategic level and does not include any quantitative assessment such as air quality modelling

2 Description of Proposal

2.1 Proposed land uses

Proposed land uses are predominantly Group 1 Business and the estimated breakdown of uses are shown in Table 1. This table is based on an economic assessment report done by Market Economics for the DSBP area and is in terms of employee numbers rather than area. "MECs" are modified employment counts and column 3 in Table 1 breaks down the percentage of employees working in each industry across all employees in the DSBP. One of the most common industry types is expected to be food manufacturing (other than meat and dairy products). This category includes a wide range of activities which might include for example: commercial bakeries, fruit and vegetable processing, coffee roasters etc. In terms of employee numbers, wholesale trade will also be significant, but is not expected to include activities with significant discharges to air.

All of the manufacturing activities listed below ("Mfg") have the potential to discharge contaminants to air. Management of these potential effects through the proposed concept layout and land use zones is described in section 2.2.

A small proportion of the DSBP area has been allocated to Group 2 activities which are less likely to discharge contaminants to air. However, Group 2 activities are likely to be more sensitive to air quality impacts than Group 1 and the layout of the development is designed to group and locate these land uses to minimise reverse sensitivity issues.

Table 1 - Estimated Breakdown of the Group 1 Mix of Uses at Drury based on 'Modified Employee Counts' (MEC) (Drury Business Land Economic Impact Assessment, Market Economics 2010)

Industry	Papakura and Franklin District Plan* Industrial zones	Percentage of total MEC
Group 1		
Meat and meat product Mfg.	4	0.0
Dairy product Mfg.	4	0.0
Other Food Mfg.	4	16.4
Beverage, malt and tobacco Mfg.	4	4.7
Textile and apparel Mfg.	3	3.2
Wood product Mfg.	3	1.2
Paper and paper product Mfg.	4	0.1
Printing, publishing and recorded media	3	3.2
Petroleum and industrial chemical Mfg.	4	0.0
Rubber, plastic and other chemical product Mfg.	4	3.0
Non-metallic mineral product Mfg.	4	1.3
Basic metal Mfg.	4	0.0
Structural, sheet and fabricated metal prod. Mfg.	4	3.1
Transport equipment Mfg.	4	0.8
Machinery and equipment Mfg.	4	2.2
Furniture and other Mfg.	3	3.3

Industry	Papakura and Franklin District Plan* Industrial zones	Percentage of total MEC
Construction	3	6.5
Wholesale Trade	3	25.2
Road transport	3	5.5
Water and rail transport	3	0.2
Air transport, services to transport and storage	3	2.0
TOTAL GROUP ONE		82.0
Group 2		
Retail Trade	3	4.1
Accommodation, Cafes & Restaurants	n/a	0.0
Communication Services	3	3.3
Finance & Insurance	3	0.2
Property & Business Services	3	7.8
Government Administration & Defence	n/a	0.0
Health & Community Services	n/a	0.5
Cultural & Recreational Services	n/a	0.0
Personal & Other Services	n/a	1.3
TOTAL Group 2		17.2
Other Industries		
Agriculture	n/a	0.0
Mining	n/a	0.2
Electricity, Gas & Water Supply	3	0.0
TOTAL OTHER INDUSTRIES		0.2
TOTAL		100.0

*Franklin District Plan light industrial zone is represented by Papakura District Plan Industrial '3' zone in rows below as described in section 2.2

3 Proposed land use zones

The DSBP has identified a number of different land use zones in order to locate compatible land uses together and minimise potential reverse sensitivity issues. The proposed zones are illustrated in Figure 2. These zones have been based on the Industrial 3 and 4 zones in the Papakura District Plan and the Light Industrial zone introduced into the Franklin District Plan by Plan Change 24 (Pokeno).

A Drury South Structure Plan, with its own objectives, policies and methods, is to be inserted in both the Papakura and Franklin District plans. The structure plan will show broad land use zones, special development precincts, roads, public open space/stormwater management areas and other infrastructure elements. The following zoning is proposed:

- n **Industrial 3 zone (Papakura District Plan) and Light Industrial zone (Franklin District Plan):** The Industrial 3/Light Industrial zone is intended to assist in providing a buffer or transition area between the 'heavier' Industrial 4 zone and the rural and rural residential activities to the south and west of the DSBP area.
- n **Industrial 4 zone (Papakura District Plan):** This zone enables industrial activities which require physical separation from sensitive activities to be established within the DSBP area and lies within a buffer created by the Industrial 3/Light Industrial zone. It also ensures that the type of industrial activity located closest to the Stevenson Drury Quarry is compatible with quarry operations and does not generate any reverse sensitivity effects upon the Quarry. This zone is not applied to the portion of the DSBP area within the Franklin District Plan area.

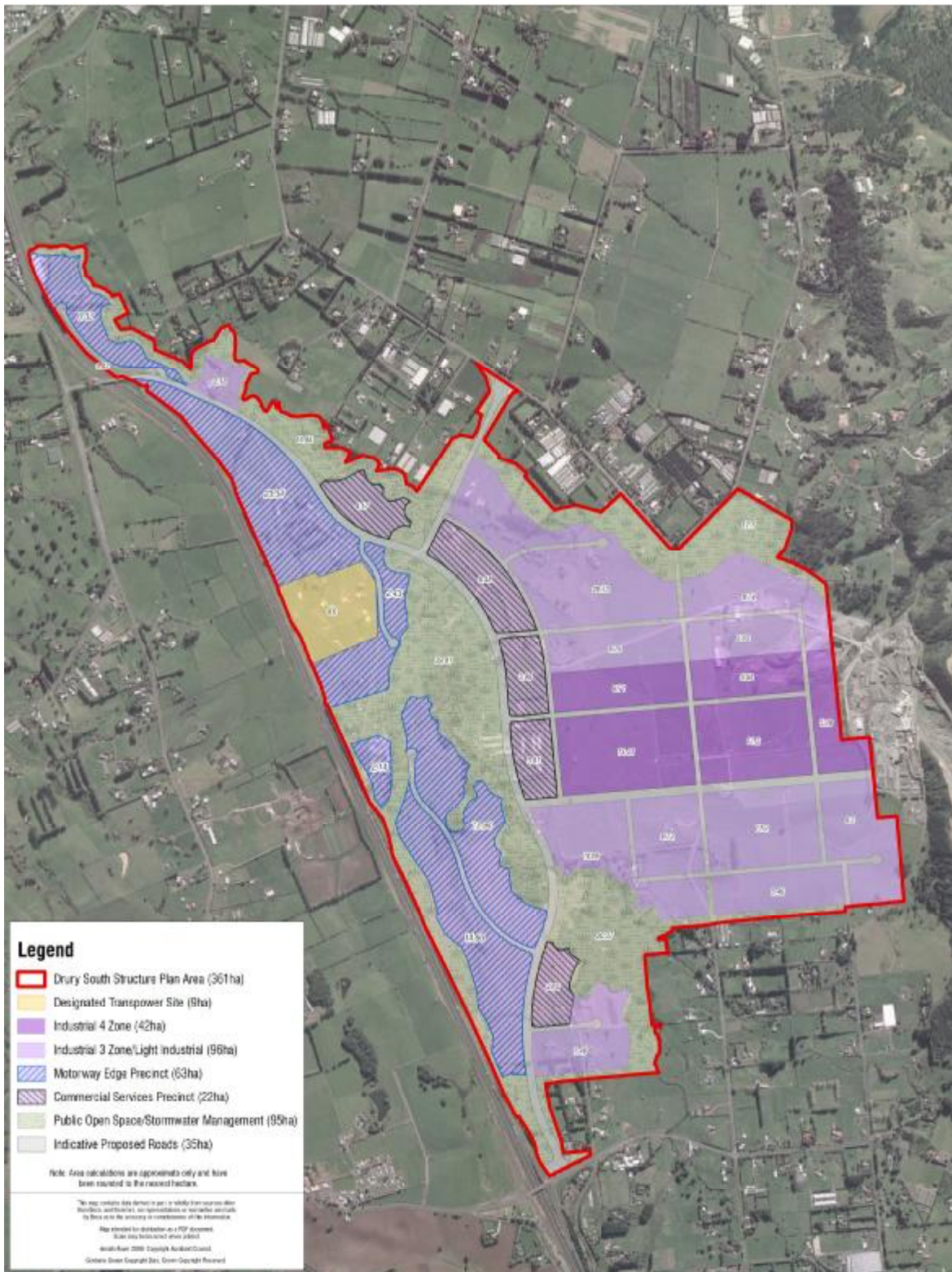


Figure 2 Drury South Business Project Concept

As outlined above, it is proposed that heavier industrial land uses in the Industrial 4 zone be located close to the centre of the DSBP, allowing the greatest possible buffer between activities surrounding the site in order to minimise the extent of impacts on these land uses and facilitate desirable land use relationships. In most areas, the buffer area between the edge of the proposed 'heavy' industrial zoned development (Industrial 4 Zone) and activities surrounding the project area will be approximately 500m.

The concept includes two Precincts, which will overlay the Industrial 3/Light Industrial zone, where specific design and activity criteria apply:

- n **Commercial Services Precinct:** Provides for the consolidation of the commercial services to support and complement the industrial use. Uses in this area include retail trade (with floor space limitations), accommodation/cafes/restaurants, communication, finance, insurance, property/business and other similar business activities designed to service the industrial area. This precinct is located closer to sensitive receptors, such as residential and education, providing a further buffer between uses.
- n **Motorway Edge Precinct:** Accommodates lower density light industrial development within the Industrial 3/Light Industrial zone. This precinct provides for a relatively high proportion of landscaped/pervious area and the opportunity to create a landscaped edge to SH1.

Once public open space and stormwater management areas are vested as reserve (at the time of subdivision), the Council will in due course move to rezone those areas as recreation/reserve under the respective district plans. In the meantime, specific rules within the Industrial zoning provisions will authorise their use for recreation and reserve purposes.

The project does not involve expanding the Quarry Zone. It proposes to reduce the western edge of the Quarry Zone, which would become part of the new industrial area.

4 Transport corridors

As the DSBP is sited between a quarry and a major State Highway, there are currently significant transport corridors for heavy vehicles through the proposed DSBP area.

A traffic survey was undertaken in October 2007 which found that the proportion of heavy to light vehicle traffic transporting quarry materials is highest on Quarry Road. Over the weekdays there were 619 vehicle movements down Quarry Road and 158 vehicle movements on Ararimu Road west of Ramarama Road past Ramarama School. This is a function of Stevenson's company policy to encourage all quarry related traffic to use Quarry Road rather than Ramarama and Fitzgerald roads which are near sensitive receiving environments. Currently air quality is likely to be impacted by traffic air emissions around Quarry road with a minimal impact on the receiving environment as this is an area with few sensitive receptors. In the proposed development some of the roads used by quarry vehicles will change so that the distribution of vehicle related air emissions may adjust.

The DSBP proposes changes to this roading network especially the roads utilised by heavy vehicles accessing the quarry. The introduction of industrial activities will also increase the amount of heavy-medium vehicle movements in the area, especially towards the Drury and Ramarama Interchanges that link the site to State Highway 1 (Southern Motorway). Therefore in relation to air quality, vehicle emissions may increase.

A map displaying the proposed transport links is provided in Appendix A.

5 Receiving Environment

5.1 Existing land uses

The existing receiving environment inside the DSBP is assumed to transition to the new land uses as the development takes place. The receiving environment outside the DSBP is therefore most relevant and is shown in Figure 3.1.

The existing environment surrounding the DSBP is primarily rural-residential and rural. Rural residential development has extended up into the foothills including in the east of Drury with one such development accessed by Macwhinney Drive, off Drury Hills Road, extending along the northern boundary of the Stevensons quarry and in parts overlooking the site. The main areas of rural-residential living are at the southern portion of the site along McEldownie Road, south of Ararimu Road, and on the hills, northeast of the site, on MacWhinney Drive. There are also rural – residential properties north of the project area, along Fitzgerald Road.

Other rural land uses are located to the north and south of the site comprising small farms grazing livestock, market gardens and greenhouses.

The population density is lower than urban residential areas and therefore the opportunity for people to be adversely affected by industrial air emissions is low. However there is still some potential for people of high sensitivity to air emissions to be exposed at all times of day and night. Often these people move into these areas for a healthier lifestyle and can be more sensitive to perceived health risks.

Stevenson's Quarry is located at the base of the Hunua foothills on the eastern edge of the DSBP, with the quarry zone currently extending into the DSBP. The Ramarama School has a role of 167 students and is located 200 metres from the Ramarama interchange. Schools (together with childcare facilities, rest homes and hospitals) are considered to be a highly sensitive land use, as people of high sensitivity to the effects of emissions to air (i.e. children) are exposed. The school is located approximately 400 metres south of the DSBP southern extent. The air quality is potentially already affected due to its proximity to the Southern Motorway.

The western edge of the DSBP is bounded by the Southern Motorway section of State Highway One in which the Ramarama interchange is at the southernmost point of the DSBP. The receiving environment on the western side of the motorway is not considered in this report..

5.2 Topography

The northern area of the site is rolling country with the foothills of the Hunua Ranges bounding the site to the east. The southern portion of the site is relatively flat but is within the influence of the Bombay Hills which are approximately 4 km to the south. Across the Southern Motorway to the west the country is rolling. The Hingaia stream traverses the area with the north-western section of the site being low lying and prone to flooding. MacWhinney Drive to the north of the Quarry is elevated above land to the south with views over the project area.

Ridges and valleys have the potential to impact on air quality by restraining and channelling air flow; reducing the dispersion of air contaminants. The site is gently rolling so that this effect will be minimal and localised.

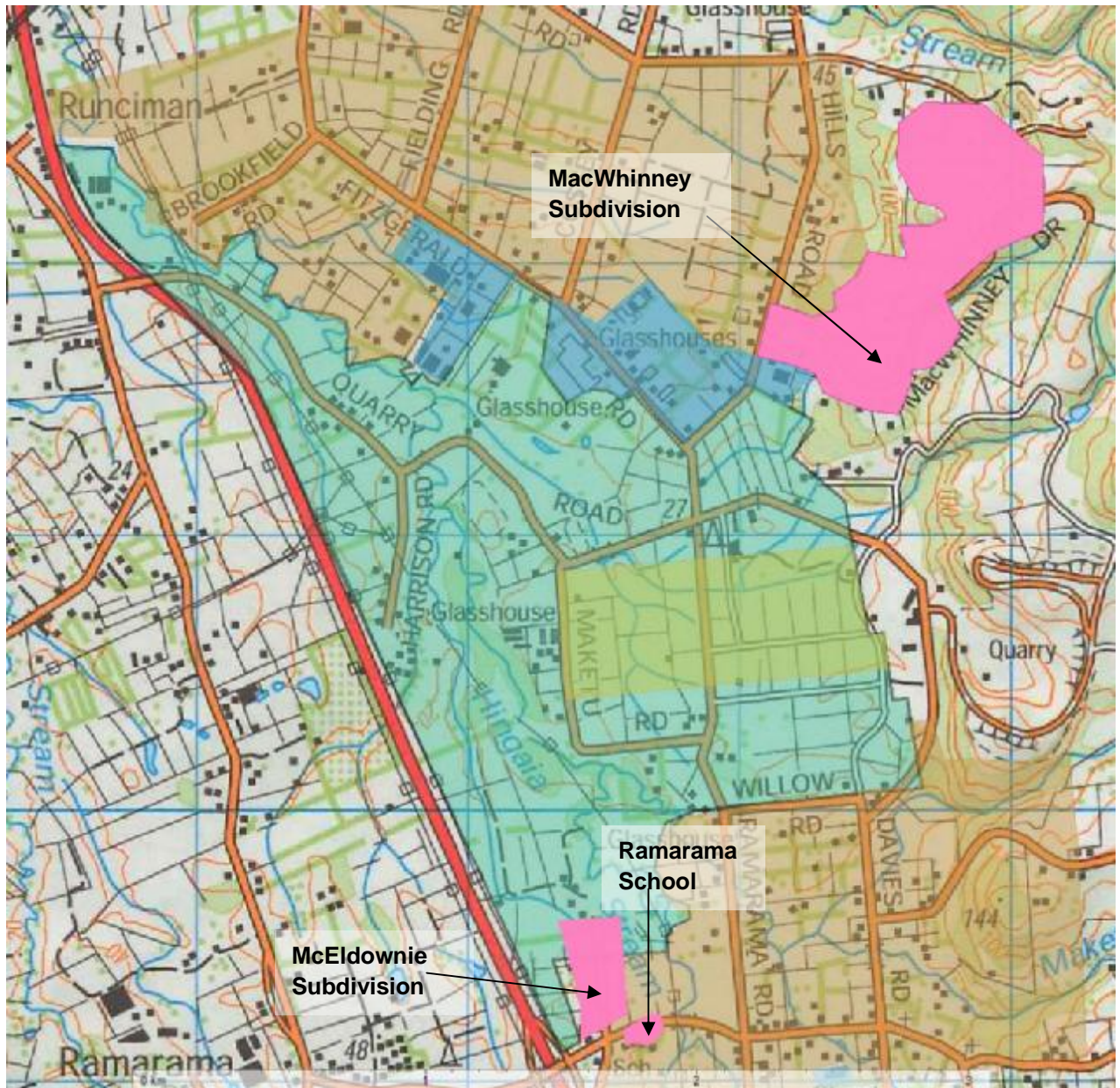


Figure 3 – Land uses surrounding the Drury South Structure Plan Area (green) including sensitive receiving environments (pink), glasshouses and market gardens (blue), small farms (orange).

5.3 Meteorology

5.3.1 Influence of meteorology on air quality

The dispersion of air contaminants when discharged from industrial processes are impacted by meteorological conditions including wind speed, wind direction, and atmospheric conditions. These meteorological conditions vary according to seasonal and diurnal factors, as well as day to day weather changes. Hence the impact of air emissions on a sensitive environment can change in relation to these factors. An initial analysis of wind data recorded at the Drury quarry is described below.

5.3.2 Windrose analysis

Figure 4 shows a windrose of wind directions and speed categories from July 2008 to July 2009 measured at the weather monitoring station at the Drury Quarry. The quarry is adjacent to the

DSBP, so the windrose is a reasonable representation of wind direction and speeds that the DSBP will typically experience. The windrose shows the dominance of southwesterly winds which are prevalent for the Auckland region. The average wind speed is considered low at 1.61 ms^{-1} . Therefore areas east and northeast of the DSBP (quarry and MacWhinney Drive) are likely to be downwind of potential air discharges from the DSBP more frequently than other locations. Areas to the south (Ararimu Road) and south west have a lesser potential to be impacted by air contaminants emitted from the DSBP.

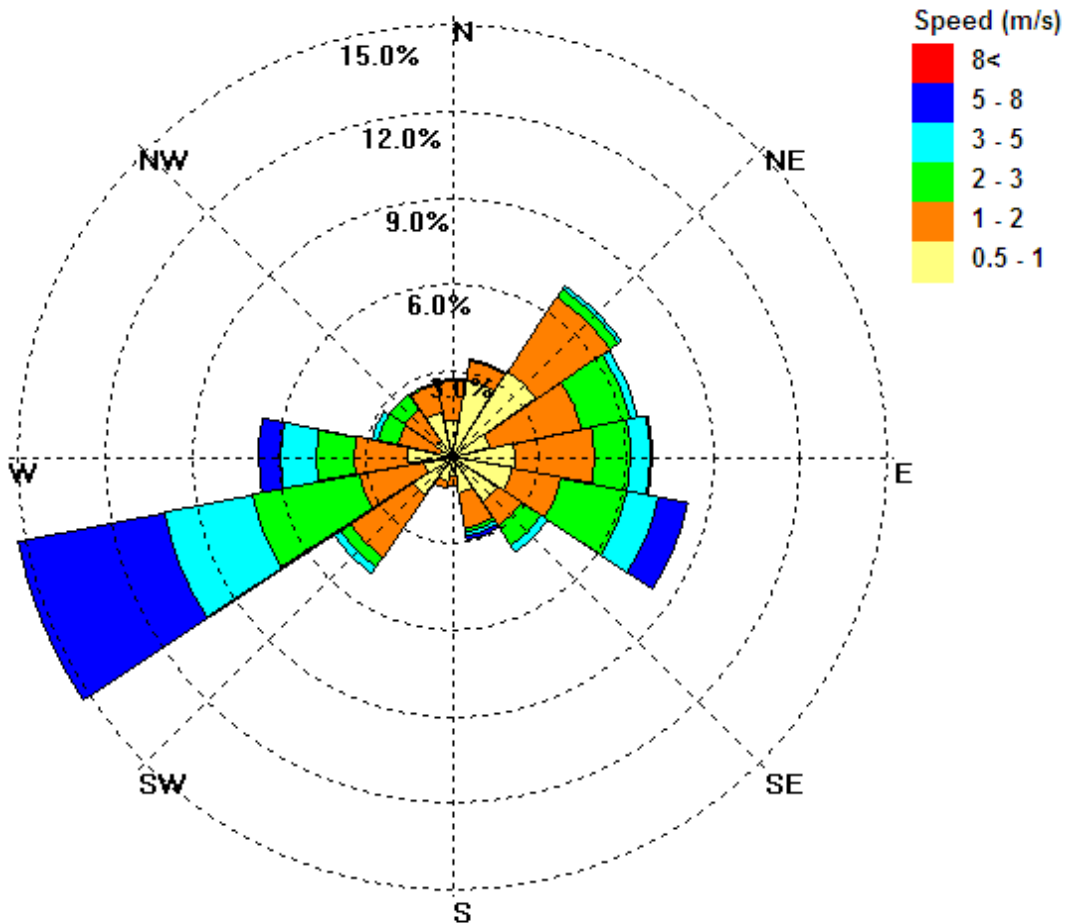


Figure 4 - July 2008 - July 2009 Windrose of Drury (Stevenson's) Quarry
Meteorological Data

5.4 Existing air quality

Currently there are three main types of activities that are affecting existing air quality in the area. These are vehicle emissions from the southern motorway, localised dust emissions from quarry vehicles and dust emissions from the Stevenson's Quarry.

The Auckland Council carries out ambient air quality monitoring at various locations within Auckland city and the Auckland region. The closest of these sites to the project area is a rural monitoring site at Pukekohe, located in Cronin road, approximately 2.5km west of the Pukekohe urban area. This site is likely to represent typical background rural air quality similar to what would be expected in the Drury south project area.

At this monitoring site, particulate less than 10 microns in size (PM_{10}) has been measured since the end of 2006. A summary of this data for the last two years is shown below in Table 2:

Table 2 – 24 hour average PM₁₀ concentrations measured at Pukekohe (Cronin Rd) 2007-2008

Year	2007 (µg/m ³)	2008 (µg/m ³)
Mean	12.2	12.7
90 th percentile	18.3	19.1
Maximum	43.7	56.8

The data measured at the Pukekohe site is compared with other background monitoring sites in Auckland in Figure 3.3. This figure shows that there was one exceedance of the National Environmental standard of 50 µg/m³ for PM₁₀ recorded in 2008, which was likely to be due to a one off short duration dust event. Overall, the 2008 Pukekohe data is similar to Henderson and Glen Eden. The Penrose data is collected at the Gavin St substation and represents air quality in an existing industrial area in Auckland, also impacted by home heating and the Southern motorway.

The existing air quality within the project area is likely to be influenced by dust emissions from rural activities and particulates from solid fuel burners for home and glasshouse heating. Some dust may be generated in locations close to the quarry. As the predominant land use in the area is rural-residential, the overall air quality is likely to be good. The transfer from the existing rural air quality management area to an industrial air quality management area may cause a small change in overall air quality, but the contribution from industry is expected to be small as these discharges will be required to be mitigated and comply with best practice. Due to the rolling topography and prevalent south west winds of low wind speeds it is unlikely that identified sensitive receptors are impacted by these activities.

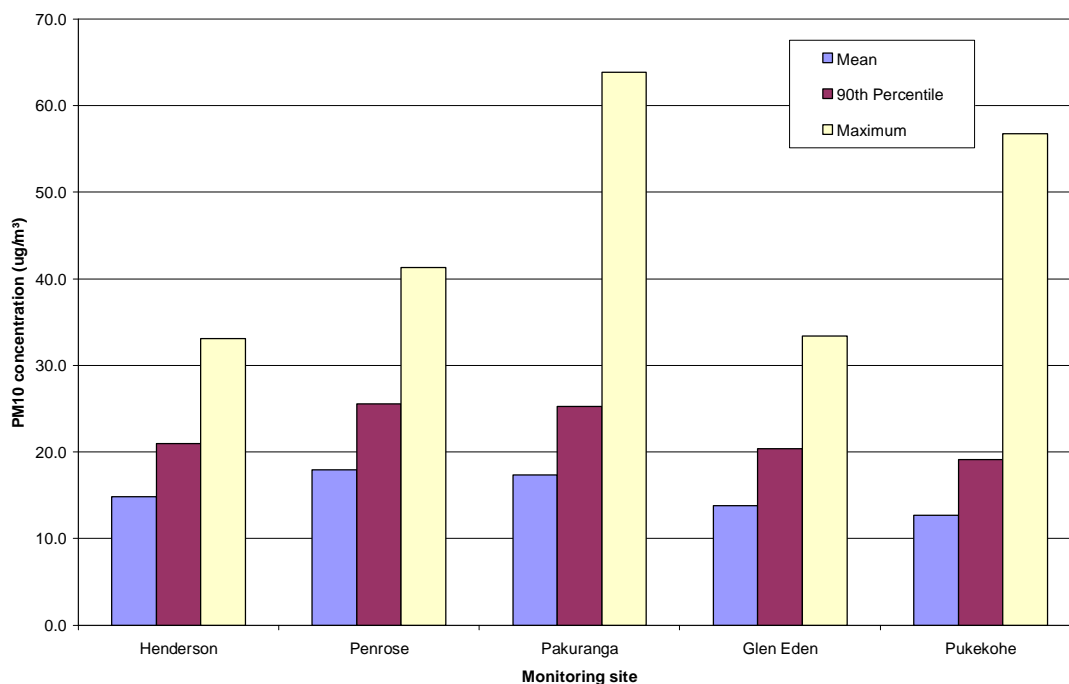


Figure 5: Summary of 24-hour average PM₁₀ concentrations recorded at various locations in the Auckland region, 2008

No air quality related complaints were received by the former Franklin District Council for the existing area within and around the project. The former Papakura District Council has record of a complaint relating to odour from a chicken farm on Marketu Road. The former Auckland Regional Council received two complaints in June 2003 and 2009 regarding dust with the source suspected to be from the Quarry.

6 Statutory Requirements

6.1 Papakura and Franklin District Plans

The DSBP area lies across the boundary between the Papakura and Franklin District Plan areas and the provisions of both plans apply to the proposal. Amendments to both district plans are required for the project to proceed.

Papakura District Plan also has specific provision for the discharge of contaminants to air from heavy industry, which supports reduced amenity and are therefore suitable as areas to promote industrial intensification.

6.2 Auckland Regional Policy Statement

The DSBP Area currently lies outside of the Metropolitan Urban Limits (MUL) and “urban activities” are therefore not permitted under the Auckland Regional Policy Statement (RPS). Therefore an amendment to the MUL is required for the project to proceed. The RPS is currently being reviewed. Key criteria for amendments to the MUL are contained under RPS Change 6 and currently any MUL extension must include supporting information including an assessment of air quality management issues.

6.3 Auckland Regional Plan: Air, Land and Water

The Auckland Regional Plan: Air, Land and Water (ARP: ALW) was made operative in part on 21 October 2010 and outlines objectives and policies in relation to discharges to air and from industrial or trade processes.

The ARP: ALW rules have been developed to address the issues covered in the objectives and policies and are instrumental in assessing the effect of an activity. The discharge of contaminants to air from industrial processes establishing inside the DSBP area will need to be assessed and consented individually against the rules of the ARP: ALW.

Specifically, further details relating to air quality related matters is provided Chapter 4 of the ARP:ALW. These policies support Part 2 matters of the RMA, the objectives and policies of Chapter 2 of the ARPS and Chapter 2 of the ARP:ALW.

In particular, Objectives 4.3.1, 4.3.2 and 4.3.9 state:

- “4.3.1 To maintain air quality in those parts of the Auckland Region that have excellent or good air quality and enhance air quality in those parts of the Region where it is poor or unacceptable.
- “4.3.2 To avoid, remedy or mitigate significant adverse effects from the discharge of contaminants into air on human health, amenity and the environment. In particular:
- b) To maintain or enhance existing amenity within the Urban Air Quality Management Areas; and
 - c) To maintain existing levels of amenity within Industrial and Rural Air Quality Management Areas and the Coastal Marine Air Quality Management Area”.
- “4.3.9 To avoid significant adverse effects on human health and the environment arising from the discharge of contaminants into air from individual sources including industrial processes ...” .

The following two policies are also considered to be relevant to the DSBP area:

Policy 4.4.7 To avoid or minimise adverse effects from competing and incompatible land uses, including reverse sensitivity, activities shall:

- a) Locate within the Air Quality Management Area suitable to the nature of the activity; and/or
- b) Manage the effects of their discharges of contaminants into air in a manner that is commensurate with the receiving environment (including the relevant provisions of the underlying District Plan zones); and/or
- c) Maintain adequate separation distances

Policy 4.4.8 Potential conflicts between incompatible land uses along the boundaries of Air Quality Management Areas shall be minimised.

To be consistent with the ARP:ALW policies, adequate separation distances between incompatible land uses will need to be established. South Australian guidance on recommended minimum buffer distances has been utilised in the planning of the concept layout. These guidelines are designed for land use planning purposes to mitigate potential air quality impacts of industrial activities. This is discussed further in section 8.1.

6.3.1 Air Quality Management Areas

The ARP: ALW recognises that adverse effects from air quality can be exacerbated by land use. The inappropriate location of activities that discharge contaminants into air and the inappropriate location of parties sensitive to those activities (*reverse sensitivity*) can aggravate any adverse effects from the discharge of contaminants into air. Air Quality Management Areas (AQMA) are intended to help address this issue. The ARP: ALW defines industrial, urban and rural AQMAs.

The proposed site is currently within a Rural AQMA. This type of AQMA is designed to maintain current levels of amenity while enabling 'rural' activities including pastoral farming, horticulture, intensive livestock farming, forestry and quarrying. The purpose of the Rural AQMA is to enable 'rural' activities to exist whilst maintaining appropriate levels of amenity.

Industrial AQMA apply to specific industrial areas within the Metropolitan Urban Limits. They overlay specific industrial zones within some district plans.

Hence a change from the existing Rural AQMA to an Industrial AQMA would be required for the project to be considered consistent with the policies of the ARP: ALW. The AQMAs should be in place before industrial activities establish in the DSBP area.

6.4 Air quality standards and guidelines

In October 2004 the Government introduced five National Environmental Standards for Ambient Air Quality (AQNES). These five standards are for fine particles (PM₁₀), sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), and ozone. These are mandatory standards which set maximum ambient air concentrations to protect human health and the environment.

The Ministry for the Environment has also published Ambient Air Quality Guidelines (AAQG), which contain guidelines limits for other contaminants and also other averaging periods.

The ARP: ALW also sets Regional Air Quality Targets which cover ambient pollutants or averaging periods that are not included within the National Environmental Standards for Ambient Air Quality. (e.g. annual average PM₁₀).

The activities within the Drury South development will be required to comply with these standards.

The Auckland region contains 12 airsheds that are gazetted in accordance with the AQNES. The Auckland urban airshed is in breach of the AQNES for PM₁₀. In response to this, the former

Auckland Regional Council developed a strategy for reducing PM₁₀ emissions in the Auckland urban airshed. One potential benefit of the implementation of the DSBP may be the relocation of some industrial activities (and associated air discharges) out of the densely populated Auckland urban airshed to the less sensitive receiving environment of the DSBP area (located outside of the gazetted airsheds).

7 Potential Effects on Air Quality

The proposed development has the potential to positively and negatively impact upon air quality depending on the scale of the effect as discussed below. However there is an opportunity to manage these effects through appropriate location of land uses and buffer distances.

As the proposed development will lead to a change in the land use from rural to industrial, there is likely to be some localised decrease in the quality of the air. This will be from an increase in the discharge of air contaminants associated with industrial activities.

7.1 Activity types and potential contaminants

The potential contaminants which may be discharged are:

- n Particulates and dust
- n Odour
- n Combustion emissions
- n Others (e.g. Volatile organic compounds (VOCs), solvents, and metals)

The following provides a general discussion about the potential sources of these contaminants:

- n Fine particulates may be generated from burning coal, oil, wood and diesel. Dust may be generated from activities within the DSBP area especially from wind-blown dust from exposed surfaces such as bare land and construction sites, dust caused by vehicle movements along un-sealed roads, and dust from road works.
- n Industrial activities within the proposed development have the potential to discharge emissions from combustion (e.g. boilers and generators for energy and heating demands) in which the contaminants could include particulates, sulphur dioxide (SO₂), nitrogen oxides (NO_x), and carbon monoxide (CO). Vehicles emit these contaminants.
- n Offensive odour may be generated by activities such as waste management, food and beverage manufacturing, processing activities, and wastewater treatment. It is noted there is no proposal to treat wastewater within the DSBP (other than potential on-site treatment of process wastewater).
- n VOCs are released from activities like spray painting using solvent base paints and fibreglass manufacture, agrichemical manufacture and use, industries such as synthetic rubber manufacture, printing making adhesives, and particle board mills.

Table 3 summarises types of industry identified in the Market Economics report summarised in Section 2.2, together with the potential types of contaminants emitted.

Table 3 – Potential types of contaminants emitted according to industry type and potential effects on the receiving environment

Types of contaminants	Types of industry	Potential effect on receiving environment
Particulates and dust	<ul style="list-style-type: none"> § Food Mfg (other than meat and dairy) § Structural, sheet and fabricated metal prod. Mfg § Construction § Non-metallic mineral product Mfg § Wood product Mfg 	<ul style="list-style-type: none"> § Reduce amenity as particles settle on surfaces § Fine particulates (<10 microns) may cause human health effects when inhaled

Types of contaminants	Types of industry	Potential effect on receiving environment
Combustion emissions	<ul style="list-style-type: none"> § Rubber, plastic and other chemical product Mfg § Paper and paper product Mfg § Wood product Mfg 	§ Human health effect - acute (short term) or chronic (long term) effects on the respiratory system.
Odour	<ul style="list-style-type: none"> § Food Mfg (other than meat and dairy) § Beverage, malt and tobacco Mfg § Rubber, plastic and other chemical product Mfg. 	§ Nuisance effect
Others (VOCs, Solvents, Metals)	<ul style="list-style-type: none"> § Printing, publishing and recorded media § Textile and apparel Mfg § Machinery and equipment Mfg. § Non-metallic mineral product Mfg. 	§ Long term human health effect from some VOCs
N/A or likely to be minor	<ul style="list-style-type: none"> § Wholesale Trade § Road transport § Water and rail transport § Air transport, services to transport and storage 	§ N/A or likely to be minor

7.2 Potential effects of contaminants

7.2.1 Particulates

Discharges to air from the proposed development have the potential to result in the discharge of particulates. Fine particulates which are small enough to be inhaled (<10 micrometers in diameter) can be breathed into the lungs and cause pulmonary health effects in extreme cases. The contribution of fine particulates from industry is expected to be small as these discharges will be required to be mitigated and comply with best practice. Without mitigation described in section 6, this would be a concern for sensitive receptors such as Ramarama School.

Heavier particulates (>20 micrometers in diameter) are more commonly classified as dust and fall from the air at an appreciable rate and can cause nuisance effects as the particulates settle on surfaces. Nuisance dust generally consists of larger particles (> 20 um) and these tend to settle out in the immediate vicinity of a source.

Water supply for some existing properties relies on rainwater collected from roofs, although in future this is likely to become reticulated. Potential discharges to air from activities within the DSBP are not expected to affect the quality of rainwater (collected from roofs) as all air discharges will be managed and mitigated to minimise potential discharges of dust and particulate matter. The prevailing wind direction also affects dispersion of dust and in this case, prevailing winds are away from existing residential areas. Significant buffer distances will exist between industrial activities and residential areas. Heavy vehicles may generate dust along roads causing a nuisance effect, however the roading network is improved as part of the development to take vehicles away from sensitive receptors. The most significant source of such dust would be vehicles travelling on paved and unpaved roads, close to houses, however these sources of dust are not expected to increase significantly as a results of the DSBP.

7.2.2 Odour

Discharges to air from some types of industrial activities, proposed to be located within the DSBP area, have the potential to result in odours. Whether or not an odour is considered to be a nuisance is dependant on a number of factors. These factors are often described as the FIDOL factors;

frequency, intensity, duration, offensiveness and location. Different combinations of these factors can result in odour causing adverse effects.

Sensitive receptors such as the Ramarama School and the McEldownie subdivision are less likely to experience odours due to their location 'upwind' from the zoned industrial activities, under the prevailing south westerly wind direction (Figure 4). MacWhinney subdivision and rural-residential areas north of the site are also unlikely to experience odour effects due to a combination of separation distances and rolling topography. Commercial services and light industry in close proximity to heavy industry could potentially experience odour nuisance effects; however the area to the northwest, downwind of the proposed Industrial Zone 4 area in southeasterly winds, is small and predominantly designated for quarry related activities.

7.2.3 Combustion emissions

If not appropriately mitigated, components of combustion emissions such as sulphur dioxide (SO₂), nitrogen oxides (NO_x), and carbon monoxide (CO) may have acute (short term) or chronic (long term) effects on the respiratory system. Residents around the project area have the potential to be affected by these emissions however mitigation measures in section 6 would act to minimise this effect. Furthermore industrial activities can minimise these discharges by efficient operation and other techniques which would be enforced during the consenting processes.

7.2.4 Others (VOCs, Solvents, Metals)

Other types of emissions may be discharged from industrial activities that are potentially hazardous air pollutants (HAPs). These can include VOCs such as benzene, poly-aromatic hydrocarbons (PAH), 1,3-butadiene, acetaldehyde, xylene, toluene, styrene, formaldehyde, benzo(a)pyrene, and metals such as mercury, chromium, arsenic and lead.

These hazardous air pollutants can adversely affect human health. This usually happens when the pollutants are breathed in over long periods of time as hazardous air pollutants can accumulate in our bodies. However some hazardous air pollutants can have a short-term effect. Discharges of these contaminants will be required to be mitigated to protect human health and comply with the Air Quality NES.

7.3 Beneficial effects of the project

The development of the DSBP area for industrial purposes has beneficial impacts on air quality for the Auckland region including the following:

- n Air quality impacts are often exacerbated by incompatible land uses. The DSBP area will be designed to separate incompatible land to reduce the potential for reverse sensitivity.
- n The DSBP takes into account recommended buffer distances so that sensitive receiving environments are appropriately separated from activities that have the potential to impact upon human health and amenity.
- n The grouping of heavy to medium industries will minimise the individual activities air contaminant nuisance impact on its surrounds.
- n The DSBP area is located away from the densely populated urban Auckland.
- n The DSBP area provides an opportunity for heavy and medium industry to relocate out of urban Auckland.

8 Mitigation

The potential air quality effects of activities establishing within the DSBP area will be first and foremost mitigated by the requirement for compliance with the National Environmental Standards for Air Quality (NES). The NES is a mandatory standard and sets limits for primary air contaminants to ensure that air remains a usable resource and to protect human health and the environment (refer section 4.4).

Furthermore, mitigation of the potential effects of the DSBP area on air quality has been a consideration in development of the concept design. These mitigation measures include:

- n provision of adequate buffer distances between activities both within the DSBP area and with respect to the boundaries of the DSBP area;
- n Land use zones within the DSBP area in order to locate similar types of activities together;
- n identification of an Industrial Air Quality Management Area for the development;
- n roading network improvements and routing of heavy vehicles away from sensitive locations;
- n vegetation filter strips to screen and reduce potential dust impacts along the western edge of the development;
- n requirement for best practicable option (BPO) for managing air discharges in existing and future statutory provisions; and
- n land use and planning provisions in the amended Papakura and Franklin District Plans and discharge consent requirements under the ARP:ALW.

These mitigation measures are discussed in more detail below.

8.1 Buffer distances

To minimise the impact of the emissions of air contaminants from industrial activities on sensitive receiving environments, separation or 'buffer distances' have been allowed for in the DSBP between potential emitters of air discharges and sensitive receiving environments. The physical distance reduces the potential for nuisance effects for dust or odour to impact on sensitive areas.

Buffer distances between industrial activities and sensitive receptors are recommended in the "Guidelines for separation distances" South Australian Environmental Protection Agency (SAEPA), 2007. The separation distances recommended in these guidelines vary in relation to the types and quantities of emissions generated by specific industrial activities. The average buffer distance recommended is 300 m – 500 m with buffer distances ranging between 100 m - 2000 m. The activities with larger buffer distances are considered to have a higher risk of odour.

According to the Separation Distance document, a number of heavy industrial activities such as cement works, mineral works and fat rendering are recommended to be at least 1 kilometre from a sensitive receiving environment. These activities may be established in the development provided resource consents are approved. Conditions of consent would almost certainly include mitigation measures to minimise impact of such industries on sensitive receiving environments.

Currently there are three major sensitive receiving environments; the MacWhinney subdivision north-east of the site, the McEldownie subdivision to the south of the site and the Ramarama School. There are also rural – residential properties north of the project area. Figure 6 shows the 500m and 300m buffer from these receptors in which it is recommended that specific industrial activities are not located, as listed in SAEPA, 2007. These buffer distances have been taken into account in the planning of the DSBP area as shown in Figure 2. Heavy to medium industrial activities are planned to be located beside the quarry and activities that do not have the potential to generate air contaminants, such as wholesale trade, and 'other industries' listed in Table 1, may be

located within the buffer zones in Figure 6. Some of these buffer distances will also be enhanced by topography which acts to screen some areas from the DSBP.

Industrial 3/Light Industrial zone shown light purple in Figure 2 would assist in providing a buffer or transition area between the 'heavier' Industrial 4 zone and the rural and rural residential activities to the south and west of the DSBP area. The commercial services precinct is designed to support and complement the industrial uses. Therefore this precinct is proposed to be located adjacent to the Papakura District Plan Industrial 4 area as shown in Figure 2. The proposed Motorway Edge Precinct, commercial services precinct and light industrial areas, together with the vegetation buffer, also serve to provide a separation distance between the Industrial area 4 and the Ramarama School to the south and rural residential land uses to the north.

8.2 Land use zones

As discussed in section 2.3, the DSBP has defined a number of different land use zones in order to locate compatible land uses together and minimise potential reverse sensitivity issues. As described above in section 6.2, zoning of land uses can be utilised to provide a buffer effect.

The development of the DSBP area will also be staged and there will be a period of time when rural land uses within the proposed boundary of the development will co-exist with new activities as they are established. The effects of this transition will be managed through the existing statutory framework for assessing the effects of activities for air discharge consents. This framework is discussed in detail in Section 4.

8.3 Industrial Air Quality Management Area

A change from a rural Air Quality Management Area to an Industrial Air Quality Management Area within the ARP:ALW would encourage industrial intensification and discourage sensitive activities. This approach would reinforce district plan rules and assist in reducing issues of reverse sensitivity and conflicts between incompatible and competing land uses.

8.4 Vegetation buffer strips

To separate less compatible land uses within the development, natural vegetation buffer strips are proposed to extend along the northern and southern boundaries of the site length of the site as shown in Figure 2. These will be densely planted with vegetation including native trees and shrubs and will include ponds and wetlands. The natural increase in roughness or friction caused by the varying heights of native trees and shrubs have the ability to reduce dust impacts as they decrease the velocity of wind which then reduces its dust carrying capacity across the site. The vegetation acts as a buffer between the industrial areas within the project area and surrounding rural areas.

8.5 Roothing network improvements

The proposed roading network will be improved to cater for increased traffic volumes. Quarry Road will continue to be used as a main haulage route, although it will be realigned. It is intended to remove heavy truck traffic from a section of Fitzgerald Road and the section of Ararimu Road which passes the Ramarama School by closing connections with Ramarama Road at its northern and southern ends and diverting all that heavy truck traffic to higher standard industrial roads with vastly improved horizontal and vertical alignments. This will reduce or eliminate the potential impacts of heavy vehicle exhaust emissions and dust generated from the transport of quarry materials on human health and amenity values in these sensitive areas.

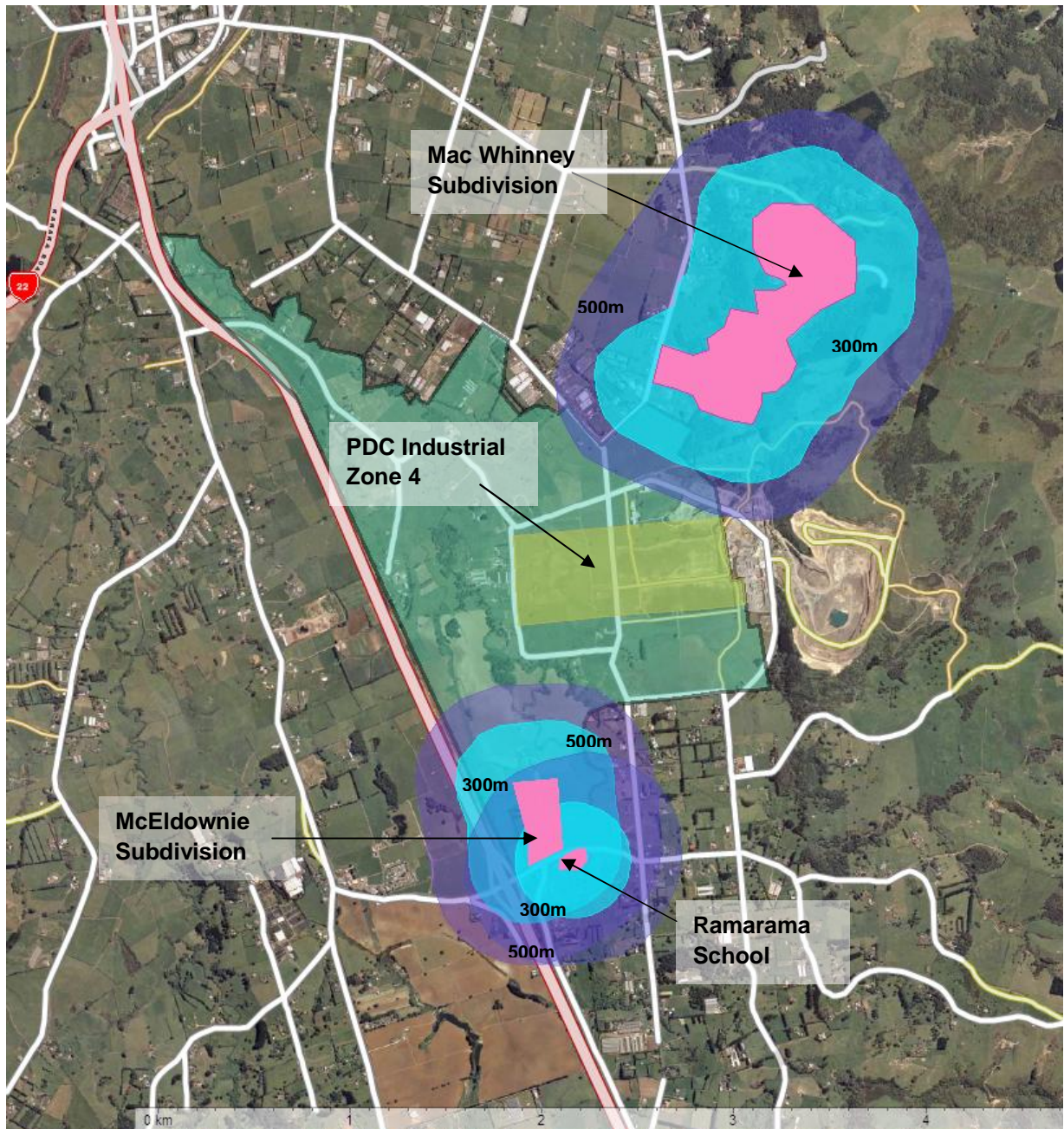


Figure 6 - 500 m buffer distance (purple), 300m buffer distance (blue) around sensitive receiving environments (pink) surrounding the proposed development (green) and Papakura District Plan Industrial zone 4.

9 Conclusion

As the DSBP is currently zoned for rural purposes and lies outside of the Auckland Region's metropolitan urban limits (MUL), an amendment to the MUL and changes to the Papakura and Franklin District Plans are required for the project to proceed.

Mitigation of the potential effects of industrial development on air quality has been a key consideration in the design of the DSBP area.

The potential air quality effects of activities establishing within the DSBP area will be first and foremost mitigated by the requirement for compliance with the National Environmental Standards for Air Quality (AQNES). All air discharges will be managed and mitigated to minimise potential discharges of dust and particulate matter.

The DSBP has defined a number of different land use zones in order to locate compatible land uses together and minimise potential reverse sensitivity issues. These zones have been based on existing light and heavy industrial zones in the Papakura District Plan and the Franklin District Plan.

In accordance with Policy 4.4.7 of the ARP: ALW, the DSBP has been designed to minimise adverse effects from competing and incompatible land uses by:

- n Provision of different land use zones within the development in order to locate similar types of activities together
- n Locating medium and heavy industries within the eastern portion, compatible with the existing quarry activities
- n Mitigating the effects of discharges to air between activities both within the development and with respect to the boundaries of the development by utilising buffer distances

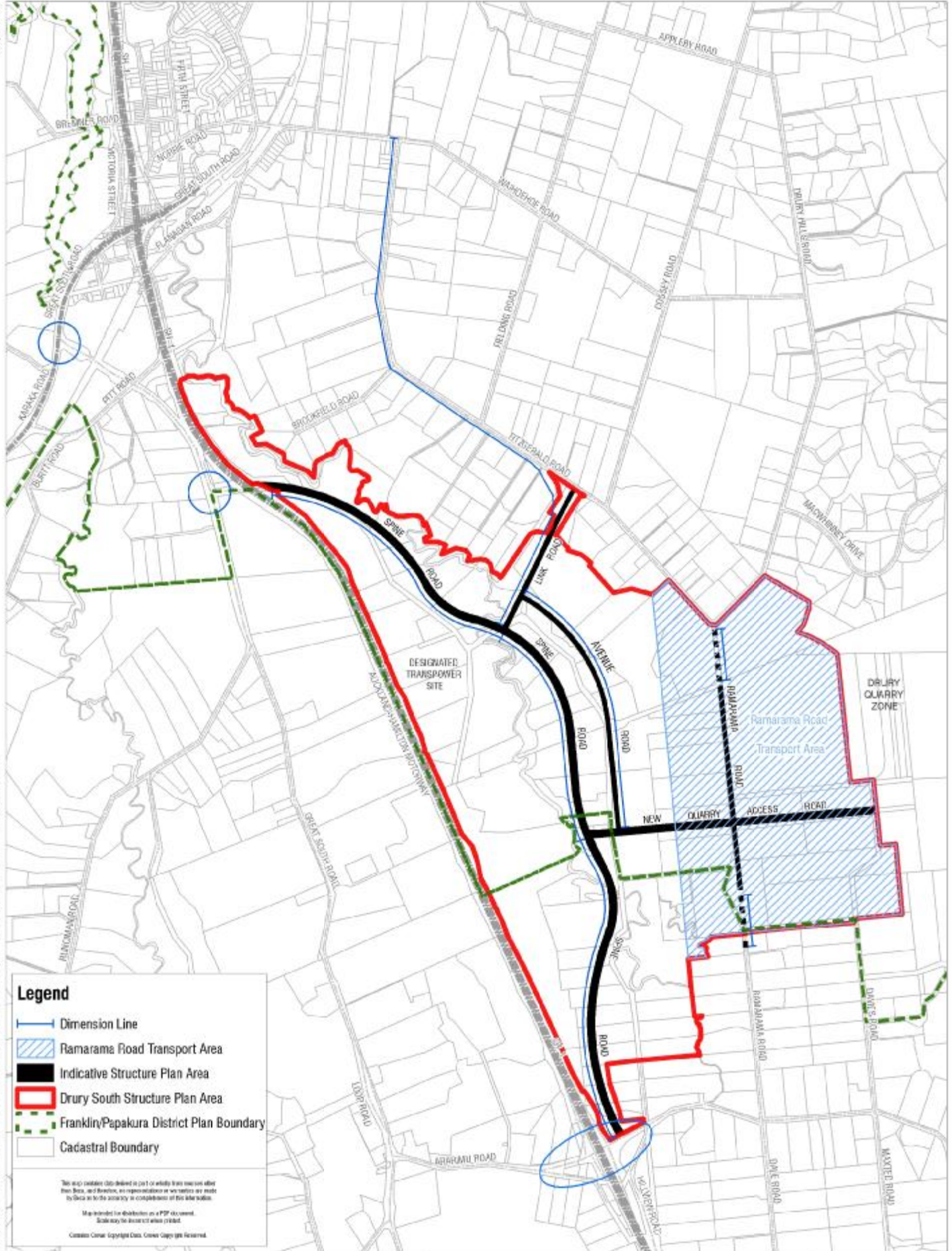
Being located away from the intensively occupied residential areas of urban Auckland and providing a development suitable for industrial activities; and

- n Providing vegetation buffers strips to screen and reduce potential dust impacts on surrounding rural activities.

Appendix A

Road Network Map

Plan: P:\04\10201\10201007 - Infrastructure requests\2015_10\04\000000011_mof\mof\mof\2015_10\04\000000011\10201007\40934-Base\Borwick_Plan.mxd
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Legend

- Dimension Line
- Ramarama Road Transport Area
- Indicative Structure Plan Area
- Drury South Structure Plan Area
- Franklin/Papakura District Plan Boundary
- Cadastral Boundary

This map contains data derived in part or wholly from sources other than Bechtel, and Bechtel, as represented in this report, are not liable for any errors or omissions in this data or the accuracy or completeness of this data.

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Drury Project

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