

2.44 – Air quality for major roads - section 32 evaluation for the Proposed Auckland Unitary Plan

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1 Overview and Purpose

This evaluation should be read in conjunction with Part 1 in order to understand the context and approach for the evaluation and consultation undertaken in the development of the Proposed Auckland Unitary Plan (the Unitary Plan).

Vehicle emissions are very difficult to control or contain. Degraded air quality, as a result of transport emissions in Auckland, has adverse impacts on human health, ecosystems and amenity values. This evaluation deals primarily with health impacts of vehicle emissions on sensitive activities.

Two key factors contributing to peoples' exposure to air pollution are:

- (i) how much is emitted, and
- (ii) how people are exposed.

How people are exposed is influenced by proximity to source. People living closer to busy roads are typically more exposed to vehicle emissions. Where people live is, in turn, influenced by land use planning.

The Unitary Plan provides an opportunity to use an integrated management approach to reduce the exposure, and associated increased risk of adverse health effects, of susceptible parts of the population to air pollution from vehicles. Accordingly, this evaluation considers a proposal to introduce land use provisions to separate childcare centres from busy roads to improve health outcomes for children.

1.1 Subject matter of this section

This evaluation assesses the proposed introduction of separation distances for new childcare centres from existing roads. The purpose of the proposal is to reduce children's exposure because they are particularly susceptible to adverse health effects from vehicle emissions. A number of alternative sensitive land uses are also considered for inclusion.

1.2 Resource management issue to be addressed

Transport is a major contributor to air pollution emissions in Auckland, contributing 47 per cent of particulate matter less than 10 micrometres in diameter (PM₁₀).¹ Air quality in Auckland consistently approaches, and sometimes exceeds, regional and national standards for air quality. This means that whilst exceedances are not regular, background levels are regularly elevated (i.e. annual public exposure may be significant).

There is a substantial body of international and national evidence that shows that exposure to vehicle-related air pollution is harmful to human health. In March 2012, the updated Health and Air Pollution in New Zealand study estimated 126 premature deaths associated with air pollution from vehicles every year in Auckland.² In June 2012, the International Agency for Research on Cancer classified diesel engine exhaust as carcinogenic to humans (Group 1) because exposure is associated with an increased risk for lung cancer.³ Emissions from diesel vehicles in Auckland are concentrated on motorways and strategic and primary arterials.

Previous studies have shown that, in addition to premature mortality, air pollution from vehicles in Auckland also causes a wide range of non-lethal health problems, such as increased hospitalisations and doctor's visits.⁴ This places a heavy load on the regional health resources.

¹ Auckland Regional Council, (2006)

² Kuschel *et al.* (2012)

³ http://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213_E.pdf

⁴ Kuschel *et al.* (2012)

Air pollution impacts are determined by how much is emitted, and also how people are exposed. Air pollutants dissipate over distance. Therefore, typically the closer an individual is to the source of pollution the greater their exposure and associated effects are likely to be. There is increasing evidence that proximity to busy roads is a risk factor for respiratory effects, especially in children.⁵ International studies indicate that public exposure is often disproportionate, with disadvantaged sectors of the population bearing the greatest burden.⁶

Based on health studies, the groups within the population who are most affected by air pollution include:

- Children (including babies, infants and unborn babies) and pregnant women
- The elderly
- People with heart, respiratory or circulation conditions (such as asthmatics and diabetics)
- People that are exposed for 24 hours a day, seven days a week (e.g. residential properties)

This means that certain land uses are also particularly sensitive to air pollution (for example child and aged care facilities, hospitals, schools, marae, churches and residences).

Whilst Council cannot control emissions from individual motor vehicles through the Unitary Plan, it can control land use activities to reduce exposure of at-risk populations to vehicle emissions through consent application and plan change processes.

In light of the strong body of evidence associating adverse health effects with proximity to roads, separation of sensitive activities from roads is an effective method of reducing exposure, reducing risk and improving health outcomes. Separating *existing* sensitive land use from *existing* roads is practically impossible. However, separation can be considered for **new** activities on or near existing roads.

Based on an investigation of overseas approaches and indicative dispersion modelling,⁷ separation distances between new sensitive land uses and existing or new roads (varying depending on road category) have been proposed in the Unitary Plan to reduce exposure to the effects of poor air quality.

Recommended separation distances are (from road edge):

- 150 m for motorways and strategic arterial routes;⁸ and
- 70 m for primary arterials.⁹

The Unitary Plan includes additional rules so that all proposed new childcare centres are a restricted discretionary activity within these separation distances. The intent of this approach is not to sterilise large areas of land adjacent to strategic and primary arterials. Rather, the purpose is to mandate a requirement to assess, and if necessary, address vehicle emissions to reduce the exposure, and associated risk of adverse health impacts, on children before new childcare centres are established.

⁵ Emission Impossible Ltd, (2012)

⁶ *Ibid.*

⁷ Emission Impossible Ltd, (2012)

⁸ As defined in Auckland Transport, (2012). Strategic arterials and primary arterials were previously defined as strategic and regional arterials in Auckland Regional Transport Authority, (2009).

⁹ *Ibid.*

1.3 Significance of this subject

The introduction of separation distances for **new** sensitive land uses (only) from roads is a significant policy shift because it has not been applied before in Auckland.

The Regional Land Transport Strategy does include a policy to “*where possible, avoid locating sensitive land uses such as hospitals, schools, childcare facilities, aged care facilities, marae and playgrounds close to roads on the regional freight network.*”¹⁰

However, there are no separation distances (for new sensitive land uses from roads or motorways) specified in any of the existing planning or transport documents for Auckland.

The proposal to introduce separation between people and roads to avoid adverse health impacts conflicts to some extent with the Auckland Plan vision of a compact urban form, with intensification focussed around highly functioning transport corridors. This conflict arises because, whilst a compact urban form will contribute to lower emissions and improved air quality at the city and regional level – it does not necessarily improve air quality at the local level and some sensitive groups of the population may still be exposed to higher levels of air pollution. This is why, in part, this policy shift has been proposed.

1.4 Auckland Plan

In order to make Auckland the world’s most liveable city, the Auckland Plan recognises the need to reduce vehicle emissions and **reduce the exposure** of a growing Auckland population to those emissions. It includes a key directive to meet national and international ambient air quality standards and guidelines.

The Auckland Plan further includes a directive to locate and develop greenfield areas as sustainable liveable neighbourhoods in a way that, amongst other things, protects and enhances air quality.

1.5 Current objectives, policies, rules and methods

Legacy regional plans and strategies have done little to address either emissions, or exposure, in relation to vehicle emissions. This is because the former Regional Council’s ability to control individual vehicle emissions was limited and proximity to source is a land use function (administered by district councils).

Childcare centres frequently locate near (or adjacent) to major intersections and roads in Auckland and this is a permitted activity under existing district plan provisions. There is guidance and processes in place for registration, but these have not been effective in preventing childcare centres from locating on or near major transport routes. As such, the status quo is not effective in addressing the risks associated with poor air quality from vehicle emissions for children.

A growing Auckland population will mean more children are exposed to elevated levels of pollutants from transport emissions. Extensive national and international research suggests that this will result in short and long term adverse health outcomes for larger numbers of children with a corresponding increase in health costs.

1.6 Information and analysis

Council commissioned a study to review the science on the adverse effects caused by air pollution and associated with vehicle emissions. The study considered international approaches to separation distances in other, similar jurisdictions. It further included screening modelling for typical levels of traffic on busy roads. The modelling provided

¹⁰ Auckland Regional Council, (2010)

information on the levels of protection afforded by increasing separation distances from busy roads. This was used to establish council's proposal for separation distances for childcare centres away from motorways, strategic and primary arterial routes in Auckland.

1.7 Consultation undertaken

External consultation undertaken on the Unitary Plan is outlined in 1.8.

1.8 Decision-making

The proposal was endorsed by the Political Working Party on 2 August 2013.

1.9 Proposed provisions

The proposal is to include regional and district objectives and policies in the Unitary Plan to reduce the exposure of children in childcare centres to vehicle emissions. This will be achieved through an Air Quality-Transport Corridor Separation overlay that introduces a separation distance for the location of new childcare centres away from busy roads in Auckland.

A district rule will classify new childcare centres within the Air Quality-Transport Separation Corridor overlay as discretionary activities. To gain land use consent, the childcare centre must assess and if necessary, avoid, mitigate or remedy the harmful effects of vehicle emissions on children.

The distances proposed for the Air Quality-Transport Corridor Separation overlay are (from road edge):

- 150 m for motorways and strategic arterial routes; and
- 70 m for primary arterials.

Busy roads are defined as motorways, strategic and primary arterial routes. New childcare centres include existing childcare centres wishing to expand.

The proposed Air Quality-Transport Corridor Separation overlays are shown in Appendix 3.43.1.

1.10 Reference to other evaluations

This section 32 report should be read in conjunction with the following evaluations:

- 2.1 Urban form and land supply
- 2.2 Rural urban boundary location
- 2.3 Residential zones
- 2.4 Business
- 2.6 Business building form and design
- 2.7 Design statements
- 2.8 Sustainable design
- 2.16 Maori development
- 2.17 Maori land
- 2.20 Conversion of dwellings
- 2.22 Future Urban zone
- 2.35 Rural subdivision
- 2.37 Schools
- 2.39 Traffic in centres
- 2.41 Strategic Transport Corridor
- 2.42 Crossings on arterial roads
- 2.43 Land transport noise
- 2.46 City centre precincts

2 Objectives, policies and rules

Council commissioned a study to review the science on the adverse effects associated with vehicle emissions to air and to establish separation distances for childcare centres away from motorways, strategic and primary arterial routes in Auckland. Key findings from the study included:¹¹

- There is a widespread scientific consensus that air pollution causes adverse health effects. These effects range from aggravation of asthma, increased prevalence and incidence of cough and bronchitis to adverse effects on lung function development and premature mortality (including post-neonatal respiratory mortality).
- There is also a strong body of evidence that residential proximity to traffic is associated with adverse health effects.
- A recurring feature of the studies considered was the disproportionate exposure of disadvantaged sectors of the population to traffic pollution with associated disproportionate adverse health effects. Put simply, poorer people tend to live closer to roads and suffer more adverse health effects.
- Real life interventions show improved health outcomes associated with improved air quality. For example, during the Olympic Games in Atlanta in 1996, city-wide changes in transportation patterns reduced vehicle exhaust and related air pollutants (such as ozone) by about 30 per cent. The number of asthma attacks fell by 40 per cent and paediatric emergency admissions dropped by 19 per cent.¹²
- Based on studies quantifying an estimate of adverse health impacts associated with traffic emissions in Auckland, proximity to traffic poses a public health threat in Auckland.¹³

This was considered in the following Auckland context:

- Air quality in Auckland consistently approaches, and sometimes exceeds, regional and national standards for air quality. This means that whilst exceedances are not regular, background levels are regularly elevated (i.e. annual public exposure can be significant).
- Road freight is anticipated to dominate for the foreseeable future and is forecast to grow by over 65% by 2031 compared with 2016.^{14,15} Heavy diesel vehicles are disproportionate polluters and diesel exhaust is a known carcinogen.
- Even with significant increases in public transport patronage, the majority of trips will be made by private transport in the foreseeable future.¹⁶

The review of international approaches to separation distances revealed that most recommended sensitive land uses such as schools, hospitals and in some cases residences, to be at least 150 m away from highways or busy roads (e.g. California, Sacramento, British Columbia, and Ontario).¹⁷

¹¹ Emission Impossible Ltd, (2012)

¹² Friedman (2001)

¹³ Kuschel *et al.* (2012)

¹⁴ Auckland Regional Council, (2009)

¹⁵ Auckland Regional Council, (2010)

¹⁶ Auckland Regional Council, (2011)

¹⁷ Emission Impossible Ltd, (2012)

Dispersion modelling of key transport pollutants was then used to establish proposed separation distances for Auckland as follows:

- 150 m for motorways and strategic arterial routes;¹⁸ and
- 70 m for primary arterials.¹⁹

Key transport pollutants are particulate matter less than 10 micrometres in diameter, particulate matter less than 2.5 micrometres in diameter (PM₁₀ and PM_{2.5}) and nitrogen dioxide.

As modelled, the proposed distances represent a space within which vehicle emissions will dissipate to levels that are very low compared with health-based standards and guidelines. In other words at these distances, concentrations of pollutants would typically dissipate to levels that are below five or ten per cent of the relevant standards - for the majority of busy roads in Auckland. This is all that is feasible because some pollutants (e.g. PM₁₀, PM_{2.5}, benzene) have no known 'safe' threshold.

The modelling considered only the impact of traffic emissions during normal operation to establish the potential health protection afforded by the proposed separation distances. It did not consider emissions during congestion. It further did not consider other sources of ambient air pollution such as domestic fires or industry which also contribute to overall public exposure to air pollution in Auckland.

Table 1 shows the vulnerable populations within the proposed separation distances.²⁰ This shows the land uses (e.g. number of schools) and an estimate of the number of people that are currently within the proposed separation distances. The estimate is based on 2006 census data so will have increased in reality since then.

Table 1 Sensitive land uses and populations near major transport routes in Auckland²¹

Land Use*	Motorways and Strategic Arterial Routes	Primary Arterial Routes	Both**
Separation Distance	150 m	70 m	70 m and/or 150 m
Schools	15	37	52
Childcare centres	49	117	162
Hospitals	1	2	2
Residents	79,382	68,318	184,125
Age 0 – 14	17,398	12,414	32,367
Adults 15 – 65	55,961	48,340	136,759
Age over 65	6,023	7,564	14,999

* Orewa, North Shore, Auckland Central/South/West. NB: Aged care facilities are not included due to a lack of readily available information.

** Total not cumulative – e.g. some childcare centres located close to both a strategic and a primary arterial route.

¹⁸ Road classifications as defined in Auckland Transport, (2012). Strategic arterials and primary arterials were previously defined as strategic and regional arterials in Auckland Regional Transport Authority, (2009).

¹⁹ *Ibid.*

²⁰ Emission Impossible Ltd, (2012)

²¹ *Ibid.*

2.1 Objective

The following regional and district objective is proposed:-

Chapter E: Section 7.10

Objective.1 *Childcare facilities located near transport corridors are managed to reduce the adverse effects of vehicle emissions on children.*

The objective is appropriate because:

- Proposed separation distances for roads are consistent with the purpose (Part 2) of the RMA. This is because the proposed integrated management of land use will be undertaken in a way that enables people and communities to provide for their children's health and safety by:
 - Safeguarding the life-supporting capacity of air; and
 - Avoiding the adverse effects of transport on the environment.
- The proposal is also appropriate because it only focuses on major transport routes where vehicle numbers are high and therefore, vehicle emissions are significant.
- Babies, infants and young children are particularly susceptible to air pollution because they have a higher respiration rate, their lungs are not fully matured, and they have incomplete metabolic systems, immature defence mechanisms and high respiratory infection rates. These factors coupled with a higher intake per unit of bodyweight, and increased outdoor activities (mandated under educational guidelines) can lead to higher exposure and higher doses reaching the lungs. Lung injury during childhood due to air pollution may also have life-long effects and make people more susceptible to illness later in life.²²

Council has the ability to enact this proposal under s.30 and 31 of the RMA. The primary function of a unitary authority under the RMA is the establishment, implementation and review of objectives, policies and methods to:

- achieve the integrated management of natural and physical resources in its region (s.30(1)(a)); and to
- achieve the integrated management of the effects of the use, development or protection of land in its district (s.31(1)(a)).

This proposal is an integrated management approach. It seeks to use land use provisions to separate sensitive land uses from roads to improve health outcomes and reduce risk for susceptible parts of the population.

Section 30(1)(fa)(iv) further provides for the establishment of rules to allocate the capacity of air to assimilate a discharge of a contaminant. Arguably the proposed separation distances represent the capacity of air to assimilate emissions from motor vehicles, by establishing a buffer within which vehicle emissions can dissipate.

2.1.1 Policies

The proposed regional and district policies below achieve the purpose of the objective by encouraging separation of new childcare facilities from roads with high traffic flows.

²² World Health Organisation, (2005b)

Chapter E: Section 7.10

- Policy 1.** Avoid adverse effects on human health from vehicle emissions by discouraging new childcare facilities from locating within 150 m of a motorway or strategic arterial route, and/or 70 m of a primary arterial route, as shown on the Air Quality-Transport Corridor Separation overlay.
- Policy 2.** In the event that new childcare facilities do locate within these areas, they must be designed, constructed and operated to avoid, remedy or mitigate adverse health effects on children attending the facility from vehicle emissions from arterial routes.
- Policy 3.** Require applications for land use consent for childcare facilities locating within this overlay to demonstrate:
- a. How adverse health effects on children attending the facility will be avoided, remedied or mitigated;
 - b. How the location and design of the activity and buildings comply with (a) above;
 - c. There is adequate separation from the roadway to any outdoor play areas to comply with (a) above;
 - d. Air discharges from motor vehicles on the strategic route have been assessed using best practice methods, such as modelling and monitoring, appropriate to the scale of the transport discharges and any potential adverse effects; and
 - e. The method(s) proposed to avoid, remedy or mitigate adverse health effects on the children does not have a practicable alternative that causes fewer adverse health effects.

Policy 1 specifies distances from motorways and strategic and primary arterial routes where childcare facilities should not locate unless it can be shown that air quality is acceptable for that activity.

Policy 2 requires the design, construction and operation of any new childcare centre within the minimum distance to reduce the risk of harmful effects on children from vehicle emissions.

Policy 3 requires the applicant demonstrate, through application for land use consent, that vehicle emissions have been assessed and appropriate design and building methods have been employed to avoid, remedy or mitigate adverse health effects on children attending the facility.

The policies will be achieved through the district level land use consent process. An associated rule will require restricted discretionary activity status for new childcare activities locating within the Air Quality-Transport Corridor Separation areas identified in the overlay.

These activities will be required to demonstrate, through air quality assessment, that health impacts on children attending the facility are avoided, remedied or mitigated and that

appropriate mitigation measures have been implemented in the building design and site layout, including separation of outdoor play areas from the road.

Effectiveness

In May 2012, there were 162 childcare centres within the Air Quality-Transport Corridor Separation areas.²³ Based on an assumed 25 children per centre, this equates to around 4,000 children enrolled in these centres at any point in time.

Given that Auckland's population is estimated to almost double in the next 30 years, it can be assumed that the number of childcare centres will increase at a similar rate. Doubling the existing facilities could lead to just over five new childcare centres a year looking to locate within the Air Quality-Transport Corridor Separation areas (i.e. a total of 162 centres with around 4,000 children in that time).

There is a substantial body of international and national evidence that shows that exposure to vehicle-related air pollution is harmful to human health. In June 2012, the International Agency for Research on Cancer classified diesel engine exhaust as carcinogenic to humans (Group 1) because exposure is associated with an increased risk for lung cancer.²⁴ Emissions from diesel vehicles in Auckland are concentrated on motorways and strategic and primary arterials. Emissions from heavy duty diesel vehicles are also less likely to reduce over the longer term compared with other vehicles.

The proposal to separate new childcare facilities from these roads therefore, is an effective intervention at the planning stage.

Efficiency

Ensuring air quality effects are considered early in the planning stages of a childcare facility can potentially reduce exposure of thousands of babies, infants and children to elevated concentrations of vehicle emissions over its lifetime. As an approach, it is highly efficient compared with existing childcare centres that may not have any practicable options to mitigate or remedy emissions by virtue of their existing location on, or near, a busy road.

2.1.2 Rules

The proposed district rule will be an overlay and apply to childcare centres with more than three children under the age of five. The Air Quality-Transport Corridor Separation overlay applies to all underlying zones where the activity is permitted or controlled and requires new childcare centres, within the Air Quality-Transport Corridor Separation to be a restricted discretionary activity.

Rule Care centres with more than three children under the age of five where the care centre is permitted or controlled in the underlying zone

Consent applications will be assessed against the following criteria:

- a. how adverse health effects on children attending the facility will be avoided;
- b. the location and design of the activity and buildings comply with (a) above;
- c. There is adequate separation from the roadway to any outdoor play areas to comply with (a) above;

²³ Emission Impossible Ltd, (2012).

²⁴ http://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213_E.pdf

- d. Air discharges from motor vehicles on the arterial route have been assessed using best practice methods, such as modelling and monitoring, appropriate to the scale of the transport discharges and any potential adverse effects; and
- e. The method(s) proposed to avoid adverse health effects on the children does not have a practicable alternative that causes fewer health effects.

This rule will apply to applications for new childcare activities within the Air Quality-Transport Corridor Separation overlay. Implementation, therefore, is anticipated to occur over the long term. These provisions will come into effect immediately on the Unitary Plan being made operative.

To maintain fairness, the definition of new includes existing childcare facilities looking to expand.²⁵ Otherwise, existing centres have a competitive advantage gained from increasing the number of children exposed to increased risk of adverse health impacts from vehicle emissions over new, or existing, childcare facilities located further away from busy roads.

Effectiveness

Inappropriately located childcare centres can potentially expose children to elevated levels of harmful vehicle emissions. Children, especially babies and infants, are particularly susceptible to air pollution because their lungs are still developing and there is a risk of long-term health impact.

By requiring new childcare centres to locate away from harmful vehicle emissions, or by requiring them to assess and address the risk of locating closer, the proposal will effectively avoid significant public health risk.

Efficiency

New childcare centres choosing to locate within the Air Quality-Transport Corridor Separation areas will be required to conduct an air quality risk assessment and obtain a resource consent. The burden of doing so is considered reasonable given the potential health impacts. In most cases, it is expected that the air quality assessments will be straight forward. Guidance is already available, from work undertaken by the Ministry of Education and New Zealand Transport Agency, on which to build air quality assessments.

The level of assessment required is dependent on the proximity to a major road, the number of vehicles on that road and the topography. Locations further from major transport routes but still within the separation areas may only require a simple assessment using an on-line tool. Council staff propose to develop simplified guidance relevant to these provisions.

In all cases, it is more efficient to intervene in the location of new childcare centres, than to attempt to effect mitigation or remedies for existing centres located on or near major transport routes. This reflects the better efficiency of an integrated management approach.

2.1.3 Costs and Benefits of Proposed Policies and Rules

Costs

Those centres that choose to locate outside the Air Quality-Transport Corridor Separation areas face no cost due to these provisions.

²⁵ A childcare centre proposing to expand does not enjoy existing use rights. This is because the effects of the land use (i.e. increased capacity) are not the same in scale as those which existed before the proposed rule becomes operative (section 10 of the RMA 1991).

Those that choose to locate within the Air Quality-Transport Corridor Separation areas will incur additional costs as a result of consent processing and requirements to assess air quality effects. These centres may also incur some additional design and build costs where additional mitigation measures are required.

Costs to childcare centres wishing to locate close to busy roads are minimised as guidance already exists to assist in the assessment process, and council staff propose to provide additional, simplified guidance for the proposal. Similarly, mitigation costs are likely to be identified early in the design process allowing efficiencies to be made in the design and construction phases.

These costs are considered modest and reasonable compared with the potential long term costs of exposing children to harmful emissions.

Benefits

The updated Health and Air Pollution in New Zealand study published in 2012 estimated the health impacts and social costs associated with air pollution in New Zealand. These were impacts and costs were broken down by region and source (domestic fires, motor vehicles, industry, open burning and natural sources).

The updated study estimated that there are three cases of premature death of babies (aged 1 month to 1 year) that are associated with vehicle emissions in Auckland every five years.²⁶ The study also estimated that there are 20 hospital admissions for respiratory illness in children aged 1-4 associated with vehicle emissions in Auckland each year.

Due to limited data availability, this study did not consider all known adverse effects associated with all transport pollutant emissions. For example, in 2012, the International Agency for Research on Cancer classified diesel exhaust as a Class I carcinogen to humans due to the impacts of lung cancer.

Reducing exposure of children in childcare centres to elevated vehicle emissions can protect those children from short and long term health effects and reduce the burden on health services associated with vehicle emissions.

The proposal should therefore see significant benefits to society over the long term. Currently, there are 162 childcare centres, with around 4,000 babies, infants and children, located within the Air Quality-Transport Corridor Separation areas. Both the number of childcare centres and the number of children are set to increase in line with Auckland's projected population growth. If Auckland's population doubles over the next thirty years, and assuming a similar profile to now, this is roughly just over five new childcare centres a year being established within the proposed Air Quality-Transport Corridor Separation areas. This is potentially another 4,000 babies, infants and children exposed to elevated levels of vehicle emissions occur over the lifetime of the centres.

The benefits of the proposed separation areas are that this exposure would be avoided altogether, or mitigated or remedied to reduce risk. The reduction in children's exposure will have public health benefits in the form of reduced illness, reduced hospital admissions and reduced premature mortality. Because this only applies to new childcare centres, these reductions would only be seen as a flattening off in projected increases as opposed to reductions in existing levels. This is because existing childcare centres are not being required to relocate.

²⁶ Kuschel *et al.* (2012).

2.1.4 Adequacy of Information and Risk of Not Acting

It is considered that there is sufficient information on which to base the proposed policies and methods. There is a wealth of evidence that air pollution causes harmful health effects and recently, the International Agency for Research on Cancer classified diesel exhaust as a Class I carcinogen. Extensive national and international research suggests that locating sensitive land uses such as childcare centres close to busy roads, will result in short and long term adverse health outcomes for children with a corresponding increase in health costs.

The risk of not acting is that increasing numbers of children will continue to be exposed to harmful vehicle emissions, by virtue of the location of new childcare centres being established in close proximity to busy roads.

3 Alternatives

Alternatives considered were:

1. Preferred: Separation areas for childcare centres (only)
2. Status quo
3. Alternative 1: Separation areas for all sensitive activities except residential
4. Alternative 2: Separation areas for all sensitive activities including residential

The preferred alternative is discussed in 2.0 above. The status quo alternative is outlined in 1.5 above. The table that follows discusses each alternative compared with the preferred alternative.

	Preferred Alternative	Status Quo	Alternative 1	Alternative 2
Objective	<i>Childcare related land use activities near transport corridors are managed to reduce the adverse effects of vehicle emissions on children.</i>			
Option	Separation areas for childcare centres (only)	No separation areas	Separation areas for new: <ul style="list-style-type: none"> • Childcare facilities • Schools • Hospitals and aged care 	Separation areas for new: <ul style="list-style-type: none"> • Childcare facilities • Schools • Hospitals and aged care • Residential areas
Appropriateness	<p>Proposed separation distances for roads actively promote the purpose (Part 2) of the RMA. This is because the proposed integrated management of land use will be undertaken in a way that enables people and communities to provide for their children's health and safety by:</p> <ul style="list-style-type: none"> • Safeguarding the life-supporting capacity of air; and • Avoiding the adverse effects of transport on the environment. <p>The proposal is therefore considered appropriate.</p>	<p>This option does not actively promote the purpose of the RMA.</p> <p>Existing zone provisions permit childcare facilities to locate in close proximity to busy arterial roads where children may be exposed to high concentrations of air pollutants and suffer associated adverse effects. Therefore, existing provisions do not support the objective to reduce adverse effects from vehicle emissions on children.</p> <p>This option is not considered appropriate.</p>	<p>This option is consistent with the purpose of the RMA.</p> <p>However it incorporates a wider range of activities, with associated more significant costs and benefits, than is envisaged by the objective.</p> <p>This option is not considered appropriate.</p>	<p>This option is consistent with the purpose of the RMA.</p> <p>However it incorporates a much wider range of activities, with associated more significant costs and benefits, than is envisaged by the objective.</p> <p>This option would directly impact on residential development in critical areas where it is intended to contribute to community connectivity, successful public transport and the compact urban form envisioned in the Auckland Plan.</p> <p>This option is not considered appropriate.</p>
Effectiveness	<p>This option supports the objective of protecting children from the adverse health effects of transport emissions.</p> <p>In May 2012 there were 162 childcare centres²⁷ within the air Quality-Transport Corridor Separation Areas. Based on an assumed average of 25 children per centre, approximately 4,000 children are enrolled in these centres at any point in time.</p> <p>Given that Auckland's population is estimated to almost double in the next 30 years, it can be assumed that the number of childcare centres will increase at a similar rate exposing many thousands of children to elevated concentrations of vehicle emissions over the lifetime of these centres.</p> <p>As the inappropriate locating of one childcare centre may expose thousands of children to poor air quality over its lifetime, intervention in the planning stage is an effective way to ensure the location is safe and all practicable measures have been taken to protect the health and well-being of children attending the centre.</p> <p>Additionally, exercising discretion over childcare centres is likely to produce benefits more quickly than for other sensitive land uses (e.g. schools and hospitals) due the relative short-term nature of the</p>	<p>The status quo will not achieve the objective of protecting children from the adverse health effects of vehicle emissions.</p> <p>This is because there are no legacy provisions which require sensitive activities to assess air quality effects or restrict their operation near busy roads.</p>	<p>Requiring a restricted discretionary activity consent for new childcare centres, schools, hospitals and aged care facilities that choose to locate within the identified Air Quality-Transport Separation Corridor areas supports the objective of protecting children from the adverse health effects of transport emissions.</p> <p>However these types of facilities are often of a scale, or have other potential impacts, that could be addressed through the existing designation or discretionary activity resource consent process.</p> <p>There are a number of factors that need to be assessed when locating new schools, hospitals and age care facilities, of which adverse effects of vehicle emissions is only one of many. For this reason it is not considered effective to give particular attention to the issue of air pollutant impacts when considering development on or near busy roads.</p>	<p>Requiring a restricted discretionary activity consent for new childcare centres, schools, hospitals, aged care facilities and residential areas that choose to locate within the identified Air Quality-Transport Separation Corridor areas would achieve the objective of protecting children from the adverse health effects of transport emissions.</p> <p>However, placing restrictions on residential development within Air Quality-Transport Corridor Separation Areas is in conflict with the Auckland Plan vision of a compact urban form, with intensification focussed around highly functioning transport corridors.</p> <p>There are a number of factors that need to be assessed when locating new schools, hospitals and age care facilities, of which adverse effects of vehicle emissions is only one of many. For this reason it is not considered effective to give particular attention to the issue of air pollutant impacts when considering development on or near major transport routes.</p>

²⁷ Emission Impossible Ltd, (2012)

	Preferred Alternative	Status Quo	Alternative 1	Alternative 2
	<p>business and comparative ease of relocation.</p> <p>This option is therefore considered to be an effective way to support the objective of protecting young children from the adverse effects of vehicle emissions.</p> <p>However, this option does not consider exposure of children in other locations or the protection of children in other sensitive land uses such as schools and hospitals.</p>			
Efficiency	<p>This option would be easy to implement.</p> <p>Ensuring air quality effects are considered early in the planning stages of a development can potentially reduce exposure of thousands of children to elevated concentrations of vehicle emissions over its lifetime. In other words a modest cost incurred by the applicant will have significant benefits to society over the long term.</p> <p>This option is highly efficient compared with intervening once a location has been chosen.</p>	<p>This option is already in force.</p> <p>This option is desirable from an operators' commercial perspective as childcare centres are not subject to additional land use restrictions. However, retention of this benefit for business compromises the health and quality of life of vulnerable populations of children and increases financial burden on health services over the long term.</p> <p>However, costs are considered to outweigh benefits for this option and it is not considered particularly efficient.</p>	<p>This option would be relatively easy to implement.</p> <p>This option is efficient because it intervenes at the planning stage, rather than once a location has been chosen.</p> <p>However, consideration of the impacts of vehicle emissions is only one of many impacts that need to be assessed and balanced for new schools and hospitals.</p>	<p>This option would be moderately difficult to implement.</p> <p>This option is efficient because it intervenes at the planning stage, rather than once a location has been chosen.</p> <p>However, its overall efficiency is difficult to judge. Whilst public health benefits are likely to be significant – so too are costs.</p> <p>Any requirement for additional controls on residential development is likely to be poorly received given the overwhelming demand for affordable housing.</p> <p>Also, consideration of the impacts of vehicle emissions is only one of many impacts that need to be assessed and balanced for new schools and hospitals.</p>
Costs	<p>Childcare centres locating within the Air Quality-Transport Corridor Separation areas will incur additional costs as a result of consent processing requirements to assess air quality effects. They may also incur some additional design and build costs where additional mitigation measures are required. However, some guidance already exists to assist in the assessment process and mitigation costs are likely to be minimised as measures required are identified early in the design process allowing efficiencies to be made in the design and construction phases.</p> <p>Other sensitive land uses, including schools, hospitals, and aged care, are not protected from the adverse effects of vehicle emissions.</p>	<p>Childcare centres frequently locate near (or adjacent to) major intersections and roads in Auckland and this is a permitted activity under existing district plan provisions. There is guidance and process in place for registering childcare centres but this has not been effective.</p> <p>A growing Auckland population will mean more children are exposed to elevated concentrations of pollutants from transport emissions. Extensive national and international research suggests that this will result in short and long term adverse health outcomes for larger numbers of children with a corresponding increase in health costs.</p> <p>The updated Health and Air Pollution in New Zealand study published in 2012 estimated that there are three cases of premature death of babies that are associated with vehicle emissions in Auckland every five years.²⁸ The study also estimated that there are 20 hospital admissions for respiratory illness in children</p>	<p>Childcare centres, schools, aged care facilities and hospitals will incur additional costs initially through the consent (or notice of requirement) process. In the case of schools, aged care facilities and hospitals, these costs are not likely to be significant in proportion to the scale of development and considering the long term nature of these land uses. However provisions to consider air quality could impact on their ability to secure land which is potentially cheaper near major transport routes.</p> <p>Avoiding major transport routes for schools and hospitals is likely to give rise to other environmental, social and economic costs. Traffic associated with the use of these facilities may have significant impacts on local amenity values if the facilities are located off major transport routes. Schools are reliant on good accessibility to public transport routes, while hospitals often require proximity to major regional transport networks for emergency services.</p>	<p>Residential land developers will incur additional costs associated with consent requirements.</p> <p>There would also be significant costs in setting aside areas of land as setbacks for these sensitive land uses. These costs would include the opportunity costs of land along high transport routes being unavailable for residential development.</p> <p>Practical use and management of land set aside for setback may be uncertain and costly.</p>

²⁸ Kuschel *et al.* (2012)

	Preferred Alternative	Status Quo	Alternative 1	Alternative 2
		<p>aged 1-4 associated with vehicle emissions in Auckland each year. Due to limited data, health effects and social costs were not quantified for all pollutants associated with transport emissions that are known to affect health.</p> <p>Additionally, other sensitive land uses, including schools, hospitals, and aged care, are not protected from the adverse effects of vehicle emissions.</p>	<p>Facilities such as new hospitals, age care facilities or schools can have building designs and site layout responses to reduce the impacts of transport generated air pollutants on their operations.</p> <p>Similar design responses and site sizes are not always available to childcare facilities, which often locate in existing residential buildings.</p>	
Benefits	<p>The proposal should see significant benefits to society over the long term.</p> <p>The reduction in children's exposure will have public health benefits in the form of reduced illness, reduced hospital admissions and reduced premature mortality. Because this only applies to new childcare centres, these reductions would only be seen as a flattening off in projected increases as opposed to reductions in existing levels. This is because existing childcare centres are not being required to relocate.</p>	<p>The benefits of status quo are afforded primarily to childcare centres that are able to locate, without restriction, anywhere in a zone where the underlying land use activity status is permitted. They are therefore able to choose sites that maximise promotional potential and are easily accessed by parents commuting to and from work.</p>	<p>This option has similar benefits to the preferred option in that children attending new childcare centres will be protected from the adverse health effects of vehicle emissions. However this alternative extends this benefit further to include new schools, hospitals and aged care facilities.</p> <p>Childcare centres more frequently relocate than other sensitive land uses such as schools and hospitals. However, while these additional activities tend to be long term in nature with relatively low rates of new development, these activities provide for much greater numbers of people and therefore can provide greater cost savings for health services than the preferred option. For example, there are 52 existing schools within the Transport Corridor Separation areas, equating to approximately 35,000 children potentially exposed to elevated concentrations of vehicle emissions.</p>	<p>This option has significantly increased benefits to the preferred option. In addition to reductions in adverse health effects in children attending new childcare centres, this alternative would have additional health benefits for children in new schools and new houses (compared with status quo). Adults and elderly people would similarly enjoy increased health benefits from the appropriate location of new houses, new hospitals and new aged care facilities. Public exposure to air pollution is 24/7 at residences compared with childcare facilities and schools.</p> <p>Currently around 50,000 people (four per cent of the Auckland population) live within 70 m of a regional arterial route or 150 m of a strategic route in Auckland.²⁹ This estimate is based on 2006 census data and so the actual number will be significantly higher in 2013.</p> <p>Auckland's projected population growth, combined with the drive to create a compact urban form and connected communities, is likely to exacerbate this situation by locating even more people in close proximity to busy roads.</p> <p>This proposal would reduce exposure for a significant number of people living in new residences, by encouraging separation of residential development from busy roads and requiring management of air quality effects within the Air Quality-Transport Corridor Separation areas. This option would yield the greatest public health benefits of all options considered.</p>
Risks	<p>There is a risk of unnecessarily requiring resource consent.</p> <p>However, over the long term vehicle emissions from transport routes will change. The ability to exercise discretion over childcare activities allows for consideration of potential increases or decreases in</p>	<p>This option will result in increasing numbers of children continuing to be exposed to harmful vehicle emissions, by virtue of the location of childcare centres in close proximity to busy roads.</p>	<p>Although there is technical information on the effects of vehicle emissions on human health, this is a not an issue of high public awareness in Auckland. It has not been addressed in district plans to date. The introduction of controls for public health purposes over a wide range of sensitive land use activities within</p>	<p>This option would directly impact on residential development in critical areas where it is intended to contribute to community connectivity, successful public transport and the compact urban form envisioned in the Auckland Plan.</p>

²⁹ Emission Impossible Ltd, (2012)

	Preferred Alternative	Status Quo	Alternative 1	Alternative 2
	emissions near future major transport routes.		<p>identified transport corridors may be seen as unnecessarily restrictive. It may also give rise to the expectation that adverse effects of vehicle emissions on existing facilities should be addressed through the Unitary Plan.</p> <p>The focus on childcare facilities provides a clear basis for plan intervention on location, without giving rise to other unforeseen consequences in terms of other adverse effects. It also provides an opportunity to test out practical measures for dealing with vehicle emissions on site, through the resource consent process.</p>	<p>The introduction of controls for public health purposes over a wide range of sensitive land use activities within identified transport corridors may be seen as unnecessarily restrictive. It may also give rise to the expectation that adverse effects of vehicle emissions on existing facilities should be addressed through the Unitary Plan.</p>

4 Conclusion

The preferred option, to exercise discretion over the location of new childcare centres, would efficiently and effectively achieve the objective by managing childcare centres to reduce the harmful effects of vehicle emissions on children.

Benefits would include improved short and long-term health outcomes for children with an associated reduced burden on regional healthcare services. Costs are limited to applications to use land for childcare centres within the Air Quality-Transport Corridor Separation areas. This option actively promotes the purpose of the RMA, is relatively easy to implement and is highly efficient by intervening at the planning stage before a location is chosen. However, this option does not address exposure of children in other locations or the protection of children in other sensitive land uses such as schools and hospitals.

The status quo option would not achieve the objective of protecting children from the adverse health effects of vehicle emissions. This is because there are no legacy provisions that require sensitive land use activities to assess air quality effects or restrict their operations near busy roads.

Alternative 1, to exercise discretion over the location of new childcare centres, schools, hospitals and aged care facilities (in respect of air quality) provides greater health benefits than the preferred option, in that it applies a precautionary approach to a larger percentage of Auckland's population vulnerable to air pollution. It is anticipated that significant benefits in terms of improved public health outcomes and cost reduction for health services would accompany this option. However, these types of facilities are often of a scale, or have other potential impacts, that could be addressed through the existing designation or discretionary activity resource consent process.

Alternative 2, to exercise discretion over the location of **all** new sensitive land uses, including new residential development, is expected to provide the greatest benefits in terms of improved public health outcomes and cost reduction for health services, based on existing research information on respiratory related illnesses. However, restriction of residential development in Air Quality-Transport Corridor Separation areas would impede the Auckland Plan vision of a compact urban form. This is because much of Auckland's residential intensification is proposed around town centres and transport hubs that are typically located in Air Quality-Transport Corridor Separation areas.

5 Record of Development of Provisions

5.1 Information and Analysis

- Appendix 3.44.1 – Air Quality–Transport Separation Corridor overlay
- Appendix 3.44.2 - *Separation Distances for Roads - A discussion document prepared for Auckland Council*. May (Emission Impossible Ltd, 2012.)
- Appendix 3.44.3 - Natural Environment Issues and Approaches Paper, Report to Unitary Plan Political Working Party, 2 August 2012.
- Updated Health and Air Pollution in New Zealand. Prepared for Health Research Council of New Zealand, Ministry of Transport, Ministry for the Environment, New Zealand Transport Agency, 2012. Gerda Kuschel *et al.* 2012.
http://www.hapinz.org.nz/HAPINZ%20Update_Vol%202%20Technical%20Report.pdf
- *The Auckland Plan*, Auckland Council, 2012.
- *Auckland Regional Policy Statement Proposed Change 6: Giving Effect to the Regional Growth Concept and Integrating Landuse Transport, appeals version showing amendments arising from the consent orders issued by the Environment*

- Court* - Auckland Regional Council, 2011.
<http://www.aucklandcity.govt.nz/council/documents/regionalplans/aucklandcouncilregionalpolicystatement/acrpschange6operativemarch2012.pdf>
- *Auckland Regional Land Transport Strategy 2010-2040*. Auckland Regional Council, 2010.
[http://www.arc.govt.nz/albany/fms/main/Documents/Transport/RLTS/RLTS%202009/Regional%20Land%20Transport%20Strategy%20\(RLTS\)%202010-2040.pdf](http://www.arc.govt.nz/albany/fms/main/Documents/Transport/RLTS/RLTS%202009/Regional%20Land%20Transport%20Strategy%20(RLTS)%202010-2040.pdf)
 - *Auckland Regional Plan: Air, Land and Water*. Auckland Regional Council, 2010b.
 - *Current and Future Freight Movements in the Auckland Region and GPS Targets*. WP 2010/11, Auckland Regional Council, 2009.
http://s3.amazonaws.com/zanran_storage/www.arc.govt.nz/ContentPages/29645777.pdf
 - *Auckland Air Emissions Inventory: 2004*. Technical Publication 292. Auckland Regional Council, 2006.
<http://www.aucklandcity.govt.nz/council/documents/technicalpublications/TP292%20Auckland%20Air%20Emissions%20Inventory%202004.pdf>
 - *Auckland Regional Arterial Road Plan*. Auckland Regional Transport Authority, 2009.
http://www.aucklandtransport.govt.nz/improving-transport/plans-proposals/IntegratedTravel/Documents/Original/AT_ARTA_Policy_RegionalArterialRoadPlan2009.pdf
 - Auckland Transport Code of Practice (draft). 15 August 2012.
 - *Impact of changes in transportation and commuting behaviours during the 1996 Summer Olympic Games in Atlanta on air quality and childhood asthma*. Friedman M, 2001. JAMA, 2001; 285:897-905.
<http://jama.jamanetwork.com/article.aspx?articleid=193572>
 - *Health effects of transport-related air pollution: summary for policy-makers*. World Health Organisation, 2005. <http://www.euro.who.int/en/what-we-publish/abstracts/health-effects-of-transport-related-air-pollution>
 - *Effects of air pollution on children's health and development: a review of the evidence*. World Health Organisation, 2005b.
http://www.euro.who.int/_data/assets/pdf_file/0010/74728/E86575.pdf

5.2 Consultation Undertaken

Consultation on the proposed Unitary Plan is outlined in Section 1.8. There was no additional consultation on the specific proposal of introducing Air Quality-Transport Separation Corridor areas.

A small number of submitters (less than 10) raised the proposed option directly. The majority supported the proposal to reduce the harmful effects of vehicle emissions on children by introducing Air Quality-Transport Separation Corridor areas for new childcare centres. Several members of the public wished to extend the application of separation corridor areas to residential developments (i.e. Alternative 2). The Auckland Regional Public Health Service similarly supported increased health protection by requiring making all sensitive land-use activities require consent.

One childcare centre submitted in opposition to the preferred option considering the proposal unduly restrictive.

5.3 Decision-Making

The proposed approach was endorsed by the political working party on 2 August 2012.