Appendix G of the CEMP

Construction Air Quality Management Plan

NZ TRANSPORT AGENCY
WAKA KOTAHI

1 MacKays to Peka Peka Expressway

Revision History

Revision Nº	Prepared By	Description	Date
A	Charles Kirkby	Draft for technical peer review	9 August 2011
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Document Acceptance

Action	Name	Signed	Date
Prepared by	Charles Kirkby		16 February 2012
Reviewed by	Camilla Borger		16 February 2012
Approved by	Charles Kirkby		16 February 2012
on behalf of	Beca Infrastructure Ltd		

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Appendices

1 Introduction

1.1 Purpose and scope

This Construction Air Quality Management Plan (CAQMP or the Plan) forms part of a comprehensive suite of environmental controls within the Construction Environmental Management Plan (CEMP, Volume 4) for the construction phase of the MacKays to Peka Peka Expressway (the Project). The CAQMP addresses the potential construction air quality impacts associated with earthworks and construction activities of the Project.

The purpose of this CAQMP is to facilitate the avoidance, remediation and mitigation of any adverse effects of discharges of dust generated from the construction activities, and to promote proactive solutions to the control of dust discharges from the site.

The CAQMP identifies the following:

- Various sources of dust that may be created during the construction project.
- Dust mitigation and prevention methods.

1.1.1 Monitoring methods

- Methods for managing complaints regarding discharges into air and keeping records related to compliance.

The CAQMP is a generic document that will provide an overall framework for the control of discharges into air on site. The CAQMP will be updated, with the necessary approvals, throughout the course of the Project to reflect material changes associated with construction techniques or to the natural environmental. Any relevant revisions of a material nature for the CAQMP will be submitted to the Kāpiti Coast District Council for review. A formal review process is described in section 5 of the CAQMP.

This CAQMP focuses on the control of discharges of inert dust (e.g. sand) from construction activities. Where there is a potential that the dust may be contaminated with hazardous substances (i.e. from identified contaminated sites) the dust control measures outlined in section 3.1.1 of this CAQMP will be additionally important and reference should also be made to the Contaminated Soils and Groundwater Management Plan (Appendix K of the CEMP, Volume 4).

This CAQMP is also focussed on the protection of human health and amenity values from the effects of dust (and odour) discharges. A parallel document, the Erosion and Sediment Control Plan (Appendix H of the CEMP, Volume 4) addresses the protection of agricultural crops and the natural environment.

Figure 1 below illustrates the relationship between this CAQMP, the overall CEMP (Volume 4), and other management plans referred to in this document.

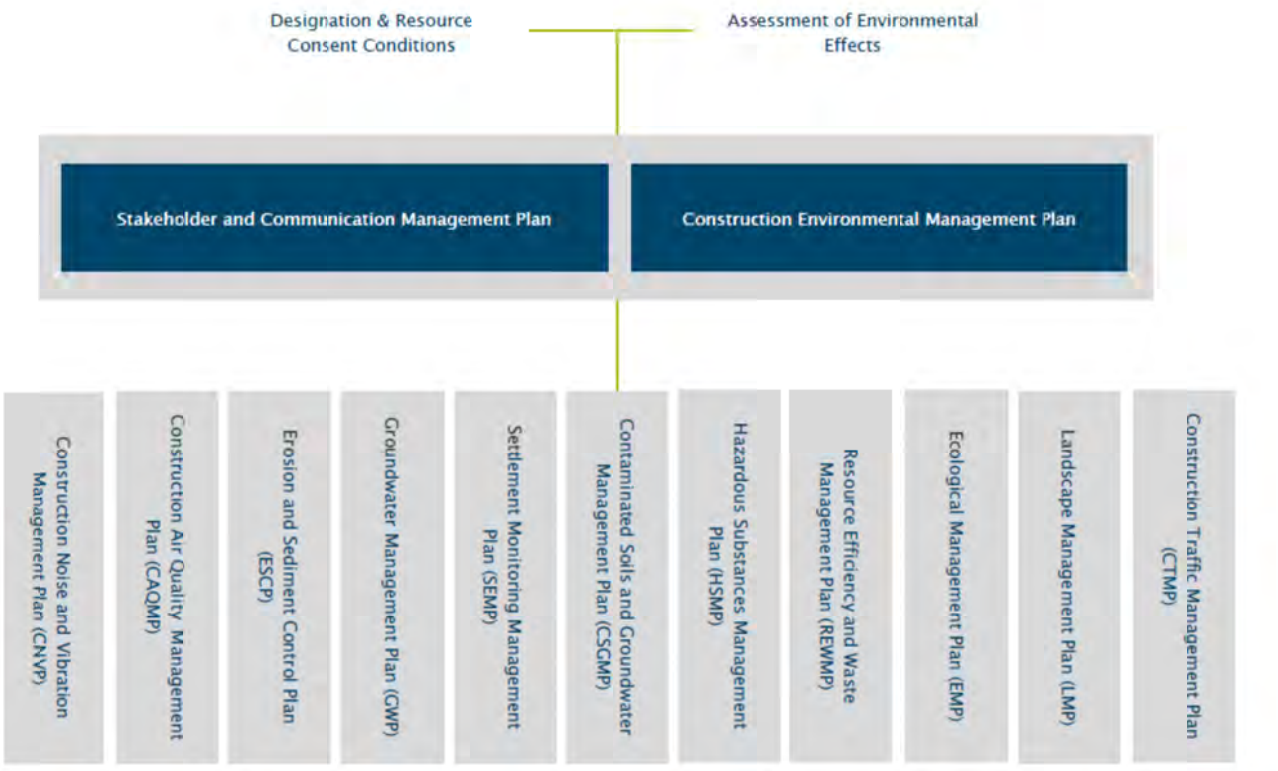

Figure 1 – Construction Environmental Management Framework

1.2 Project description

The Expressway Alignment has been divided into four geographic sectors. Each of the sectors covers a geographic area that is described in Table 1 and illustrated in Figure 2 below. For a comprehensive description of each Sector, refer to the full Project description in Section 3: Part D, Chapter 7, Volume 2 of the AEE.

The general locations of operational elements of the Project are described by chainages. A chainage refers to the distance (measured in metres) along the Expressway Alignment, with chainage 1900m being the starting point of the Project at the southern end and chainage 18050m being the approximate end point of the Project at the northern end.

Table 1 – Sector Description

Sector number	Sector name	Description	Chainage (m)	Length (km)
1	Raumati South	From just south of Poplar Ave to just north of Raumati Road	1900-4500	2.6
2	Raumati/Paraparaumu	From north of Raumati Road to north of Mazengarb Road	4500-8300	3.8
3	Otaihanga/Waikanae	From north of Mazengarb Road to north of Te Moana Road	8300-12400	4.1
4	Waikanae North	From north of Te Moana Road to Peka Peka	12400-18050	5.7

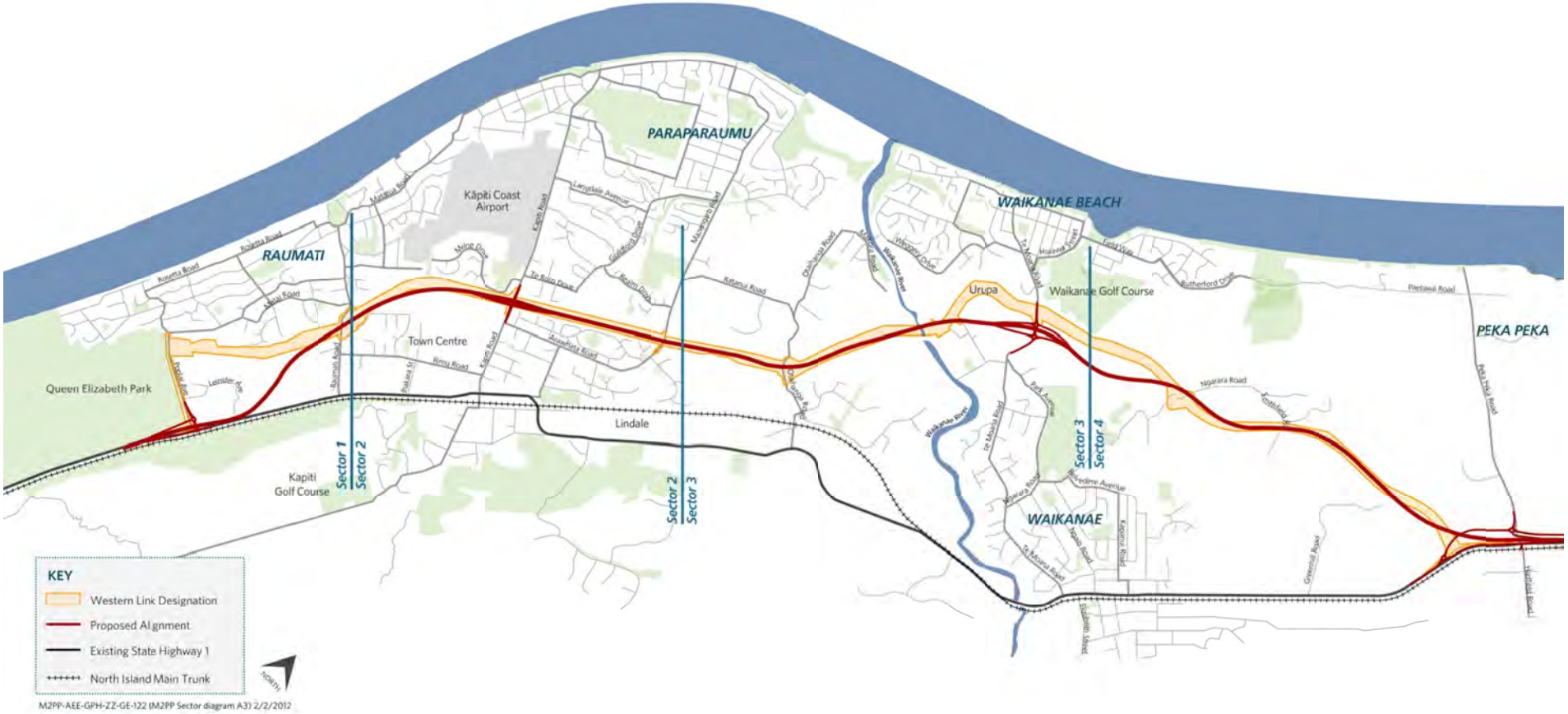

Figure 2 – Sector Illustration

1.3 Performance standards

Section 2.3 of the CEMP identifies relevant legislative requirements associated with management of dust, odour and hazardous air pollutants.

The requirements of the statutes, regulations, designations and resource consents have a common aim which is to avoid, remedy or mitigate adverse effects on the environment, including effects on the health of people and ecosystems and amenity effects. In order for the construction of the Project to comply with all statutory requirements, the discharge of dust from the site must comply with the following, which is commonly known as the "no nuisance policy"[1]:

"there is no discharge of particulate matter, smoke, odour, gas, aerosols or vapours from the process, which is noxious, dangerous, offensive or objectionable at or beyond the boundary of the property."

There are no national air quality standards or guidelines for nuisance dust; however the Ministry for the Environment (MfE) has recommended trigger levels which can be applied to individual dust sources[2]. The recommended trigger levels for airborne dust (total suspended particulate matter or TSP) are shown in Table 2.

Table 2 – MfE TSP trigger levels

Area	Total suspended particles trigger level (dust concentration)
Sensitive area	80 µg/m^3 (fixed 24-hour average)
Moderate sensitivity	100 µg/m^3 (fixed 24-hour average)
Insensitive area	120 µg/m^3 (fixed 24-hour average)

Sensitive areas are defined by the MfE to be typically areas in which there is significant residential development. Insensitive areas are typically sparsely populated rural areas. The areas in the vicinity of the Project where monitoring will take place are residential and consequently sensitive to dust.

[1] This is taken from the conditions attached to Permitted Activity Rules 20 and 22 of the Greater Wellington Regional Air Quality Management Plan (RAQMP), which relate to discharges of dust from road construction and activities on landfills (the Otaihanga construction yard).

[2] Ministry for the Environment "Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions", 2001.

The MfE trigger levels for TSP are designed to avoid dust discharges causing a dust nuisance (i.e. to avoid offensive or objectionable discharges of dust). However, because they are measured as 24-hour averages, they cannot readily be used as management tools to prevent dust nuisance – the typical response to exceedences of MfE trigger levels is to investigate the cause of the exceedence with a view to preventing a recurrence.

The MfE does not give any recommendations for short-term TSP concentrations. Short term TSP concentrations downwind of construction activities are likely to be highly variable. Appropriate short term trigger values will be developed on a site by site basis and be used as thresholds for initiating additional dust control (as outlined in Section 3.1). Some initial short term TSP and meteorological trigger levels are recommended in Table 3. It should be noted that these are interim values only, which may be revised for specific monitoring locations as additional data is acquired and should not be used as regulatory compliance measures.

Table 3 – Project trigger levels*

Trigger	Averaging Period	Sensitivity of Receiving Environment		
		Sensitive Area	Moderately Sensitive	Insensitive
Short Term TSP Threshold**	1-hour	200 µg/m^3	250 µg/m^3	300 µg/m^3
Daily TSP Threshold**	Rolling 24-hour	60 µg/m^3	80 µg/m^3	100 µg/m^3
Wind Warning Level***	1-minute	10 m/s		

* These values will be reviewed for each monitoring site.

** Dust concentration

*** Wind speed

The Project trigger levels shown in Table 3 are intended to trigger internal investigation and reporting, with the aim of avoiding breaches of the MfE trigger levels (Table 2), which would generate a need to report to the regulatory authority. Frequent breaches of the Project trigger values (Table 3) without corresponding breaches of the MfE trigger levels, would indicate that the Project trigger values are set to low. Conversely, frequent complaints regarding dust in areas where TSP concentrations are being monitored, without corresponding breaches of the trigger levels, may indicate that the trigger levels are too high.

Unless there has also been a breach of an MfE trigger level (Table 2), formal recording requirements for breaches of the Project trigger levels (Table 3) may only require a note of the activities being undertaken in the vicinity of the monitor at the time.

1.4 Environmental plans / maps

Figure 3 to Figure 11 indicate those areas within 100m of the construction footprint that are considered to be sensitive or moderately sensitive to discharges of dust, as follows:

- Figure 3 – Sector 1, north of Poplar Avenue
- Figure 4 – Sector 2, Raumati Road
- Figure 5 – Sector 2, Rata Road to Kāpiti Road
- Figure 6 – Sector 2, Kāpiti Road to Mazengarb Road
- Figure 7 – Sector 2, Kāpiti Road to Otaihanga Road
- Figure 8 – Sector 3, Otaihanga Road to Waikanae River
- Figure 9 – Sector 3, Waikanae River to Te Moana Road
- Figure 10 – Sector 4, Ngarara Road and Smithfield Road
- Figure 11 – Sector 4, Peka Peka Road

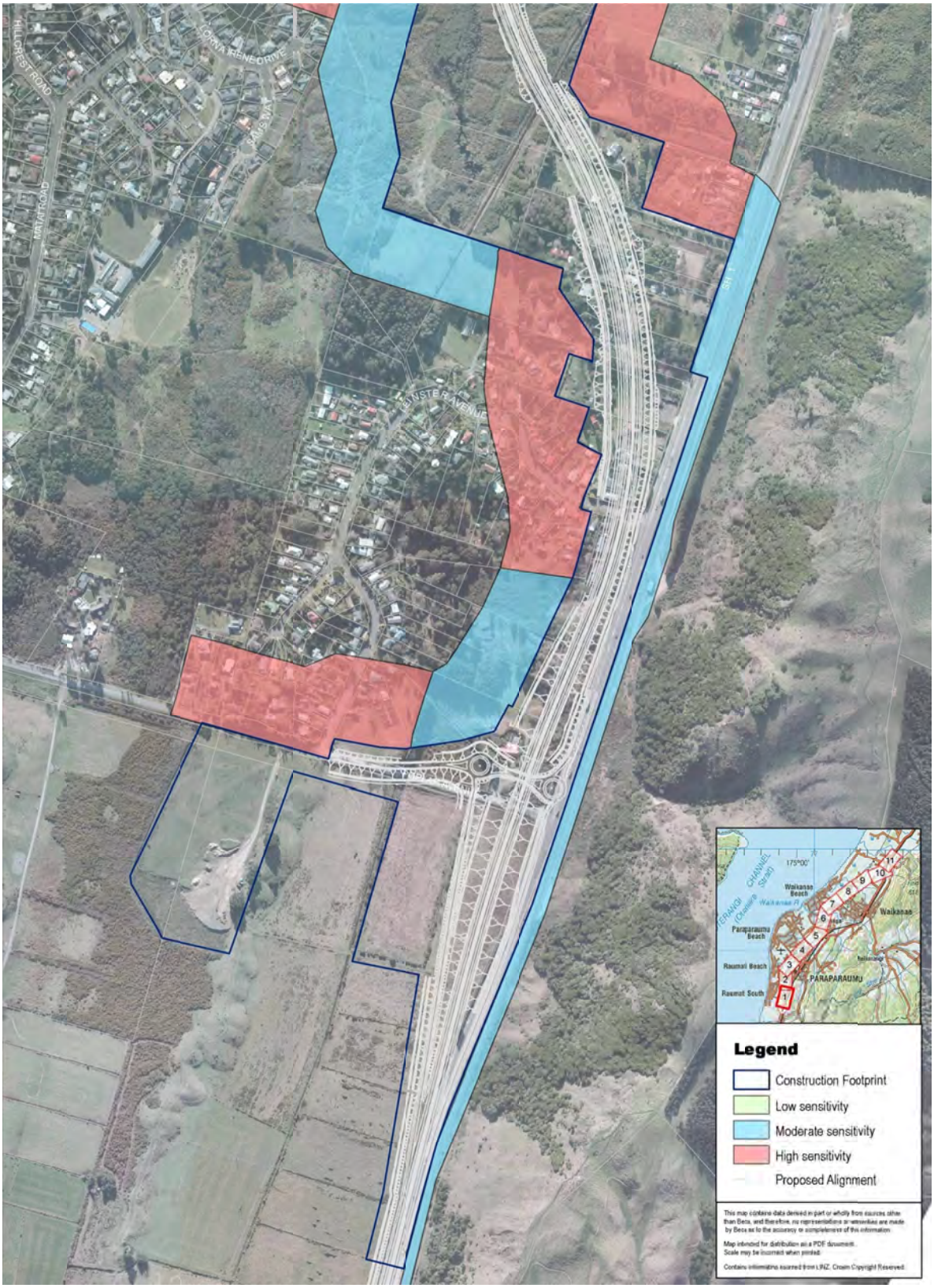

Figure 3 – Sensitive and Moderately Sensitive Areas – Sector 1 North of Poplar Avenue

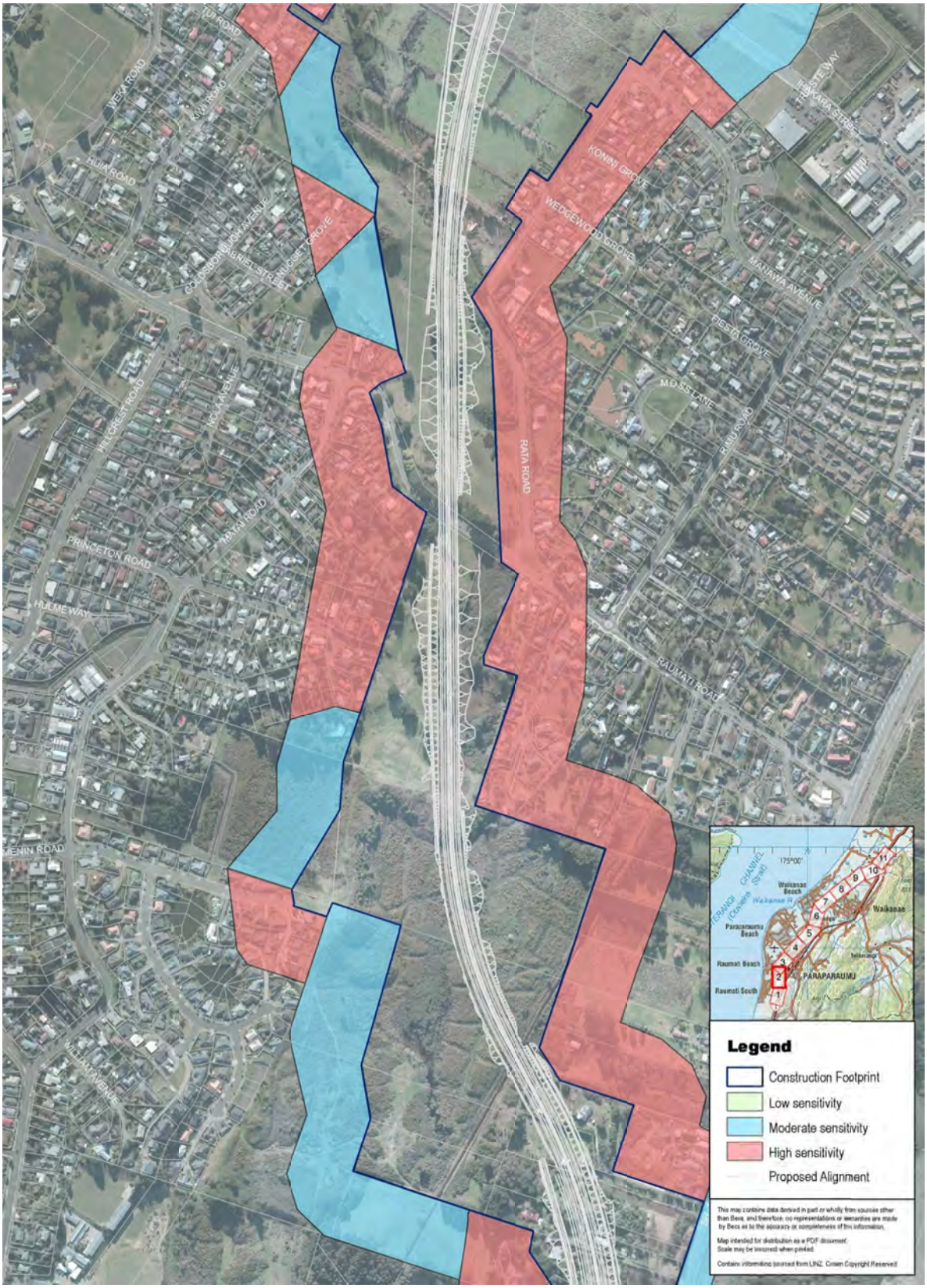

Figure 4 – Sensitive and Moderately Sensitive Areas – Sector 1, Raumati Road

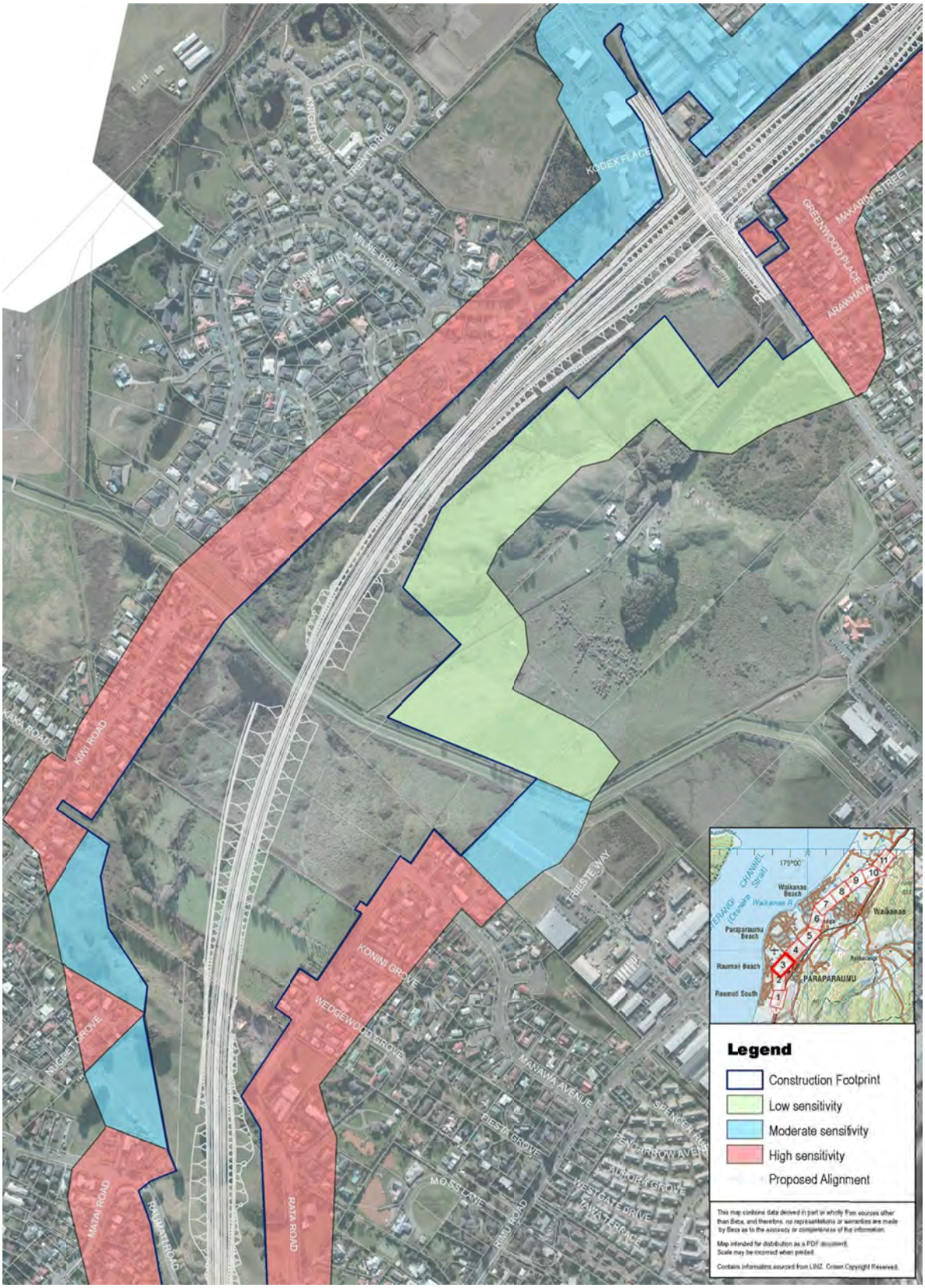

Figure 5 – Sensitive and Moderately Sensitive Areas – Sector 2, Rata Road to Kāpiti Road

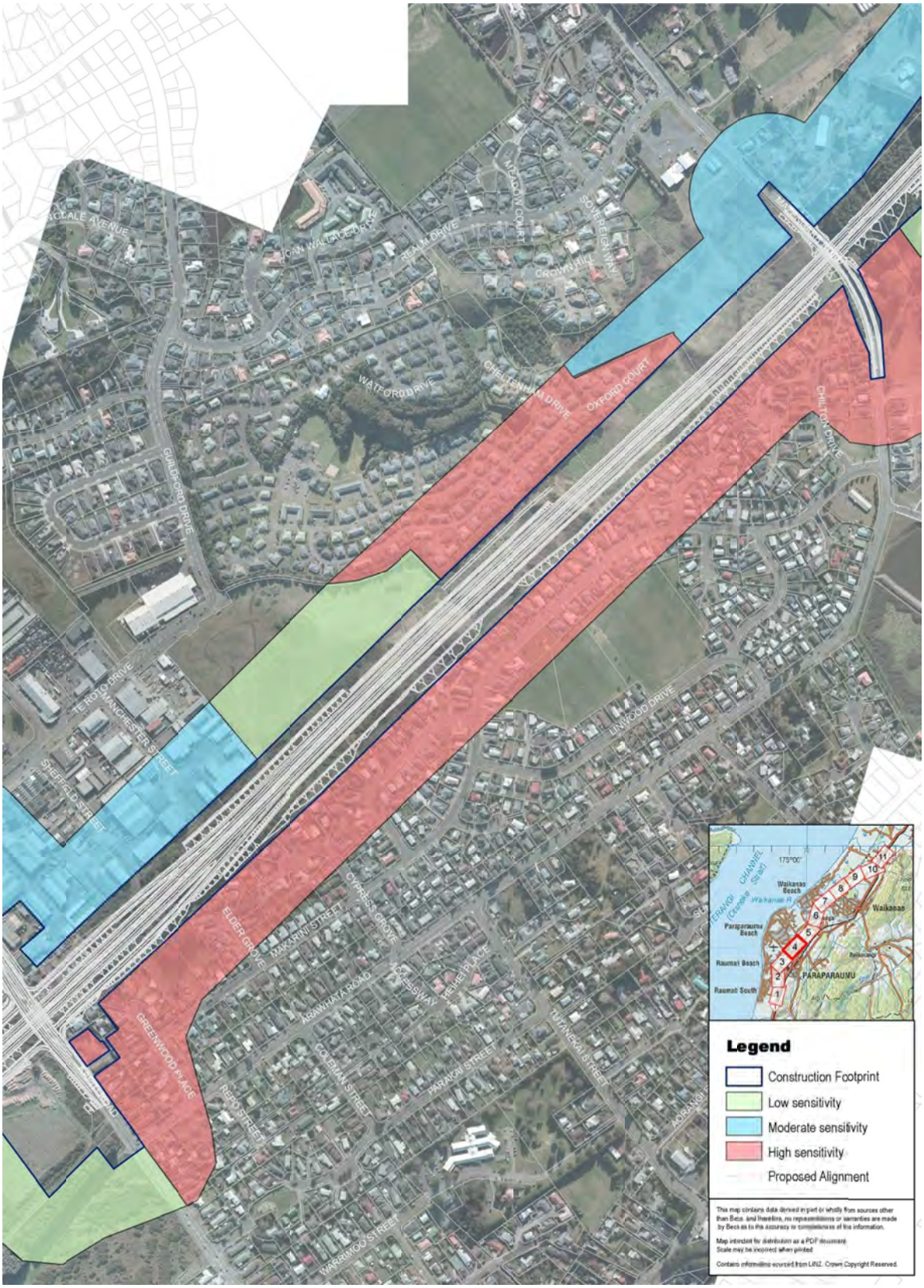

Figure 6 – Sensitive and Moderately Sensitive Areas – Sector 2, Kāpiti Road to Mazengarb Road

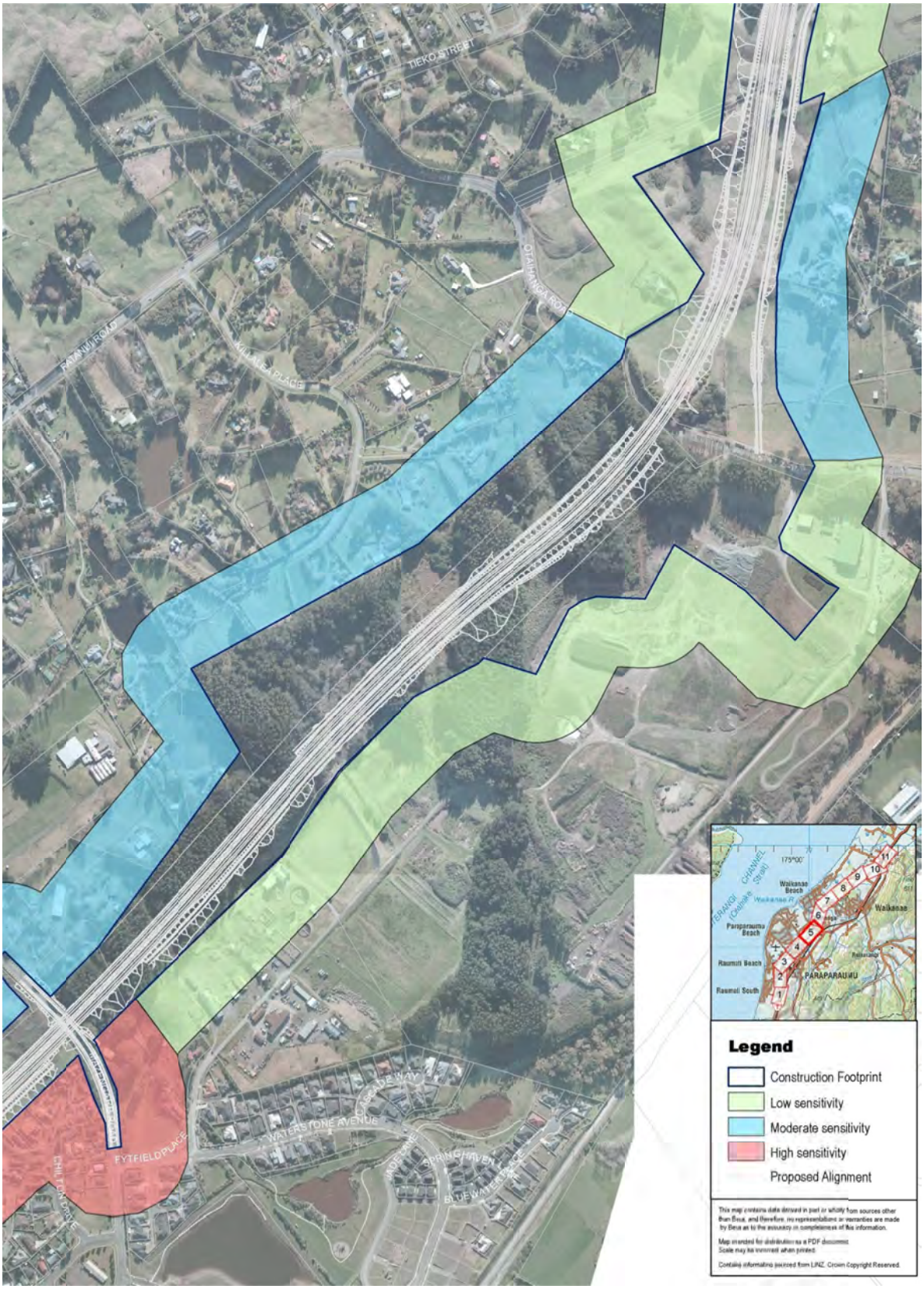

Figure 7 – Sensitive and Moderately Sensitive Areas – Sector 3, Mazengarb Road to Otaihanga Road

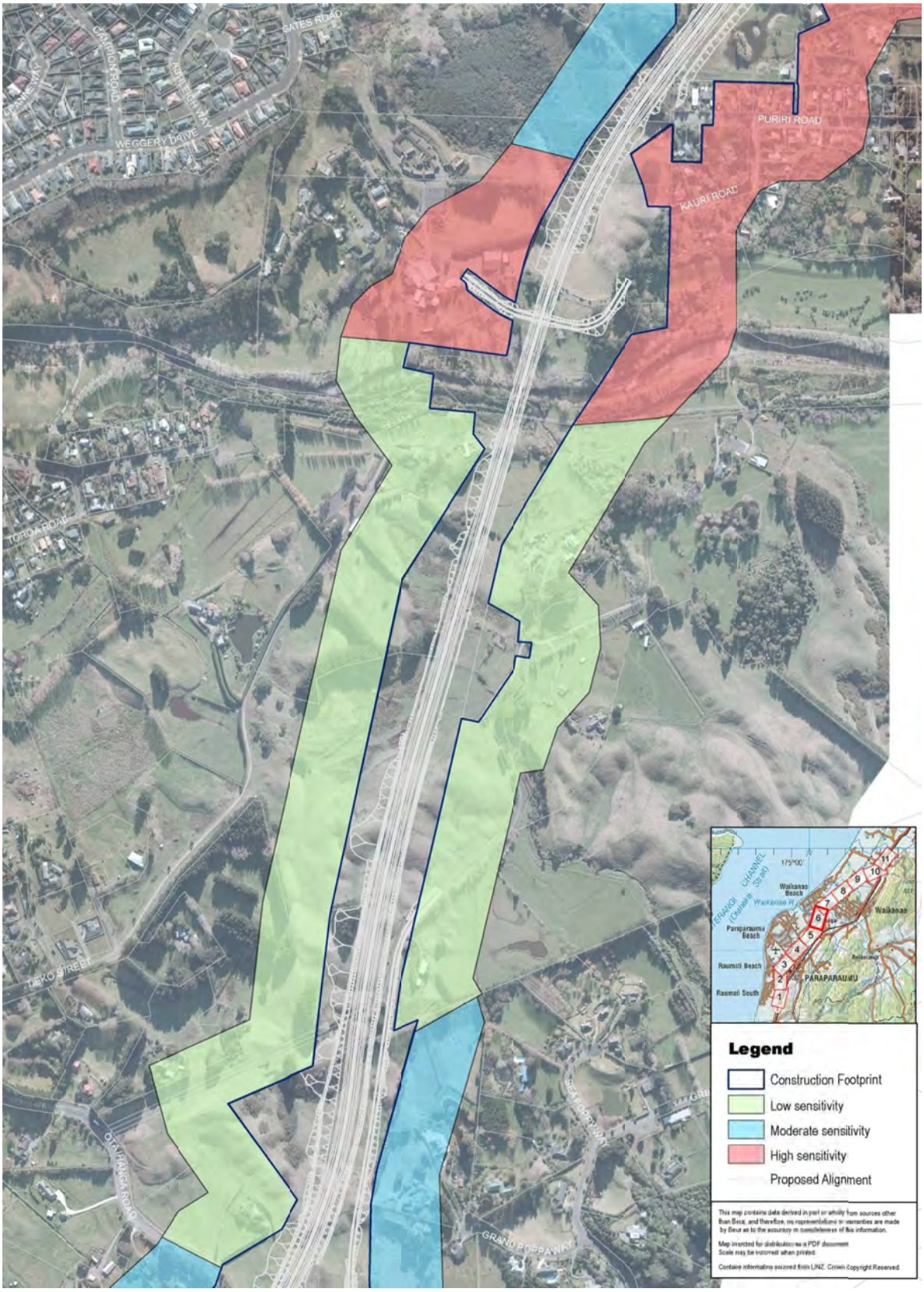

Figure 8 – Sensitive and Moderately Sensitive Areas – Sector 3, Otaihanga Road to Waikanae River

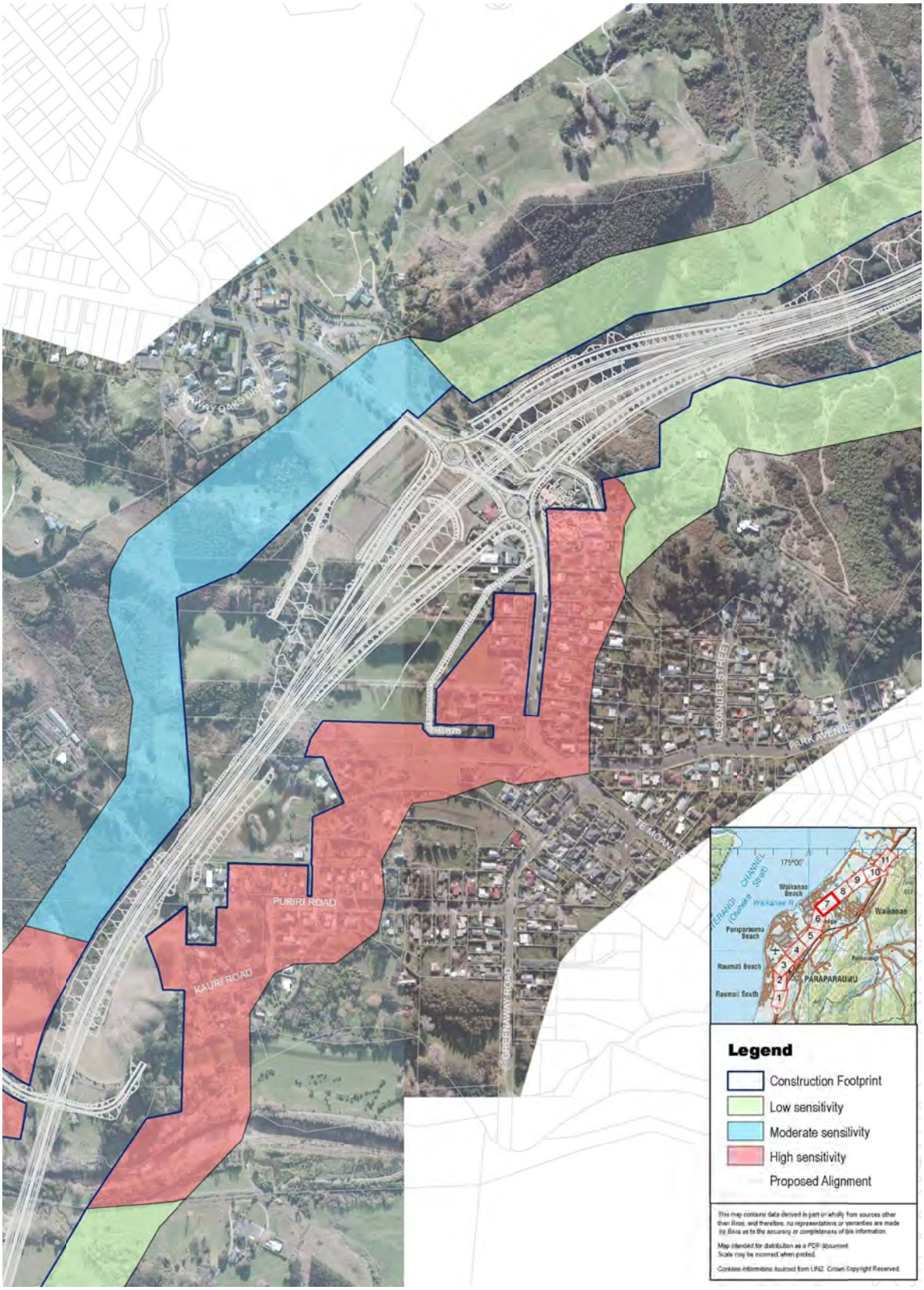

Figure 9 – Sensitive and Moderately Sensitive Areas – Sector 3, Waikanae River to Te Moana Road

Figure 10 – Sensitive and Moderately Sensitive Areas – Sector 4, Ngarara Road and Smithfield Road

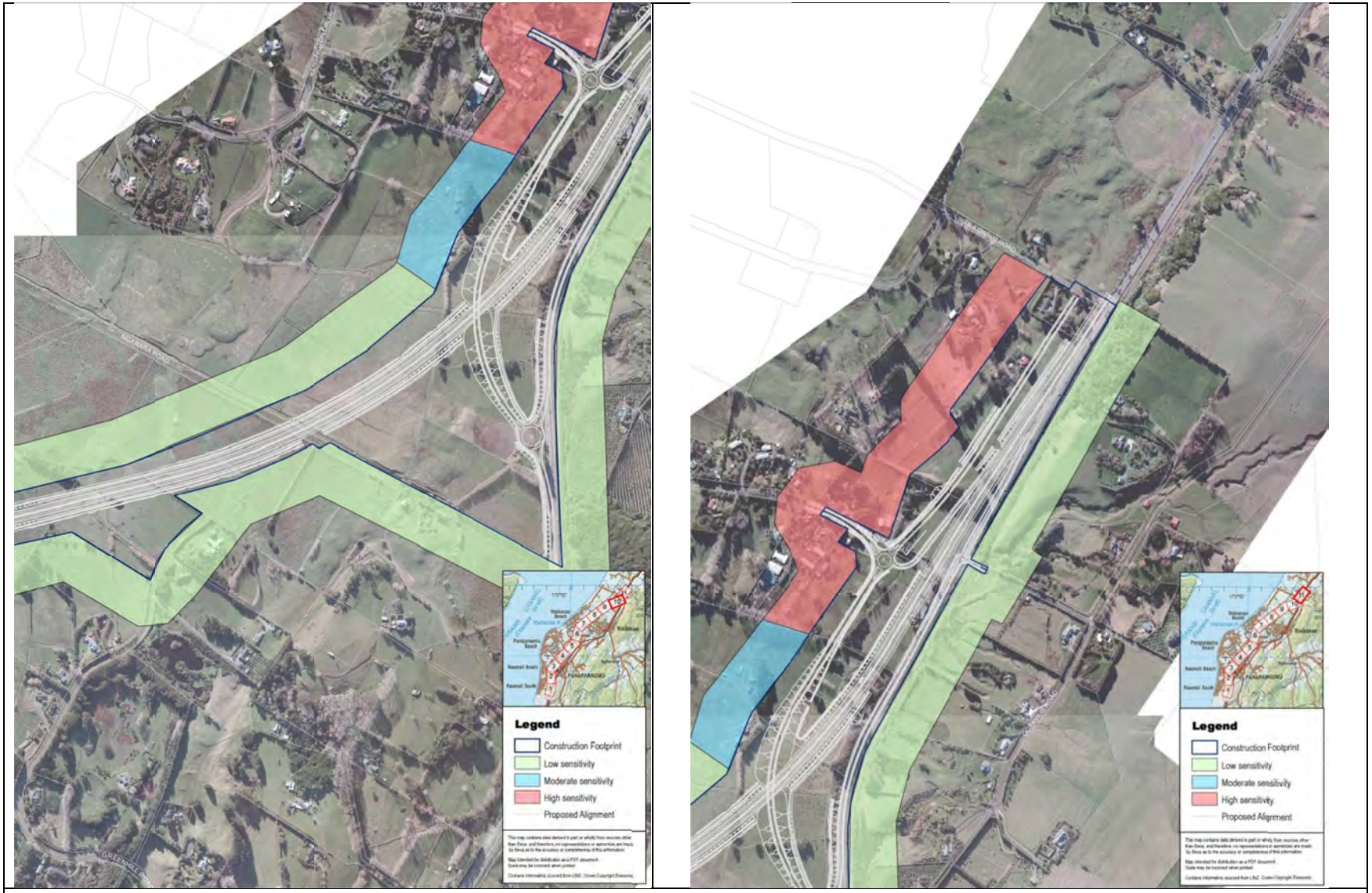

Figure 11 – Sensitive and Moderately Sensitive Areas – Sector 4, Peka Peka

2 Environmental impacts summary

2.1 Dust

When considering the potential environmental effects of dust emissions, the main issue relates to residential areas. Section 5 of the Assessment of Construction Air Quality Effects (Technical Report 14, Volume 3) outlines the nature of dust discharges from road construction activities. The main issues relate to the visual soiling of clean surfaces, such as cars, window ledges, and household washing; dust deposits on flowers, fruit or vegetables; and the potential for contamination of roof-collected water supplies. Excessive discharges of dust may also impact on visibility on roads in the immediate vicinity of the Project.

Due to the relatively large size of construction dust particles, only areas within about 100m of the construction footprint are likely to be at high risk of significant exposure to dust discharges. Figures 2 to 11 of this CAQMP identify those parts of the alignment where there are sensitive receptors and, consequently, effective dust control measures are most critical. Most of these sensitive receptors are located between Poplar Avenue and Mazengarb Road and between the Waikanae River and Te Moana Road.

2.2 Contaminated soil

A Stage 1 and 2 land contamination investigation was conducted for the Project. A report of findings was prepared, along with a Contaminated Soils and Groundwater Management Plan (Appendix K of the CEMP, Volume 4). Areas with contamination present above risk-based guideline values, as well as any potentially contaminated areas identified during construction works, should be addressed in accordance with the CSMP. Additional dust control measures should be put in place as appropriate when contaminated soil is disturbed so that dust does not adversely impact neighbouring properties.

Contaminated soils have been identified at three sites along the Expressway Alignment, as follows:

- 55 Rata Road - Heavy metals and polycyclic aromatic hydrocarbons (PAH)
- Kāpiti Road Intersection - Heavy metals and pesticides
- 124-154 Te Moana Road -Heavy metals and pesticides

Full details of these contaminants are presented in the Assessment of Land and Groundwater Contamination Effects (Technical Report 23, Volume 3).

2.3 Odour

The main potential source of odour associated with the construction of the Expressway is odour associated with landfill gas diverted from normal flow paths by the construction and operation of the main construction yard.

Landfill gas that is either diverted or collected and discharges via ventilation structures (e.g. as required to prevent the accumulation of landfill gas in buildings in the Otaihanga Road construction yard) may be highly odorous. Although landfill gas is likely to be present in the area due to fugitive emissions from the former landfill, construction and operation of the main construction yard may cause more concentrated releases in new locations. However, given that there are already a number of odorous activities in the vicinity of the former landfill (the wastewater treatment plant and a composting facility) and the lack of sensitive receptors nearby, no specific odour control measures are planned at this stage.

There is also the potential for odour associated with the extraction and removal of peat. This is essentially a 'natural' type of odour that may also be generated by a range of activities not associated with the construction of the Expressway. No specific control measures are planned for this type of odour.

2.4 Vehicle exhaust emissions

Engine exhaust emissions from construction vehicles contains a range of hazardous air pollutants, including fine particles, oxides of nitrogen, carbon monoxide and organics such as benzene, which can adversely affect human health. Poorly maintained vehicle engines discharge many times the amount of air pollutants than well maintained engines; and unnecessary idling of vehicle engines while parked can also cause significant local effects.

3 Implementation and operation

3.1 Operating/management procedures

3.1.1 Dust

Standard procedures for controlling potential dust nuisances are specified in Fletcher SOP ENV-13 Dust Nuisance. This section of the CAQMP provides further explanation of the causes of dust nuisance and of methods that may be used to control dust discharges.

Potential sources of dust and other air contaminant discharges which may cause nuisance beyond the site boundary during adverse conditions if adequate controls and mitigation measures are not adopted are:

- Dust from roads and access areas generated by trucks and other mobile machinery movements during dry and windy conditions
- Excavation and disturbance of dry material
- Loading and unloading of dusty materials to and from trucks
- Smoke and odour from diesel-engine machinery and truck exhausts
- Stockpiling of materials including material placement and removal
- Storage and handling of bulk cement
- Concrete grinding undertaken as part of the manufacture of pre-cast concrete bridge components.

There are five primary factors which influence the potential for dust to be generated from the site. These are:

- **Wind speed across the surface**. Dust emissions from exposed surfaces generally increase with increasing wind speed. However dust pick up by winds is only significant at wind speeds above 5 m/s (11 knots or a Beaufort scale number of 3 - see Appendix A of this Plan). Above wind speeds of 10m/s (20 knots) dust pick up increases rapidly.
- Moisture content of the material. Moisture binds particles together preventing them from being disturbed by winds or vehicle movements. Similarly, vegetated surfaces are less prone to wind erosion than bare surfaces.
- **The area of exposed surface**. The larger the areas of exposed surfaces the more potential there will be for dust emissions.
- **The percentage of fine particles in the material on the surface**. The smaller the particle size of material on an exposed surface the more easily the particles are able to be picked up and entrained in the wind.
- **Disturbances such as traffic and loading and unloading of materials**. Vehicles travelling over exposed surfaces tend to pulverise any surface particles. Particles are lifted and dropped from rolling wheels and the surface. Dust is also sucked into the turbulent wake created behind moving vehicles.

Systems for controlling dust emissions include:

- Methods that modify the condition of the materials (e.g. use of water sprays) so that it has a lesser tendency to lift with the wind or disturbances such as vehicle movements; and
- Methods that reduce the velocity of the wind at the surface (e.g. the use of wind breaks).

Watering of exposed surfaces and materials that may be disturbed is a primary method of control ("wet suppression"). The two main soil types within the Project area present contrasting challenges when considering the use of wet suppression:

- Sand – fast drying, free draining; high risk of dust generation at all times
- Peat – high water retention, but very hard to re-wet once dry; moderate risk of dust generation during extended dry periods.

As a general guide, the typical water requirements for most parts of New Zealand are up to 1 litre per square metre per hour[3]. Watering of surfaces is most effective when the water is applied prior to strong winds occurring and prior to particularly dusty activities commencing (which therefore requires that weather forecasts are checked on a daily basis). In certain areas, polymer additives may be used in water sprays to assist the formation of a surface crust, particularly for exposed surfaces that will be undisturbed for periods of up to a month or two.

The discharge of dust from the Project has the potential to have effects on two scales. The first is individually from a source where the effects of dust discharges are localised in the immediate area surrounding the construction area. Secondly, cumulative effects may be observed where the dust generated from all nearby dust sources combine to affect local air quality as a whole. Therefore it is important that all dust sources be minimised as far as practicable, including those well separated from sensitive locations, as all dust generated will have an effect on the overall air quality in the area.

The dust prevention methods recommended in Table 4 below are methods that have been found to be effective for many sites across New Zealand. The methods can be used alone or in combination depending on the circumstances. The methods summarised in Table 4 are considered to be sufficient to mitigate adverse effects of dust discharges from the Project. This list is not exhaustive and the Environmental Manager or subcontractors may suggest other effective methods. If alternate methods are to be employed, the effectiveness of those methods must be demonstrated and this Plan updated accordingly, following the process laid down in Section 5.

Table 4 – Potential Dust Sources and Controls

Source of dust	Control
Stockpiles	▪ Limit the height and slope of stockpiles to reduce wind entrainment. Stockpiles exceeding 3m in height have a higher risk of discharging dust. ▪ Orientate stockpiles to maximise wind sheltering as much as possible. ▪ Maximise shelter from winds as far as practicable. ▪ Keep active stockpiles damp at all times or cover stockpiles of fine materials. ▪ Dampen inactive stockpiles if they are producing visible dust emissions. Use

[3] Section 8.2 of the MfE Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions, Ministry for the Environment, 2001

Source of dust	Control
	polymer additives to assist in forming a surface crust or cover with mulch or straw. ■ Vegetate stockpiles if inactive for more than three months. Supply adequate water to support optimum vegetation growth.
Unpaved Surfaces such as Roads and Yards	■ Limit the amount of exposed surfaces as much as possible. ■ Retain as much vegetation as possible. ■ Keep unpaved roads and exposed surfaces damp. Typical water requirements for most parts of New Zealand are up to 1 litre per square metre per hour. ■ Cover surfaces with coarse materials where practicable. ■ Compact all unconsolidated surfaces where practical. ■ Regularly maintain roads by grading and the laying of fresh gravel. ■ In very high risk areas, haul roads should be sealed. ■ Stabilise cleared areas not required for construction, access or for parking, if liable to cause excessive dust during windy conditions. Methods may include wetting with polymer additives to facilitate crusting, metalling, grassing, mulching or the establishment of vegetative cover.
Sealed Surfaces	■ Regular removal of dust through washing or vacuum sweeping.
Vehicles	■ Limit vehicle speeds on unsealed surfaces to 10 km/h. ■ Limit load sizes to avoid spillages. ■ Cover loads of fine materials. ■ Minimise travel distances through appropriate site layout and design. ■ Minimise mud and dust track out from unsealed areas to sealed areas by establishing stabilised entranceways at all ingress and egress points to sealed roads. ■ If necessary, provide wheel wash facilities.
Earthmoving and Construction	■ Limit the extent of earthworks in sand carried out during dry conditions as far as practicable. ■ Adequate irrigation systems must be available on each site to dampen areas that are to be earthworked prior to any earthwork commencing and shall be used permanently on sites until the final site shape has been established and further earthworks are not required. ■ Limit drop heights. ■ Prior to a cut and fill activity in sand, pre-water the area with sprinklers to allow time for penetration of the soil.

Source of dust	Control
Miscellaneous	■ Ensure sufficient water is available on site. ■ Take account of daily forecast wind speed, wind direction and soil conditions before commencing an operation that has a high dust potential. ■ Install windbreak fences where practicable and appropriate. Effectiveness is greatest where fencing is perpendicular to the prevailing wind direction with a porosity of about 50%. ■ Minimise the area of surfaces covered with fine materials.

3.1.2 Contaminated soils

Where contaminated soils are or are likely to be present (as identified in section 2.2 of this Plan and in the Assessment of Land and Groundwater Contamination Effects: Technical Report 23, Volume 3), the controls described in Table 4 are particularly important.

Soils should be adequately wetted and dust controlled during any removal of the contaminated soil. If the excavations require these layers of contamination to be removed, dust control measures should take potential risk from contamination into consideration and precautions put in place to ensure that contaminants are not discharged from the site. Once the contaminated soil is removed, standard construction dust control measures should be applied.

Reference should also be made to the Contaminated Soils and Groundwater Management Plan (Appendix K of the CEMP, Volume 4) for additional controls related to the safe handling of contaminated or potentially contaminated soils.

3.1.3 Odour

The construction of the Project is not anticipated to result in the generation of significant odour. Therefore, no specific operational or management procedures have been specified at this stage for the control of odour from the Project.

3.1.4 Vehicle Exhaust Emissions

Poorly maintained vehicle engines discharge many times the amount of air pollutants than well maintained engines; and unnecessary idling of vehicle engines while parked can also cause significant local effects. In consequence, the following key actions should be carried out to minimise emissions:

- All construction machinery used on the site must be maintained at least in accordance with manufacturers' requirements.

- Where excessive exhaust smoke is identified from any construction vehicle, that vehicle should be serviced as soon as is practicable and taken out of use until such maintenance has been completed.
- Construction vehicles should not be left idling while parked or unattended.

3.2 Sector specific approach

Not applicable – similar methods of dust control will be required in all sectors.

3.3 Monitoring

3.3.1 Visual Dust Monitoring

Table 5 outlines the dust monitoring programme that is to be implemented. The application of this monitoring will be the responsibility of the Environmental Manager in conjunction with site personnel. The frequency of the monitoring is defined but in the instance of strong winds, discharges of dust that cross the site boundary or a complaint, the monitoring programmes will be undertaken more regularly. Instrumental dust monitoring is discussed in Section 3.3.2.

Table 5 – Dust Monitoring Programme

Monitoring Activities	Frequency
Check weather forecasts for strong winds and rainfall to plan appropriate dust management response (7 day forecasts available on www.metvuw.co.nz)	Daily
Inspect land adjacent to the site, construction exits and adjoining roads for the presence of dust deposits.	Daily
Observe weather conditions, wind via observations and data outputs from weather stations and presence of rain.	Daily and as conditions change
Inspect all unsealed surfaces for dampness and to ensure that surface exposure is minimised.	Daily and as conditions change
Inspect stockpiles to ensure enclosure, covering, stabilisation or dampness. Ensure stockpile height is less than 3m or appropriately stabilised.	Weekly and at times of expected high winds
Inspect dust generating activities (as listed in section 3.1 - Table 4) to ensure dust emissions are effectively controlled.	Daily and as new activities are commenced
Inspect watering systems (sprays and water carts) to ensure equipment is maintained and functioning to effectively dampen	Weekly

Monitoring Activities	Frequency
exposed areas.	
Additional monitoring of dust generating activities and water application rate.	In winds over 5.5 m/s (11 knots or a Beaufort scale number of 3 - see Appendix G.B of this Plan)
Inspect site access and egress points to ensure effective operation of wheelwash/truckwash systems and/or judder bars (if installed).	Weekly
Ensure site windbreak fences, if used, are intact.	Weekly

3.3.2 Instrumental dust monitoring

Continuous monitoring of Total Suspended Particulate (TSP or dust) and of meteorological conditions will be undertaken during the construction of the Project. The Environmental Manager will be responsible for the provision and maintenance of the instrumental monitoring.

The locations of the monitoring sites will depend on the scale of the construction activity in the area, the expected duration of the activity, the sensitivity of the surrounding areas and the availability of suitable monitoring sites. However, given the overall scale and duration of the Project, continuous TSP monitoring may be needed at a number of locations (although it is envisaged that some monitors may be moved as construction progresses). In those areas where the construction activity has a high potential to generate dust and where sensitive locations are nearby, the recommended monitoring locations are set out below (based on being downwind of the seasonal prevailing wind direction and/or the proximity of sensitive receptors):

- Leinster Avenue – western edge of construction footprint. Monitoring in this area is only likely to be needed during pre-loading and carriageway construction stages.
- 55 Rata Road – eastern edge of construction footprint. Monitoring in this area is needed while excavation of contaminated fill is undertaken
- Between Kāpiti Road and Mazengarb Road – southeastern edge of construction footprint. Monitoring is likely to be needed in this area for the duration of the Project, due to the use of this section as a haul route between southern parts of the Project and the main construction yard at Otaihanga Road, the presence of contaminated material in the surface layers of soil and the close proximity of residential areas.

The exact location(s) of the monitoring site(s) may be varied as appropriate to respond to changes in construction activities and methods or to complaints regarding dust discharges. The KCDC should be notified whenever instrumental monitoring commences or ceases at any location and if the specific location of any monitoring site is altered.

A real-time TSP monitor should be located at each of the above (approximate) locations. A meteorological station which measures wind direction, wind speed and temperature should be located alongside at least one of the real time TSP monitors.

The locations selected for the TSP and meteorological monitoring sites should be selected as far as is practicable to comply with the requirements of:

- AS/NZ 3580.1.1:2007 Method for Sampling and Analysis of Ambient Air – Guide to Siting Air Monitoring Equipment; and
- AS 2923:1987 Ambient Air – Guide for the Measurement of Horizontal Wind for Air Quality Applications.

The monitoring system(s) selected must be capable of meeting the following minimum requirements:

- TSP monitors should be able to produce a near continuous measurement of TSP concentrations and be able to calculate 1 hour and 24 hour average concentrations.
- The ability to collect filters for subsequent analysis for hazardous air pollutants, where monitoring is carried out in the vicinity of identified contaminated sites (55 Rata Road and the Kāpiti Road intersection in Sector 2). Refer to the CSMP for details of hazardous pollutants that may require analysis at these sites.
- The outputs from the TSP monitors and the meteorological stations must be able to be monitored remotely by the Environmental Manager, and be set to produce an alarm when trigger values are approached. Alarms should activate a pager or cell phone.
- Outputs from the monitors must be continuously recorded.

Monitors in areas of construction activity which are capable of remote notification will be checked regularly (daily if practicable) to ensure compliance with trigger levels. Monitoring may not be required at all of the above locations simultaneously but will depend on the construction programme.

Trigger levels for TSP and wind speed are summarised in Table 2 and Table 3. The following table (Figure 12) summarises the actions to be taken in the event that the results of instrumental monitoring exceed the specified Project trigger levels.

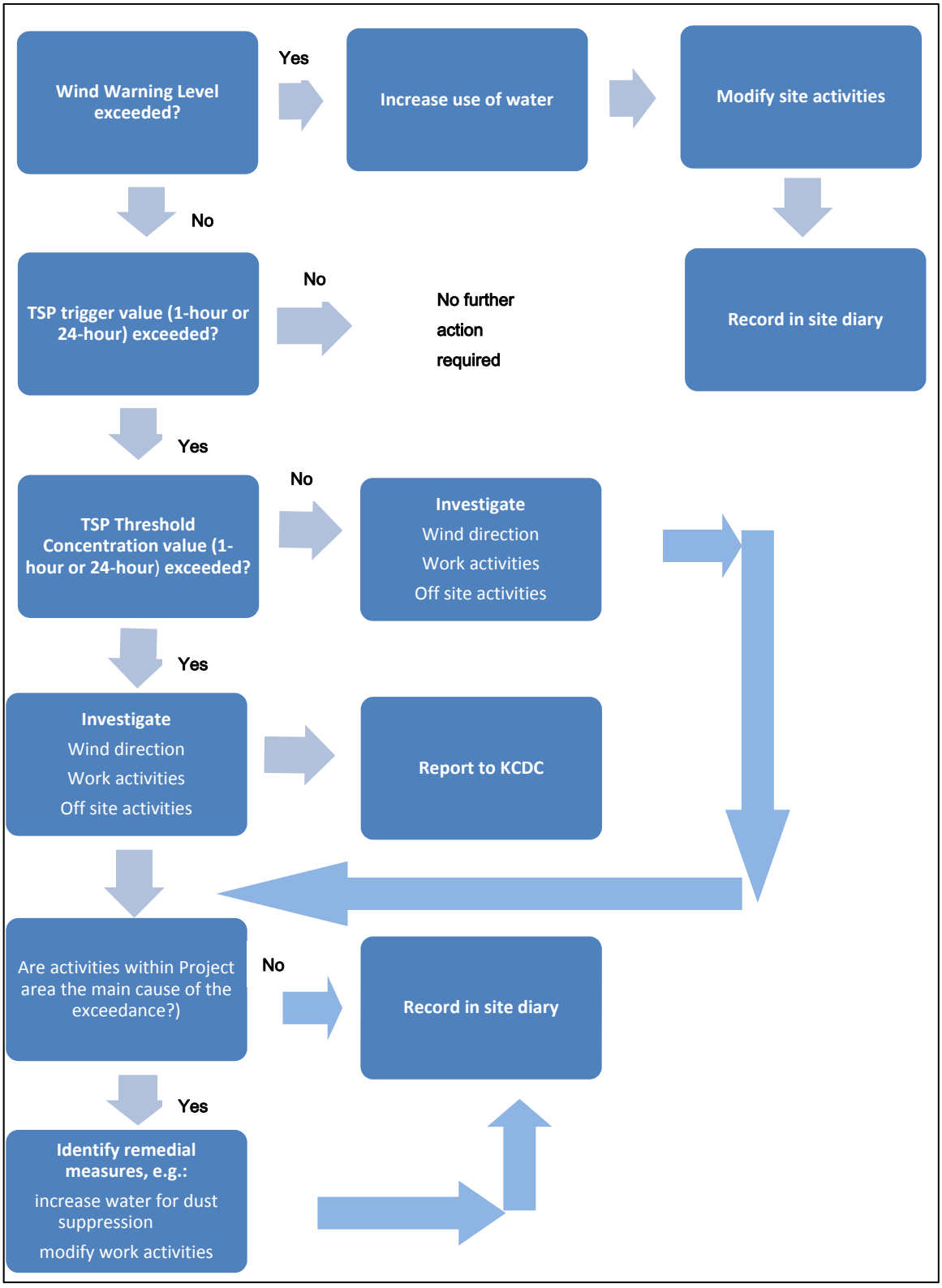

Figure 12 – Flow chart: Responses to Exceedances of Ambient Monitoring Trigger Values

3.3.3 Contingency plan for ambient air instrument downtime

Instruments need to be shut down periodically for regular maintenance and from time to time the instruments fail. During these times when an instrument is not operating, the following contingency plans should be implemented.

a. Planned Shutdowns

The instrument supplier will advise the Environmental Manager prior to shutting down a TSP instrument for regular maintenance. During the shutdown period, the following steps should be undertaken, unless it is raining steadily or the wind is less than 5m/s:

- In areas that sprinklers have been installed, turn on sprinklers on all potentially dusty surfaces whether or not dust is being generated. Do not turn sprinklers off until the instrument is back on line.
- Utilise water carts on all access roads and potentially dusty surfaces that are not covered by the sprinkler system whether or not dust is being generated until the instrument is back on line.

The instrument supplier will advise the Environmental Manager prior to shutting down the meteorological instruments. Handheld anemometers should be used to monitor local wind speed while meteorological instruments are off-line.

b. Unplanned Shutdowns

Unplanned shutdowns can occur due to power failures and instrument faults. The instrument supplier will be required to alert the Environmental Manager of an instrument failure either via an automatic alarm or by phone.

As soon as site management becomes aware that one of the instruments has failed, the following steps should be taken unless it is raining steadily or the wind speed is less than 5m/s:

- In areas that sprinklers have been installed, turn on sprinklers on all potentially dusty surfaces whether or not dust is being generated. Do not turn sprinklers off until the instrument is back on line.
- Utilise the water cart on all access roads and potentially dusty surfaces that are not covered by the sprinkler system, whether or not dust is being generated, until the instrument is back on line.
- Utilise hand-held anemometers to monitor local wind speed.

If a power failure is the cause of the fault and there are no wind speed readings available, use the Beaufort Wind Scale to estimate wind speed. A copy of the Beaufort Wind Scale is attached to this plan as Appendix A. If winds exceed a force 2 wind (light breeze), the sprinklers should be activated.

If all meteorological stations are shut down unexpectedly due to power failure or instrument faults, the instrument supplier will be required to notify the Project Manager either via an automatic alarm or by phone. If this occurs the Environmental Manager will arrange to monitor wind direction by observation and wind speeds using the Beaufort Wind Scale at least every two hours until the instruments are back on line. Records of these observations should be kept in the site log as they may be required for investigation of complaints.

3.4 Reporting

General reporting requirements are included in section 4.5 of the CEMP, Volume 4. The specific reporting requirements associated with managing dust, odour and hazardous air pollutants include the following:

Site Staff to Environmental Manager

Site personnel shall inform the Environmental Manager of the following:

- Any problems they observe or foresee with dust management on their site
- The measures taken for dust prevention and mitigation during the previous reporting period.

Environmental Manager to Alliance Project Manager

The Environmental Manager will inform the Alliance Project Manager of the following:

- Any exceedances of dust trigger values, probable causes and actions taken
- The dust monitoring results each month
- Any complaints received during the previous period regarding dust and the remedial actions taken
- Any complaints received regarding dust, odour or hazardous air pollutants within 24 hours of receipt of the complaint.

Alliance Project Manager to the Project Alliance Board and Regulatory Authorities

The Alliance Project Manager will inform the Project Alliance Board and Regulatory Authority of the following:

- Outcomes of any investigations into exceedances of the MfE trigger concentration for TSP
- Quarterly summary of TSP and meteorological monitoring, including:
  - Graph of 24-hour average TSP concentrations at each monitoring site
  - Details of any exceedences of the relevant MfE trigger levels (refer Table 2)
  - Summary wind rose of hourly average wind speeds and directions.

The Environmental Manager will also provide the Regulatory Authority with a copy of the CAQMP annually and if any significant revisions of the CAQMP are made during the year.

3.5 Training

Environmental training for all staff will be undertaken as part of the site induction programme. Details of training are included in section 3.3 of the CEMP, Volume 4. The environmental induction will include the following information specific to this Plan:

- Information about the activities and stages of construction that may cause dust and odour impacts within the construction area
- Consent requirements
- Complaints management procedures
- Dust and management procedures
- Description of dust monitoring for the Project.

3.6 Complaints

Complaints management procedures are detailed in section 3.8 of the CEMP and in Fletchers' SOP ENV-04. The specific requirements for managing complaints associated with dust/odour/vehicle exhaust nuisance effects are detailed further below.

In addition to recording general details of the complaint on a Complaint Record Form (Appendix R to the CEMP), the person receiving the complaint must record:

- A description of the discharge from the complainant – constant or intermittent, how long it has been going on for, whether it is worse at any time of day and/or comes from an identifiable source
- Wind direction and strength and weather conditions.

The site inspection undertaken by the Environmental Manager should note:

- All dust/odour/vehicle exhaust producing activities taking place
- The dust/odour mitigation methods that are being used.
- If the complaint was related to an event in the recent past, note any dust/odour/vehicle exhaust producing activities that were underway at that time, if possible.

If it becomes apparent that there may be a source of dust/odour/vehicle exhaust other than the construction project causing the complaint, it is important to verify this. Photograph the source and emissions.

4 Roles and responsibilities

All Site Staff

- Attending inductions, tool box talks and training to manage dust and odours
- Responsible for reporting all incidents involving dust and odours
- Ensuring processes for managing dust and odour are adhered to

Environmental Manager

- Prepares, reviews and updates CAQMP
- Monitors and reports performance against the CAQMP
- Investigates and reporting of all complaints

Alliance Project Manager

- Ensure sufficient resources are provided to manage dust and odour in accordance with the CAQMP
- Provides leadership to the Project team[4] in the area of dust and odour management

5 Review

This section describes how the CAQMP will be reviewed, including looking at the environmental controls and procedures to make sure that they are still applicable to the activities being carried out.

The CAQMP will be reviewed by the Project Team after confirmation of the resource consent and designation conditions and will be revised in accordance with these conditions. The CAQMP will be updated, with the necessary approval, throughout the course of the Project to reflect material changes associated with changes to construction techniques or the natural environment. Approval from the Kāpiti Coast District Council will be required for any relevant revisions of a material nature for the CAQMP.

A management review of the CAQMP will be undertaken at least annually by the Project Management team. The management review will be organised by the Environmental Manager and the Project team will be informed of any changes to this Plan through the regular Project communications processes. The review will take into consideration:

[4] This Plan refers to the Project team as carrying out works on behalf of and as contracted by the NZTA. The NZTA is the requiring authority and the consent holder

- Any significant changes to construction activities or methods
- Key changes to roles and responsibilities within the Project
- Changes in industry best practice standards or recommended dust controls
- Changes in legal or other requirements (social and environmental legal requirements, consent conditions, NZTA objectives and relevant policies, plans, standards, specifications and guidelines)
- Results of inspection and maintenance programmes, logs of incidents, corrective actions, internal or external assessments
- The outcome of investigations into discharges of dust or odour.

Reasons for making changes to the CAQMP will be documented. A copy of the original CAQMP document and subsequent versions will be kept for the Project records, and marked as obsolete. Each new/updated version of the CAQMP documentation will be issued with a version number and date to eliminate obsolete CAQMP documentation being used.

6 References

Kirkby, C. Assessment of Construction Air Quality Effects: Technical Report 14, Volume 3 of the MacKays to Peka Peka Expressway Project AEE.

Ridley, G. Erosion and Sediment Control Plan: Appendix H of the CEMP, Volume 4 of the MacKays to Peka Peka Expressway Project AEE.

Smith, G. Assessment of Land and Groundwater Contamination Effects: Technical Report 23, Volume 3 of the MacKays to Peka Peka Expressway Project AEE.

Smith, G. Contaminated Soils and Groundwater Management Plan: Appendix K of the CEMP, Volume 4 of the MacKays to Peka Peka Expressway Project AEE.

Appendix G.A
Beaufort Wind Scale

Beaufort Wind Scale

Beaufort scale	Wind speed			Label	Observations on land
	m/s	Knots	km/h		
0	0 - 0.2	<1	<1	Calm	Calm. Smoke rises vertically.
1	0.3-1.5	1-3	1-5	Light Air	Wind motion visible in smoke.
2	1.6-3.3	4-6	6-11	Light Breeze	Wind felt on exposed skin. Leaves rustle.
3	3.4-5.4	7-10	12-19	Gentle Breeze	Leaves and smaller twigs in constant motion.
4	5.5-7.9	11-15	20-28	Moderate Breeze	Dust and loose paper raised. Small branches begin to move.
5	8.0-10.7	16-21	29-38	Fresh Breeze	Branches of a moderate size move. Small trees begin to sway.
6	10.8-13.8	22-27	39-49	Strong Breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over.
7	13.9-17.1	28-33	50-61	Near Gale	Whole trees in motion. Effort needed to walk against the wind. Swaying of skyscrapers may be felt, especially by people on upper floors.
8	17.2-20.7	34-40	62-74	Gale	Twigs broken from trees. Cars veer on road.
9	20.8-24.4	41-47	75-88	Severe Gale	Larger branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over. Damage to circus tents and canopies.
10	24.5-28.4	48-55	89-102	Storm	Trees are broken off or uprooted, saplings bent and deformed, poorly attached asphalt shingles and shingles in poor condition peel off roofs.
11	28.5-32.6	56-63	103-117	Violent Storm	Widespread vegetation damage. More damage to most roofing surfaces, asphalt

					tiles that have curled up and/or fractured due to age may break away completely.
12	32.7-36.9	64-71	118-133	Hurricane	Considerable and widespread damage to vegetation, a few windows broken, structural damage to mobile homes and poorly constructed sheds and barns. Debris may be hurled about.

Appendix G.B
Wind Speed and Direction

Wind Speed and Direction – Paraparaumu Airport, 2008-2010

Figures B1 to B7 present a summary of hourly average wind speeds and directions recorded at Paraparaumu Airport between 2008 and 2010, as follows:

- Figures B1-B3 – Annual wind roses for 2008, 2009 and 2010
- Figures B1-B3 – Seasonal wind roses for spring (B4), summer (B5) autumn (B6) and winter (B7) for the period 2008-2010.

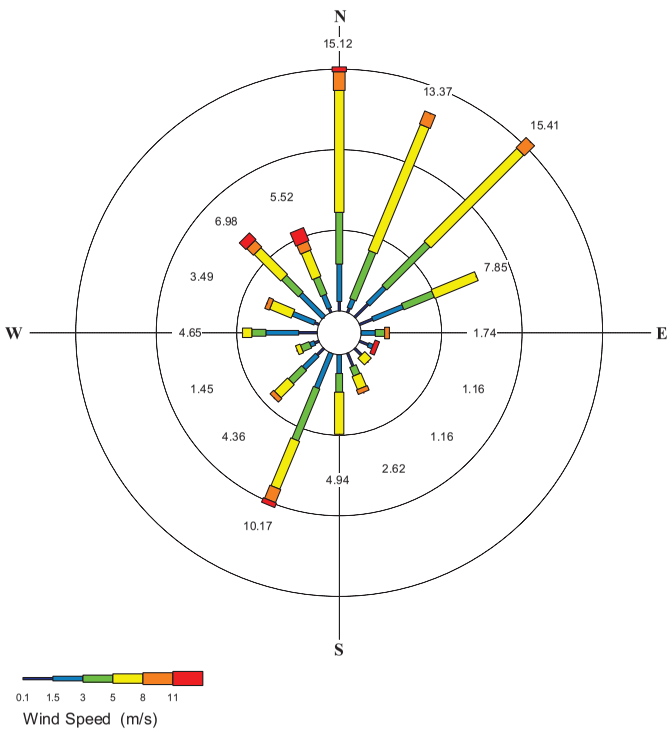

Figure B1 – Annual Wind Rose for 2008
Paraparaumu Airport

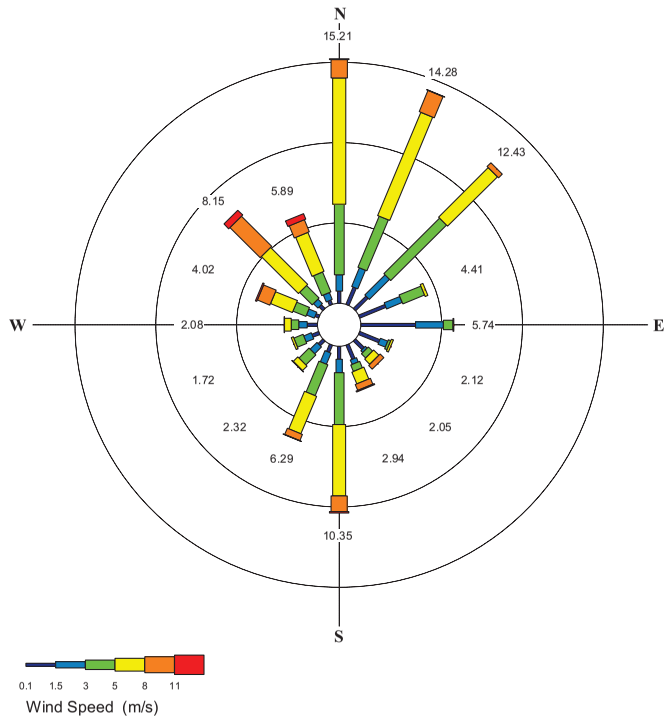

Figure B2 – Annual Wind Rose for 2009
Paraparaumu Airport

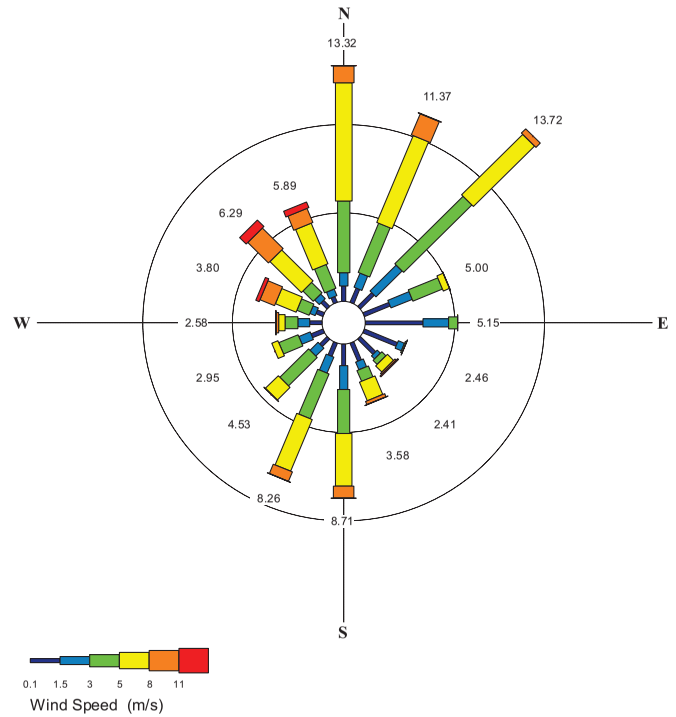

Figure B3 – Annual Wind Rose for 2010
Paraparaumu Airport

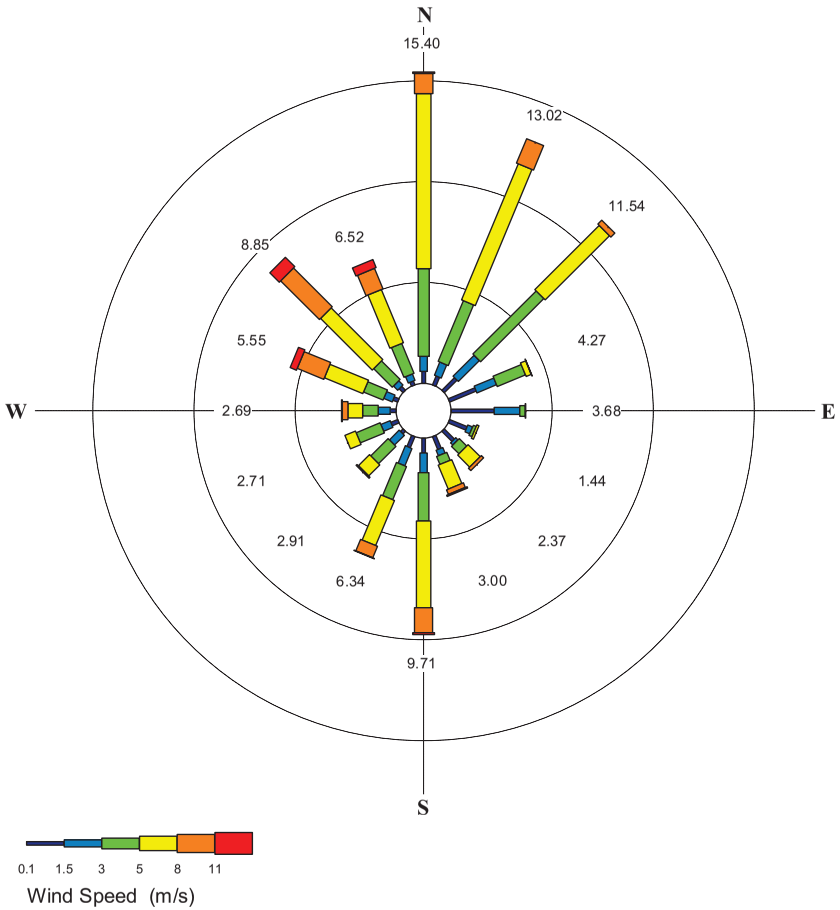

Figure B4 – Seasonal Wind Rose – Spring

Paraparaumu Airport

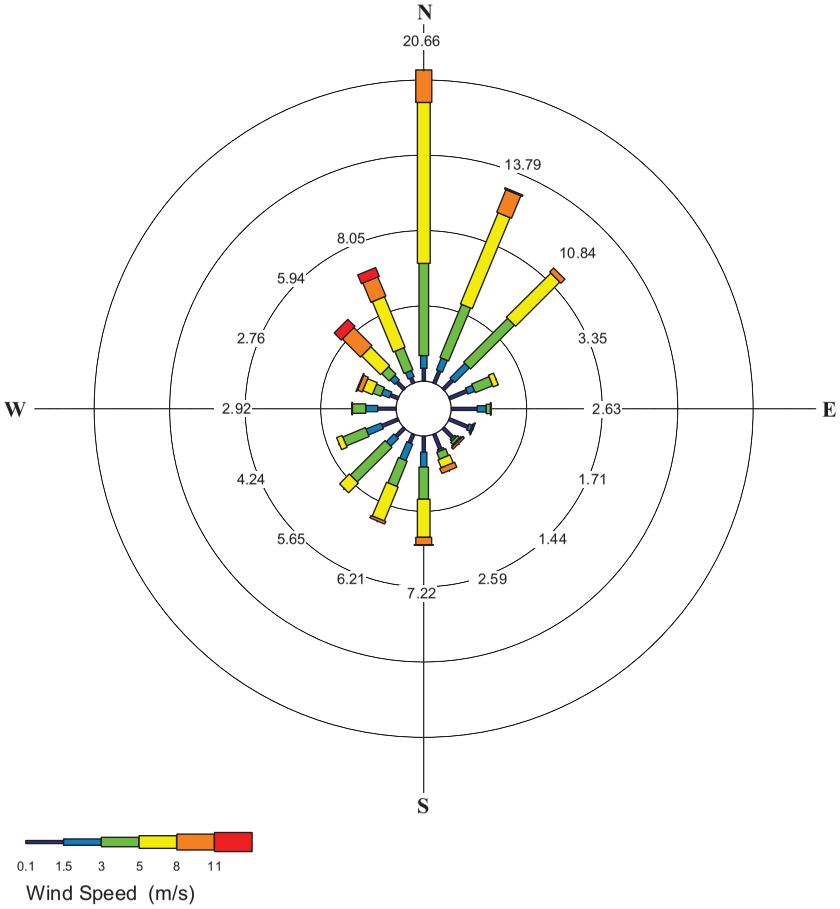

Figure B5 – Seasonal Wind Rose – Summer

Paraparaumu Airport

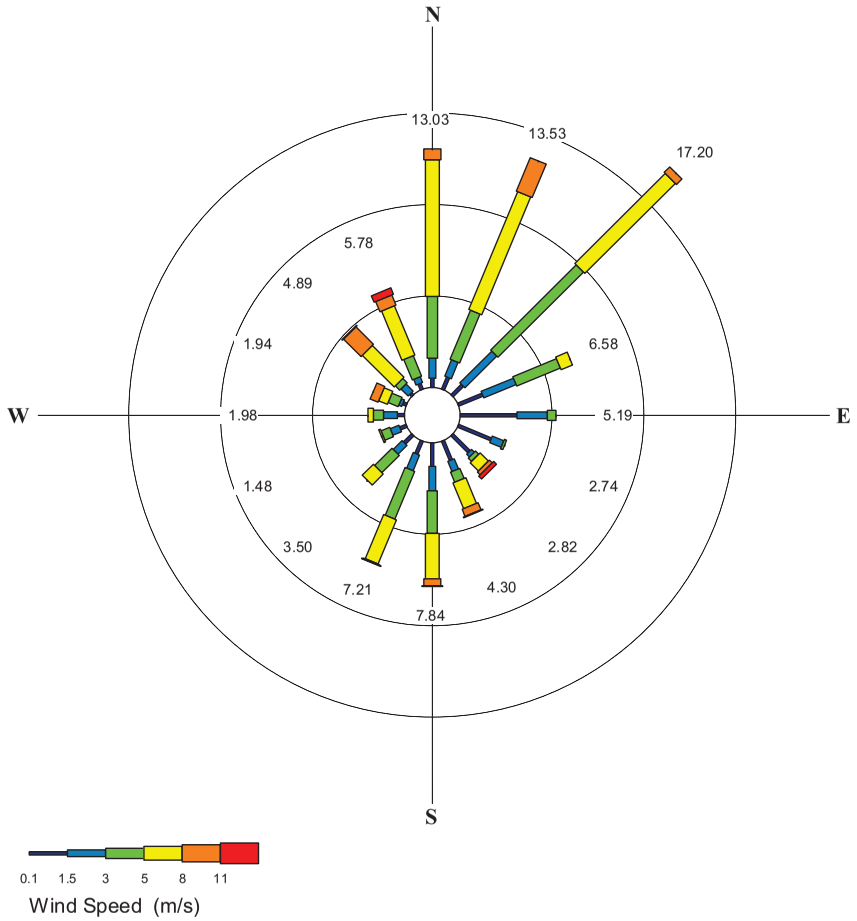

Figure B – Seasonal Wind Rose – Autumn

Paraparaumu Airport

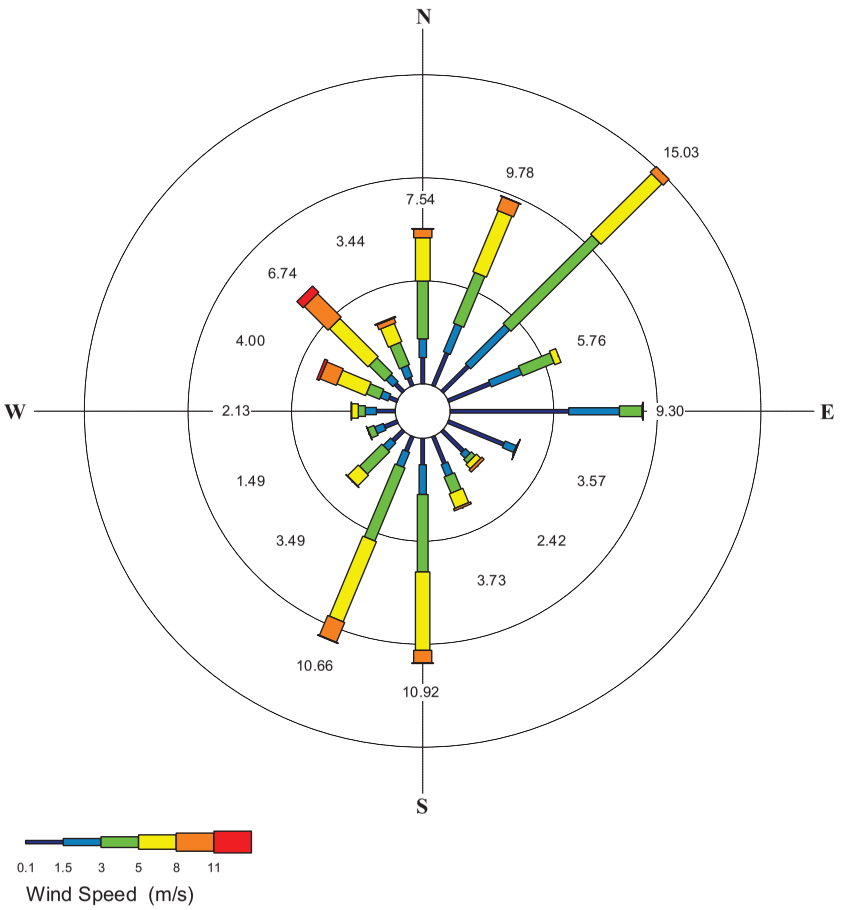

Figure B7 – Seasonal Wind Rose – Winter

Paraparaumu Airport