Nominated airsheds for the Wellington Region

Quality for Life

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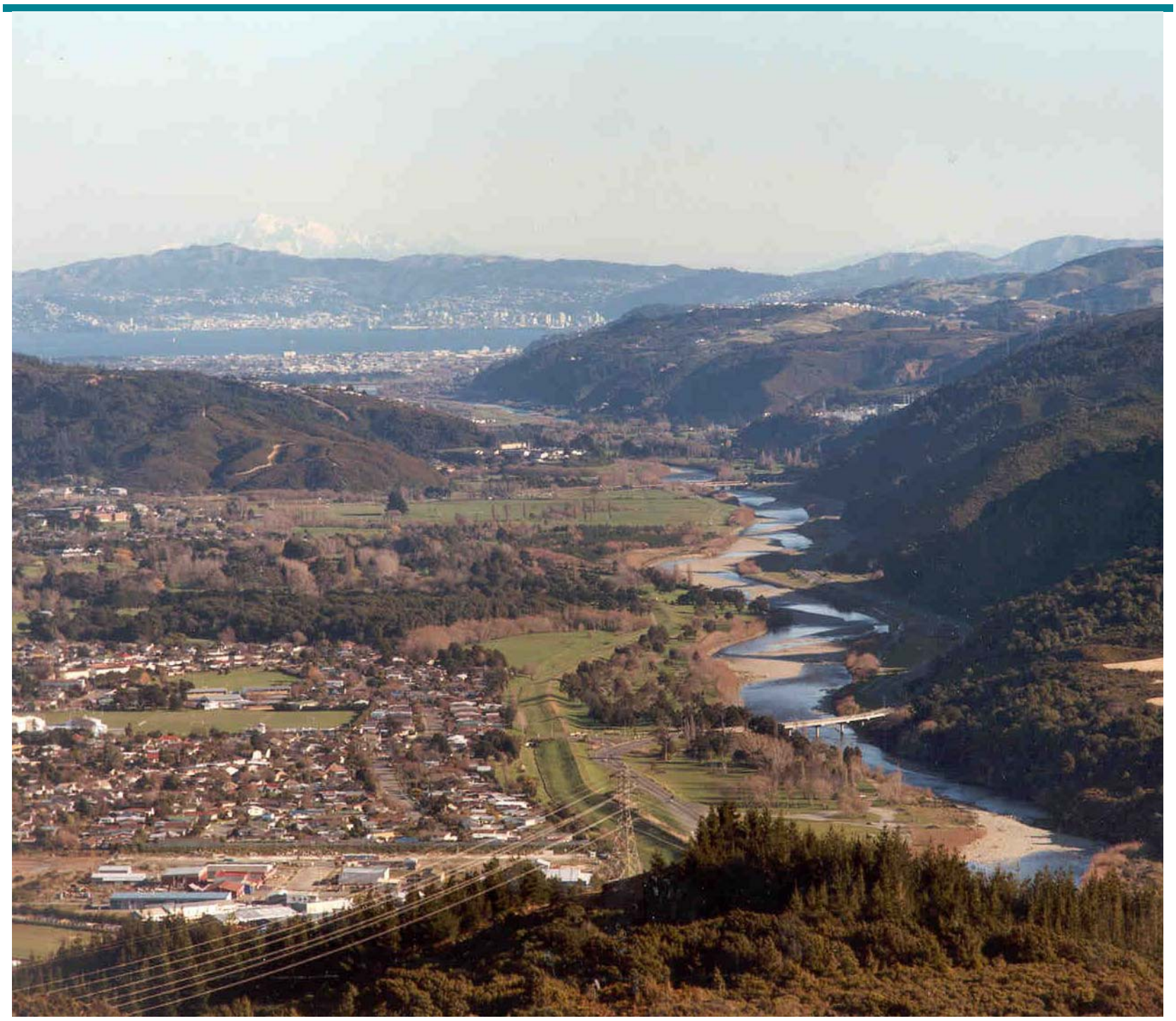

JULY 2005

Nominated airsheds for the Wellington Region

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FOR FURTHER INFORMATION

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ENV/06/01/04

Contents

1. Background

This document has been prepared in support of the airsheds nominated by Greater Wellington (GW) for the purposes of giving effect to the Resource Management Act (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Regulations 2004 (NES).

The NES was gazetted on 24 October 2004. The National Standards are environmental regulations that must be implemented by regional councils under the Resource Management Act 1991.

In summary, the Standards that have been introduced are:

- Seven activity based standards that ban various activities which discharge unacceptable quantities of dioxins and other toxics into the air.
- Five ambient air quality standards for carbon monoxide (CO), fine particles (PM_{10}), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and ozone (O_3).
- A design standard for new small-scale domestic wood burning appliances.
- A design standard for the collection and destruction of landfill gas at large landfills.

Subclause 14 of the regulations outline where the ambient air quality standards apply:

14 Application of standards. The ambient air quality standard for a contaminant applies at any place –

> *(a) that is in a region or part of a region specified by the Minister by notice in the Gazette; and*
>
> *(b) that is in the open air; and*
>
> *(c) where people are likely to be exposed to the contaminant.*

In simple terms this means that the standards apply in the open air everywhere people may be exposed over the relevant time averaging period. This includes roadside verges, residential areas, central business districts, parks, beaches, etc. – but only if these areas have been Gazetted by the Minister.

In March 2005, the Ministry for the Environment (MfE) invited councils to nominate airsheds within their region where the Standards would apply.

MfE has further advised that only airsheds where the standards are exceeded or are likely to be exceeded should be notified to the Minister. However, it is our interpretation that any nominated airsheds are primarily for air quality management purposes and that the restriction on resource consents (sections 17-20 NES) only applies to those airsheds not meeting one or more of the ambient standards, or where the discharge to be permitted may cause one or

more of the ambient standards to be exceeded – not to nominated airsheds *per se*.

Accordingly, GW has identified and delineated airsheds within the Wellington Region appropriate for the application of the NES. The purpose of this document is to present the logic by which the airsheds have been identified.

2. Definition of airsheds

The NES regulations direct regional councils to undertake monitoring, reporting, and assessment of resource consents on an individual airshed basis. It is worth noting that the definition of airshed used in the NES and the scientific definition of airsheds are not necessarily the same. The regulations require each region to define airsheds where the ambient standards will apply. This is vital to the implementation of the NES. The regulations are not clear about exactly what airsheds are, what they represent and what size they should be. However, the NES Users Guide prepared by the Ministry for the Environment does give a better indication.

Airsheds are:-

- Reasonably large areas (around 3-9 per Council area);
- Where possible based on geophysical airshed criteria;
- Designed to mesh with other planning and management processes;
- Reviewable as circumstances change;
- Categorised – allowing for different levels of management, and expedient assessments of airshed features.

A project group of research scientists has been set up with FRST funding to provide scientific guidance to assist regional councils to delineate their airsheds. While these largely coincide with the airsheds GW has defined they are not exactly the same as the FRST generated airsheds were done so on an emissions basis calculated from census data, whereas GW has identified our airsheds on an emissions **and** ambient air quality monitoring basis. We set out our reasons and methods of identifying our airsheds in the following sections.

3. Air Quality Monitoring Strategy for the Wellington Region

3.1 Air Quality Screening Investigations

GW has been monitoring ambient air quality in the Wellington Region since 1998. Initially our ambient air quality monitoring was centred around a programme of 'screening' investigations in order to identify those locations where air quality was degraded. The essential elements of our air quality screening programme were outlined in *Wellington Regional Ambient Air Quality Monitoring Strategy* (Publication No. WRC/RINV-T-97/39).

As different locations were monitored around the region, areas with degraded air quality were identified as requiring longer term air quality monitoring for the purposes of effective air quality management.

3.2 Wellington Regional Emissions Inventory

At the same time that the air quality screening investigations were being undertaken, GW also carried out an air emissions inventory of the Wellington Region as part of the Councils state of the environment monitoring programme. The inventory was conducted in several stages. The first stage of the project, completed in 1997/98, recorded emissions from the Industrial and Transport Sectors. The second stage, completed in 1998/99, entailed an inventory of Domestic and Area sources. The third stage, which was completed in June 2000, estimated emissions from natural or biogenic sources as well as agricultural activities.

The purpose of the project was to estimate the amount of criteria pollutants being discharged to air, throughout the Wellington Region and to determine the relative contribution to ambient pollutant loadings from individual source categories.

The pollutants addressed in the inventory were non-methane volatile organic compounds (NMVOC), nitrogen oxides (NOx), sulphur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2) and particulate matter less than 10 microns in size (PM_{10}). The inventory of biogenic sources also included methane due to its importance as a greenhouse gas and the contribution from the agricultural sector (cattle and sheep). A summary of results from the air emissions inventory is presented in Figure 1.

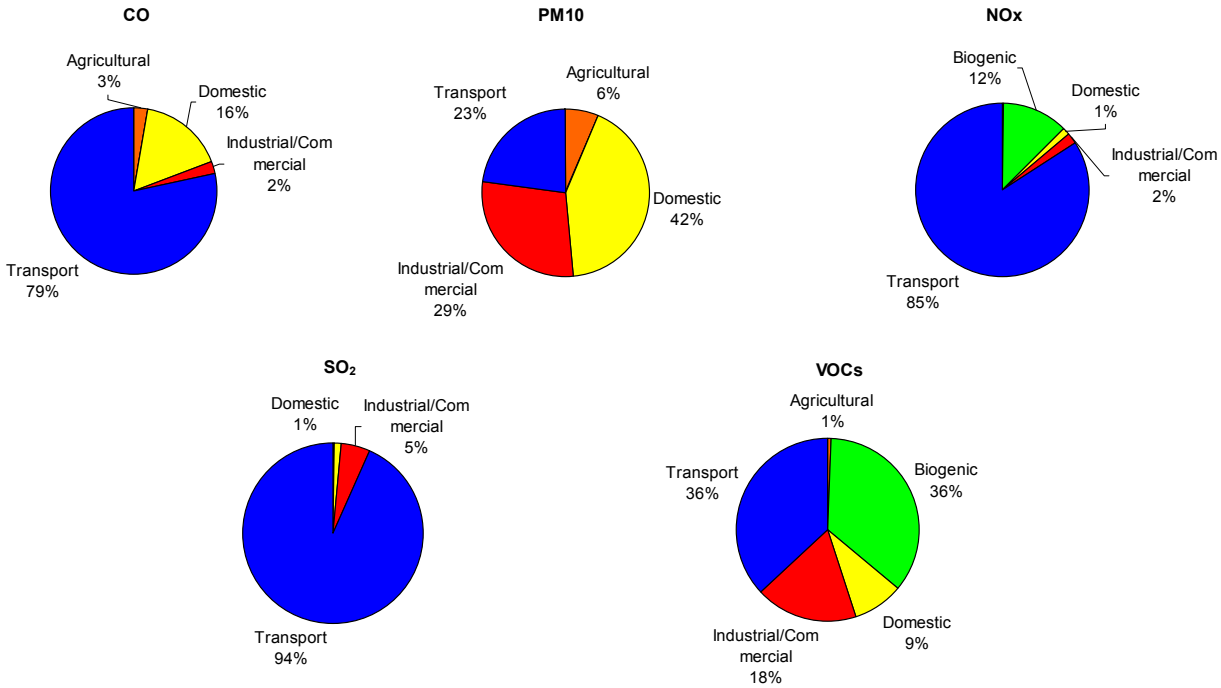


Figure 1: Relative Source Contributions to Pollutant Emissions in the Wellington Region.

The results from the emissions inventory show that mobile sources are the main source of the air pollutants that were inventoried. The exception was fine particulate matter, for which the greatest contribution comes from domestic combustion sources (mainly solid fuel fires). Approximately 85% of the annual contribution to particulate matter emissions from domestic fires occurs during the winter months. As a consequence, in some areas there are likely to be significant local pollution episodes on cold calm winter nights. Results from the ambient air quality monitoring at Masterton have confirmed this to be the case. The ambient air quality guideline for particulate matter in Masterton was exceeded on several occasions during the winter of 1999 (monitoring was part of a screening investigation), and since the establishment of a permanent air quality monitoring station in 2002, there are between 3 and 6 exceedences of what is now the NES for PM_{10} in Masterton each year

The emissions inventories provide average summers day and average winters day emissions for each category. During a typical summers day mobile sources are the primary source for most emissions within the Region. However, for PM_{10}, there is an even split between mobile and industrial sources.

During a typical winters day mobile sources are still the major pollution source, but, domestic emissions have a much greater impact, especially on PM_{10} where the contribution to air pollution is five times that of any other source.

Figure 2 contains an example of the output from the emissions inventory showing the annual emissions of PM_{10} from domestic sources in tonnes per square kilometre.

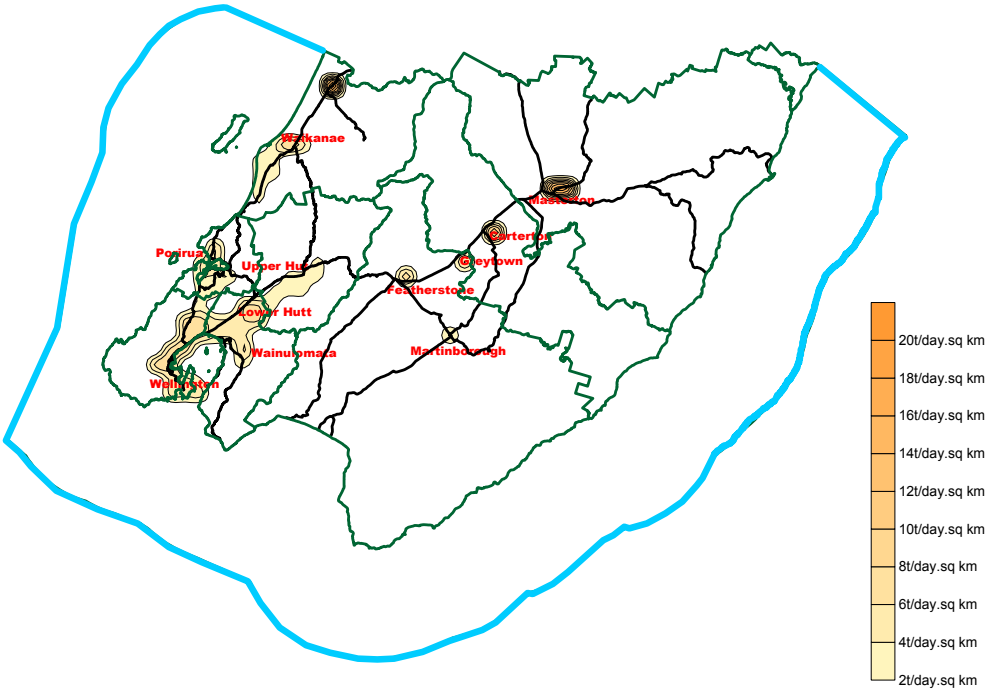


Figure 2: Annual PM_{10} Emissions from Domestic Sources

As can be seen from Figure 2, the highest density of emissions from domestic sources is centred on major urban areas. Similar patterns are seen for the other air pollutants inventoried. As an example, for pollutants where motor vehicle emissions dominate the contribution, then the emissions profile tends to be centred on urban locations and aligned with major arterial transport routes.

The results of the emissions inventory show that motor vehicles and domestic fires are the main sources of criteria air pollutants in the Region. The emissions inventory indicates that the highest pressures on air quality occurs in the urban centres of both the cities and the smaller towns in the Region.

Overall, industrial emissions are a minor contributor. However, they may still have significant localised effects due to the quantity and/or the nature of contaminants discharged.

3.3 Ambient Air Quality Monitoring Strategy

The Ambient Air Quality Monitoring Strategy for the Wellington Region (Wellington Regional Council Technical Report WRC/RINV-T-00/20) has been implemented over the period July 2000 to June 2005. The monitoring strategy was designed to address the issues identified in the Regional Policy Statement and the Regional Air Quality Management Plan with regard to the lack of information on ambient air quality within the Region. In particular, the monitoring strategy implements Methods 6.1.1 to 6.1.5 of the Air Plan.

The objectives of this ambient air quality monitoring program are to:

- Provide scientifically robust information about air quality in the Wellington Region on which to base sound resource management decisions.

- Provide data that can be used for appropriate effects based decisions on air discharge permit applications.

3.4 Ambient Air Quality Monitoring Results

The contaminants that have been monitored in the Wellington Region to date include fine particulate matter (PM_{10}), carbon monoxide (CO), and nitrogen dioxide (NO_2). These pollutants are known to adversely affect human health and well-being, as well as to have other adverse environmental effects. Air quality monitoring has focused on these pollutants as they are discharged to the atmosphere in the greatest quantities from a variety of sources (from emissions inventory results).

3.4.1 Upper Hutt

A mobile ambient air quality monitoring station has been located at Trentham Fire Station in Upper Hutt since June 2000. The monitoring data confirms that the Upper Hutt area continues to be susceptible to wintertime pollution episodes of fine particulate matter (PM_{10}).

Particulate matter, carbon monoxide and nitrogen dioxide concentrations were found to be higher during the winter. Research has shown that domestic fires are the main cause of the particulate pollution and, a combination of motor vehicles and domestic fires, are responsible for the elevated levels of carbon monoxide and nitrogen dioxide.

3.4.2 Lower Hutt

A permanent ambient air quality monitoring station has been operating at Birch Lane in Lower Hutt since February 2001.

The results indicate that nitrogen dioxide and carbon monoxide levels were higher during the winter than in summer in Lower Hutt, although there were no exceedences of any guidelines or standards. The peak winter time levels are likely to be due to the combined effects of motor vehicle emissions and combustion emissions from residential and commercial heating, combined with cold calm meteorological conditions. Peak levels occurred at similar times as those recorded at Upper Hutt, indicating the predominant influence of the weather on air pollution levels.

3.4.3 Wainuiomata

PM_{10} has been monitored at Wainuiomata Bowling Club from since September 2000. Fine particulate concentrations were found to exceed the National Environmental Standard for Air Quality on a number of occasions each winter. Peaks in air pollution occurred during cold calm weather conditions when dispersion of air pollutants was poor. The use of solid fuel fires for domestic heating is thought to be the main source of air pollution in Wainuiomata.

3.4.4 Masterton

A permanent ambient air quality monitoring station was established at Wairarapa College in Masterton during October 2002. The highest air pollution levels in Masterton were recorded during winter. A number of exceedences of the National Environmental Standard for particulate matter (PM_{10}) occurred each year. Research has shown that the cause of the high particulate matter concentrations is likely to be emissions from domestic solid fuel fires.

3.4.5 Vivian and Victoria Streets, Central Wellington

The monitoring station at the corner of Vivian and Victoria Streets was established in February 2004. Monitoring air quality at that location is aimed at tracking the influence of motor vehicle emissions on local air quality and would be classed as a 'Peak' site whereas, all other Greater Wellington sites are oriented towards background/neighbourhood air quality monitoring.

Air quality monitoring at Vivian and Victoria Streets indicates that long-term average nitrogen dioxide, carbon monoxide and particulate matter concentrations are higher than other sites around the region but peak levels have not exceeded National Environmental Standards or the National Ambient Air Quality Guidelines. Several years of monitoring at that site will be

required to provide a fully informed picture of air quality on the streets of Central Wellington.

3.4.6 Rural Otaki

PM_{10} was monitored at Otaki from September 1998 through to February 2000. There was one result that equalled the National Environmental Standard value.

The results indicate that PM_{10} concentrations tend to be highest during dry summer weather with moderate to strong winds. Further research has shown that the source of the majority of PM_{10} is likely to be fine alluvial matter from the Otaki River floodplain.

3.4.7 Conclusion

The results of the ambient air quality monitoring carried out in the Wellington Region since 1999 have indicated that the highest concentrations of air pollutants occurred during the winter. The higher winter time air pollution levels are the consequence of periods of cold, calm weather and a greater quantity of emissions to atmosphere from combustion sources. Cool, calm conditions restrict the dispersion of air pollutants. The major pollution sources have been shown to be emissions from motor vehicles and domestic solid fuel fires.

Ambient air quality monitoring at various locations within the Wellington Region showed that air quality is generally good during the summer months at suburban locations. However, at times, certain areas experience degraded air quality due to a combination of meteorological conditions and local emission sources exerting pressure on the air resource to the extent that it may pose a risk to the health of local communities. With the establishment of a permanent air quality monitoring network, clear trends in air pollution levels are becoming evident. Winter is the most likely time for pollution episodes to occur, the extent and severity of which are primarily dependent on the type of winter we experience.

4. Delineation of Airsheds in the Wellington Region

The Wellington Region is divided into a series of airsheds, delineated by valleys in between steep hills or mountains. This produces unique microclimates and meteorological conditions for each of these sub-regional airsheds. Each location has pressures on the air quality resource and resultant effects on air quality that cannot be inferred from one site to another.

At the stage of producing our ambient air quality monitoring strategy, GW had a reasonable understanding of airsheds in the Wellington Region and the concept of airshed management for the purposes of protecting human health from the poor air quality. The monitoring strategy and defined eight significant airsheds for the purposes of air quality management based on topographical features and meteorological conditions within the region coupled with the results of the screening investigations and the emissions inventory.

The eight airsheds identified are: Central Wellington, Karori, Porirua Basin (including Tawa valley and Pauatahanui Inlet), Kapiti, Wainuiomata, Lower Hutt Valley, Upper Hutt Valley and Wairarapa Valley. These are shown in Figure 3 along with an indication of whether they meet the NES for PM_{10}.

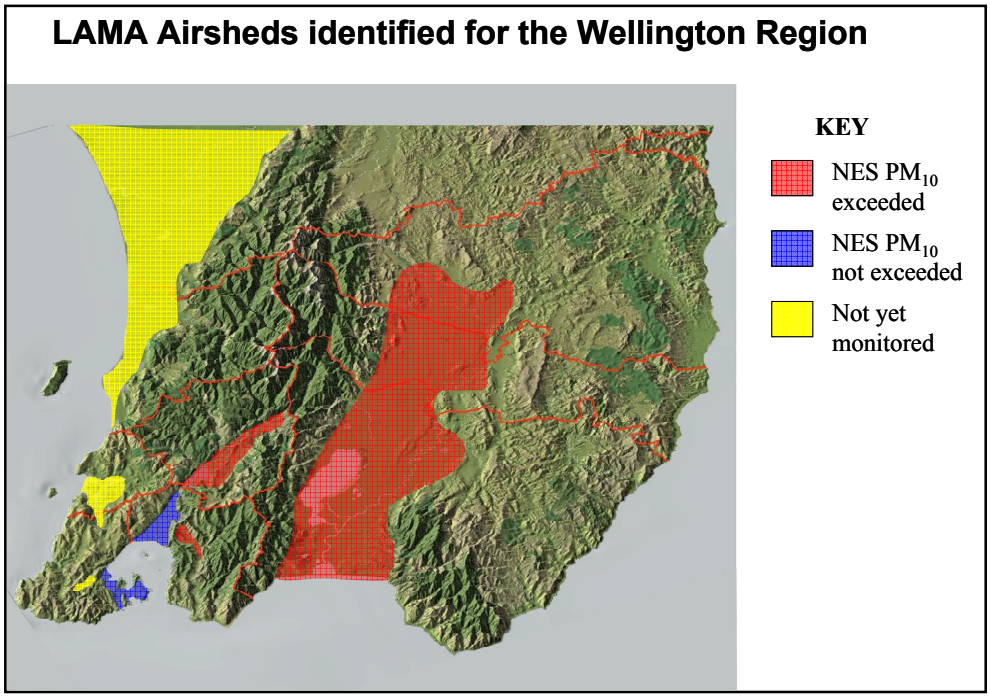


Figure 3: Airsheds identified for the Wellington Region

Through implementing the Wellington Regional Air Quality Monitoring Strategy 2000-2005, we have been progressively developing a network of monitoring stations in the eight airsheds identified in the Wellington Region. We now have monitoring stations in five of our nominated airsheds. The capital and operating expenses for further developing the air quality monitoring network to cover all airsheds (i.e. three more monitoring stations) are already included in our existing long-term budget. These are scheduled for completion in 2008.

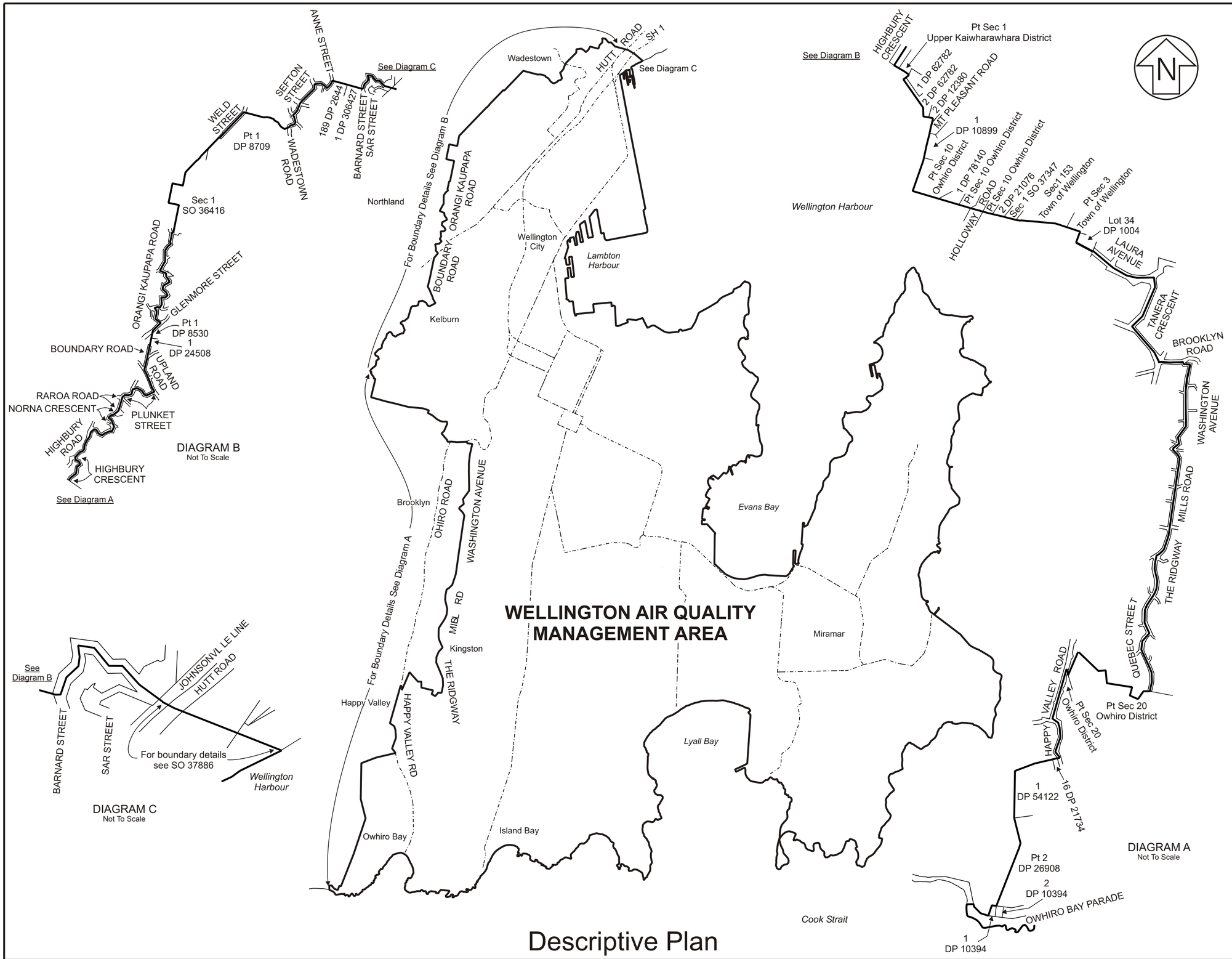
5. Conclusion

Greater Wellington considers that the airsheds that were identified in 2000 as part of our long-term air quality monitoring strategy are also suitable as airsheds for the purpose of giving effect to the National Environmental Standards for Air Quality. The primary aim of Greater Wellington's Regional Policy Statement (Chapter 8 Air), Regional Air Quality Management Plan, the ambient air quality monitoring strategy and NES is to ensure that community health is protected from the effects of poor air quality.

We have therefore defined and delineated our airsheds for the Wellington Region accordingly. These airsheds were endorsed by Wellington Regional Council's Policy and Finance Committee on 17 may 2005. Appendix 1 provides the full set of SO Plans as submitted to the Minister for the Environment.

Appendix 1

SO Plans for Airsheds in the Wellington Region



Descriptive Plan

Land District : Wellington	**WELLINGTON AIR QUALITY MANAGEMENT AREA**	TERRITORIAL AUTHORITY: Wellington City Compiled by Sinclair Knight Merz Ltd Scale 1:30,000 Date June 2005

Approvals

Where a boundary is shown along a river or road it follows the middle line of the physical river or legal road unless otherwise shown.

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All seaward boundaries follow Mean Low Water Springs (M.L.W.S.) but cross the mouths of all rivers, streams, inlets and estuaries unless otherwise shown.

greater WELLINGTON
REGIONAL COUNCIL

Wellington Regional Council Airshed Boundaries for the purposes of giving effect to the National Environmental Standards for Air Quality.

Definition not adequate for issue of Title.

Total Area

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KAPITI COAST AIR QUALITY MANAGEMENT AREA

Tasman Sea

For boundary detail see SO 335001

For boundary details see Diagram B

For boundary details see Diagram A

SH 1

Otaki River

Otaki

Waikanae

Paraparaumu

Paekakariki

SH 1 NIMT RAILWAY

PAEKAKARIKI HILL ROAD

Pt 2 DP 4269

13 DP 70122

6 DP 70122
2 DP 30426

4 DP 71876

2 DP 71876

Sec 1 SO 36580

WATERFALL ROAD

1 DP 62914

1 DP 70710

6 DP 33688

RUAPEHU STREET

1 DP 73696
Pt Ngarara West B
2 DP 73696

Pt 9 DP 2183
Blk XIII Kaitawa SD
Pt Sec 4
Pt Sec 5
3 DP 58141
Sec 2
Sec 3

VALLEY ROAD

VALLEY ROAD

NIKAU PALM ROAD

1 DP 86565
2 DP 86565
1D P 32725
1D P 82049

Pt Ngarara West C7
Pt Ngarara West C8
Pt Ngarara West C9
Pt Muaupoko A2No1
Pt Muaupoko A2No2 Sbdn 1

31 DP 84601
Pt Ngarara West C10

41 DP 84601

Waikanae River

REIKORANGI ROAD

2 DP 32514
1 DP 26401

1 DP 18826

3 DP 60807
5 DP 79753

1 DP 75946
Pt 2 DP 60807

HADFIELD ROAD

1 DP 80916
8 DP 80916
Pt 1 DP 11457
Pt 1 DP 8379

See Diagram B

DIAGRAM A
Not To Scale

Pt 3 DP 14384
Pt 1 DP 8379
Pt 1 DP 11457

Sec 5 Blk VI Kaitawa SD
Pt Sec 4 Blk VI Kaitawa SD
Pt Sec 19 Blk VII Kaitawa SD
Pt Sec 41 Blk III Kaitawa SD
MANGAONE NORTH ROAD
Pt Sec 36 Blk III Kaitawa SD
Pt Sec 35
Pt Sec 34
Pt Sec 33

See Diagram A

DIAGRAM B
Not To Scale

OTAKI GORGE ROAD

1 DP 51707
1 DP 64750

Otaki River

PARENGA ROAD

Pt Wairarapa

1 DP 75807
8 DP 75807
7 DP 75807

1 DP 89304

Pt Waihoanga 4A

Pt Sec 10 Blk IV Kaitawa SD

1 DP 14037

3 DP 75319

2 DP 75319

Pt 74 DP 427

1 DP 65505

Pt 2 DP 61572

Pt 4 DP 59545

2 DP 59545

LEGAL ROAD

WAITOHU VALLEY ROAD

Pt 2 DP 20984

Descriptive Plan

Land District : Wellington

KAPITI COAST AIR QUALITY MANAGEMENT AREA

TERRITORIAL AUTHORITY: Kapiti Coast
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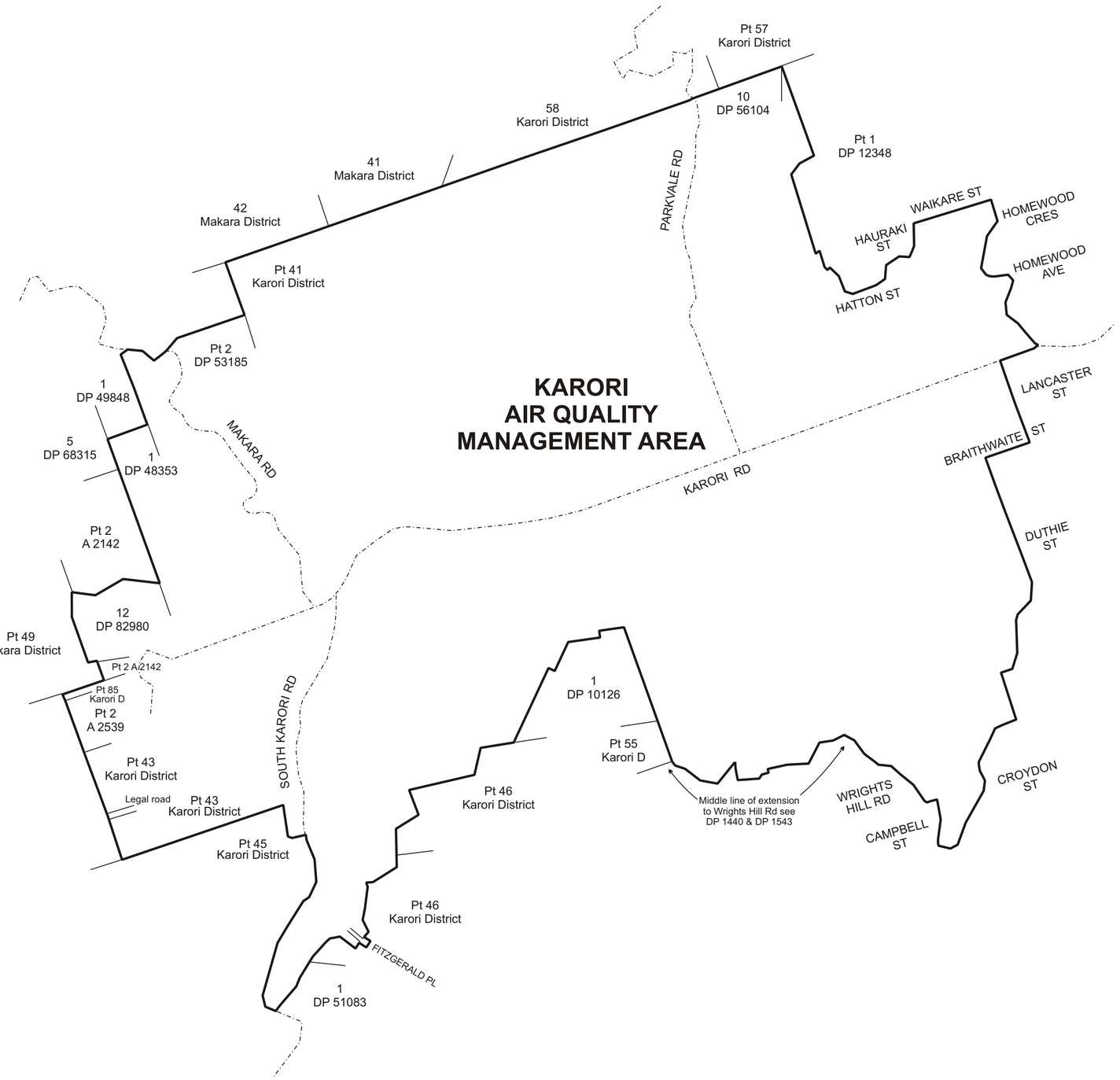

Descriptive Plan

Land District : Wellington

KARORI
AIR QUALITY MANAGEMENT AREA

TERRITORIAL AUTHORITY: WELLINGTON CITY

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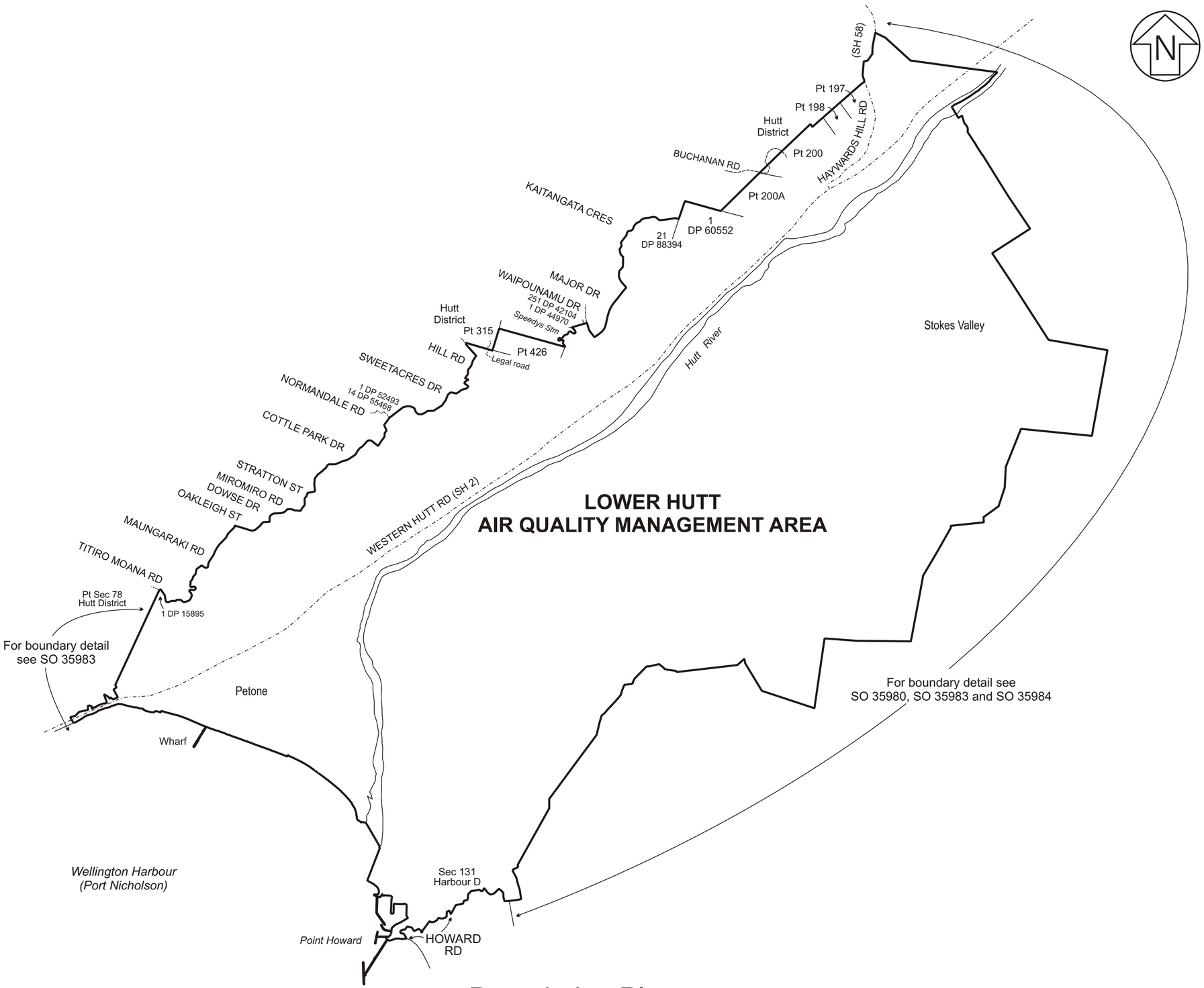

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Land District : Wellington

LOWER HUTT
AIR QUALITY MANAGEMENT AREA

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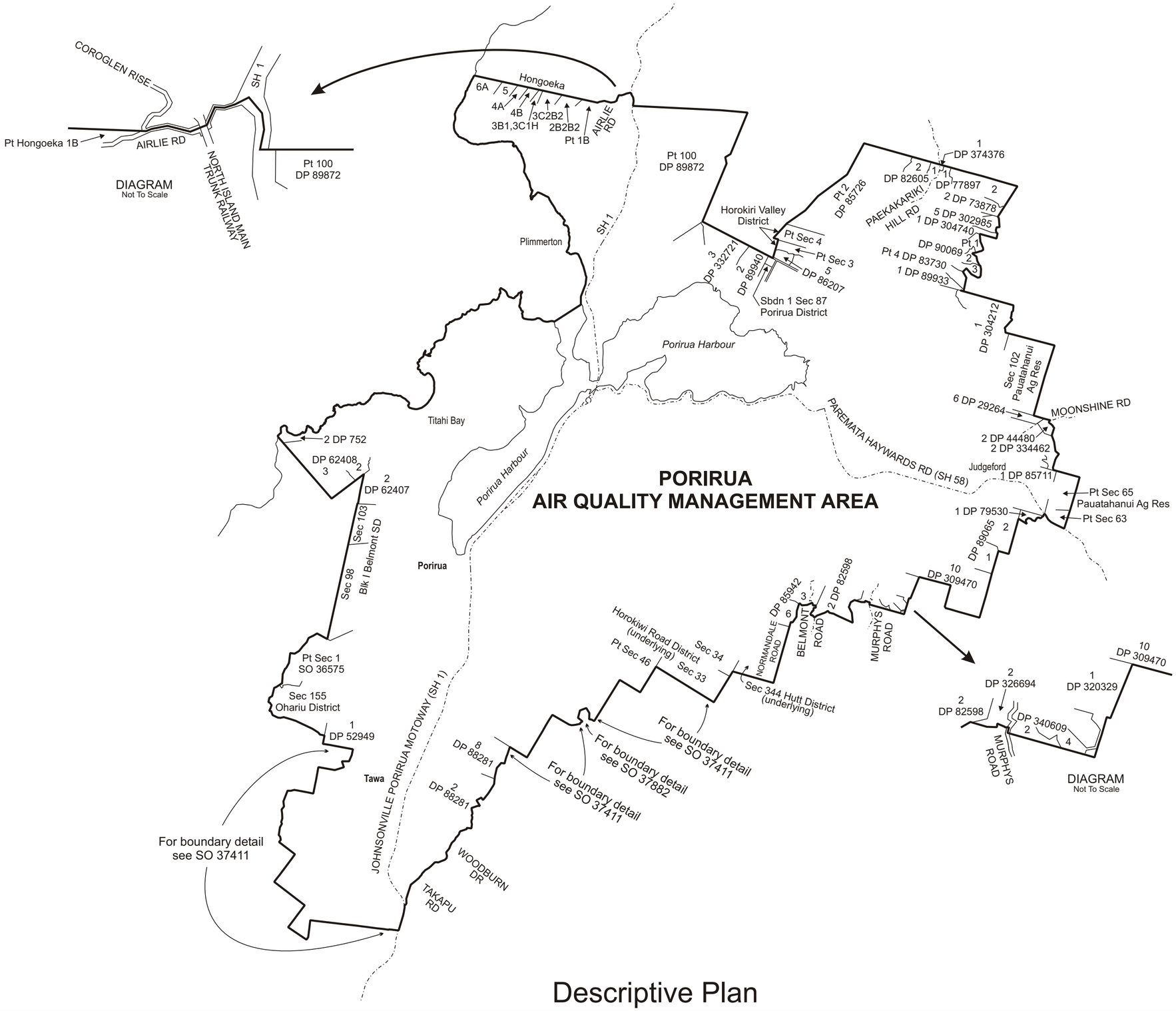

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PORIRUA AIR QUALITY MANAGEMENT AREA

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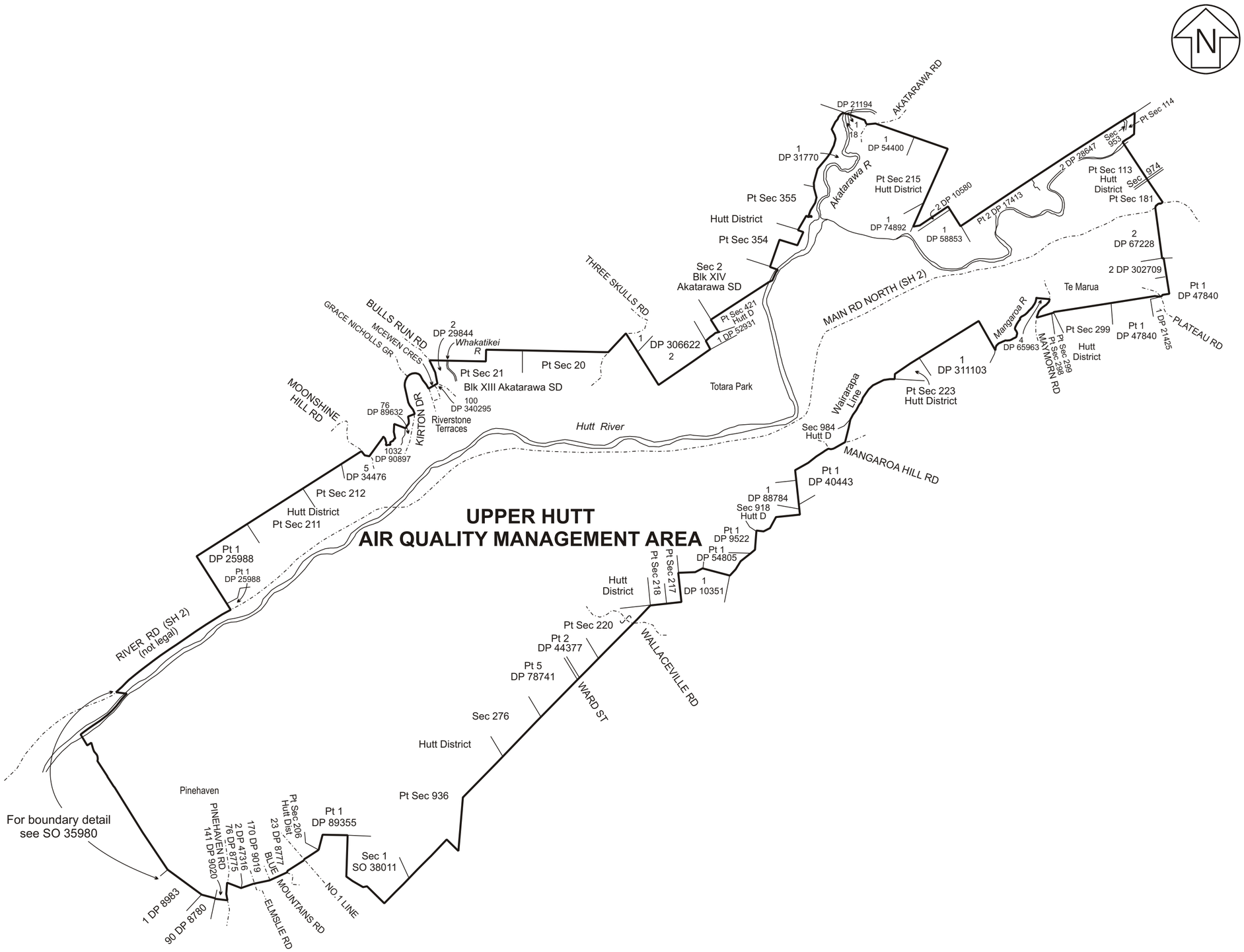

Descriptive Plan

Land District : Wellington	**UPPER HUTT AIR QUALITY MANAGEMENT AREA**	TERRITORIAL AUTHORITY: UPPER HUTT CITY Compiled by Sinclair Knight Merz Ltd Scale 1:35,000 Date June 2005

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Instructions:

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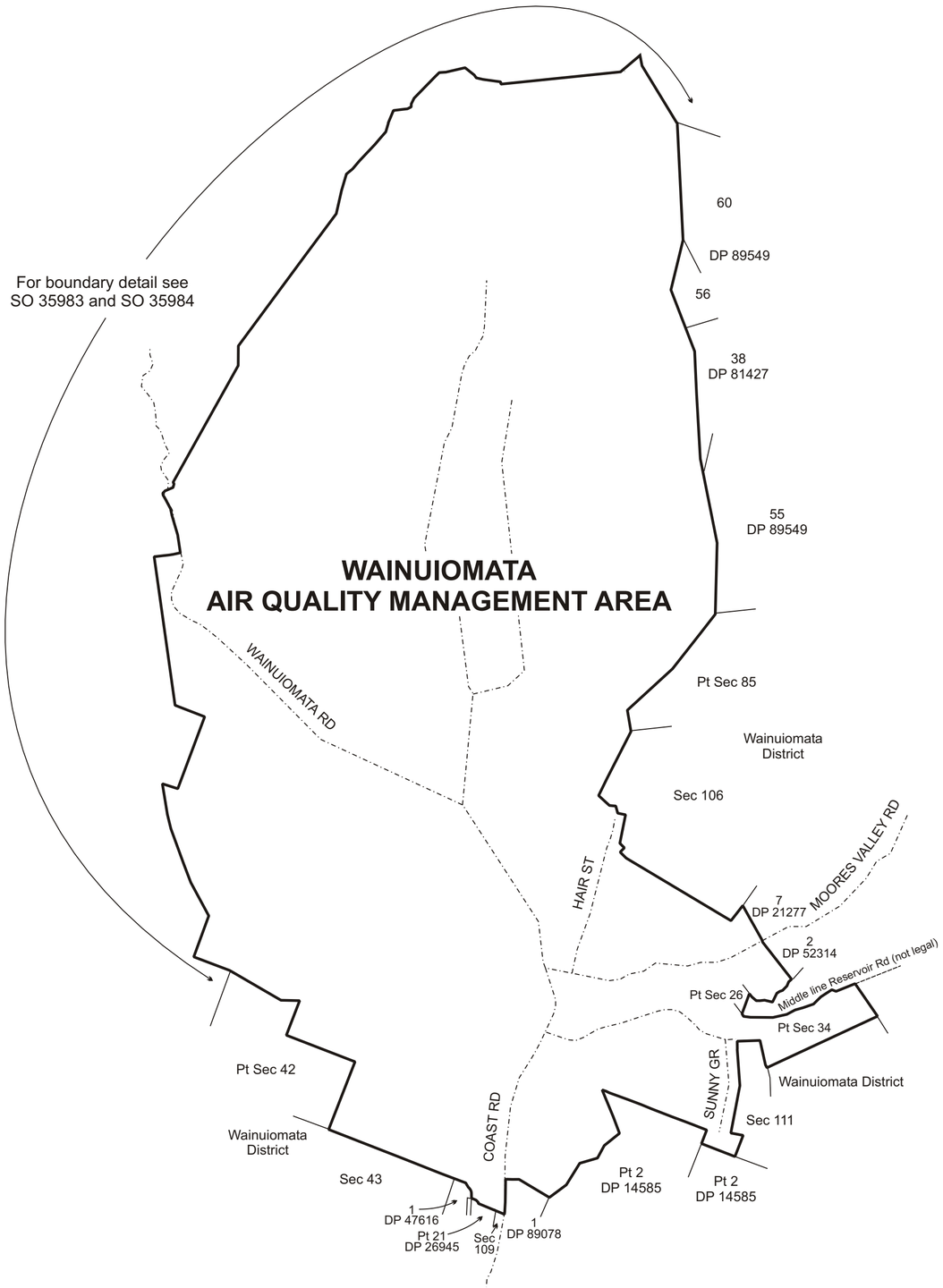


Descriptive Plan

Land District : Wellington	**WAINUIOMATA AIR QUALITY MANAGEMENT AREA**	TERRITORIAL AUTHORITY: LOWER HUTT CITY Compiled by Sinclair Knight Merz Ltd Scale 1:25,000 Date June 2005

Approvals

Where a boundary is shown along a river or road it follows the middle line of the physical river or legal road unless otherwise shown.

greater WELLINGTON
REGIONAL COUNCIL

Wellington Regional Council Airshed Boundaries for the purposes of giving effect to the National Environmental Standards for Air Quality.

Definition not adequate for issue of Title.

Total Area

Comprised in:

I , being a person entitled to practise as a licensed cadastral surveyor, certify that -

(a) The Surveys to which this dataset relates are accurate, and were undertaken by me or under my direction in accordance with the Cadastral Survey Act 2002 and the Surveyor-General's Rules for Cadastral Survey 2002/2:

(b) This dataset is accurate, and has been created in accordance with that Act and those Rules

...../...../..... .....

Field Book — p. — Traverse Book - p. —
Reference Plans

Examined ..... *Correct* .....

Approved as to Gazettal Purposes
by Land Information NZ

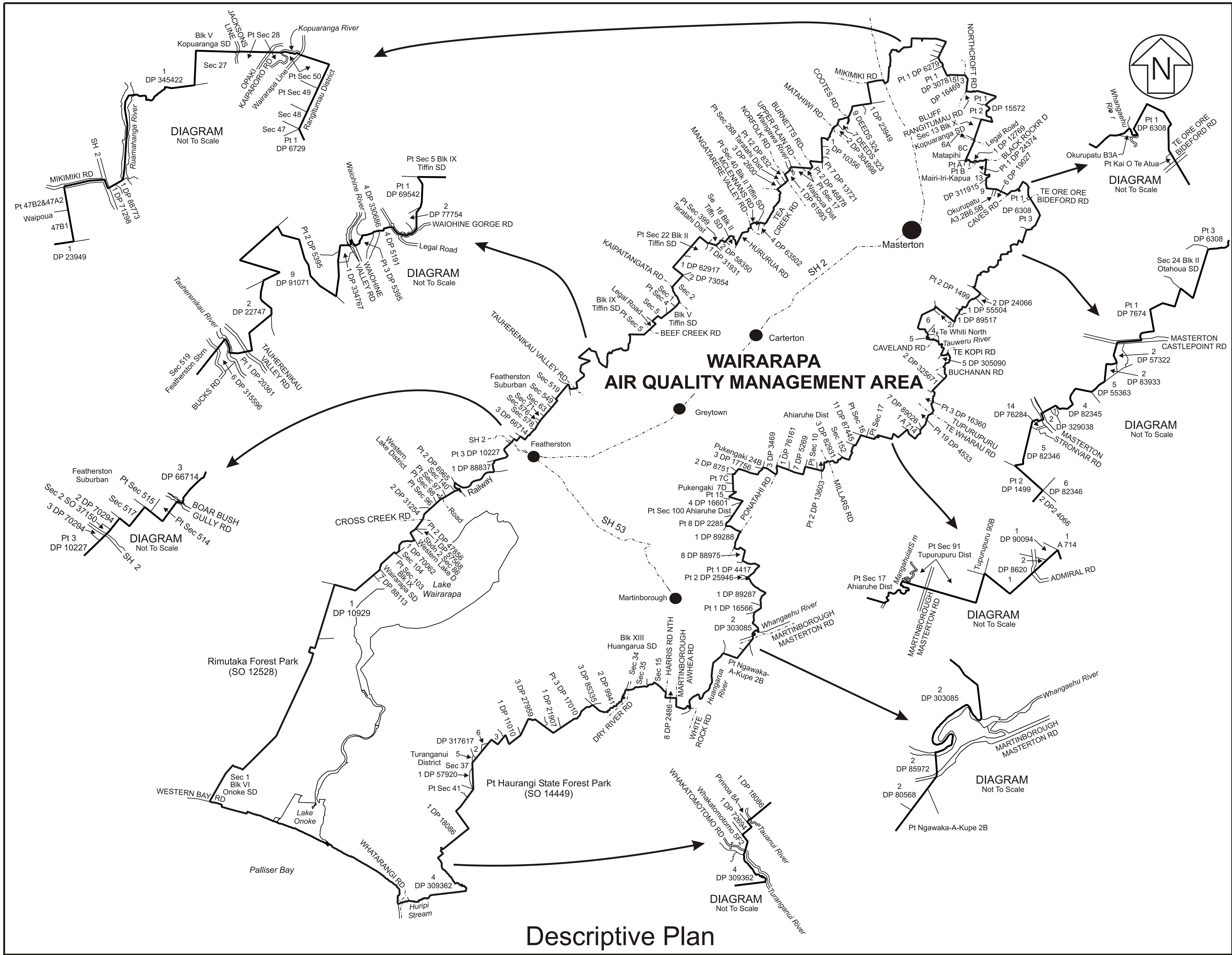
..../..../....

Deposited this.... day of..... .....

..../..../.... ..... for Registrar-General of Land

File AE02581
Received
Instructions:

SO 355944



Approvals

Where a boundary is shown along a river or road it follows the middle line of the physical river or legal road unless otherwise shown.

Where a boundary is shown along a railway it follows the middle line of the cadastral railway unless otherwise shown.

All seaward boundaries follow Mean Low Water Spring but cross the mouths of all rivers, streams, inlets and estuaries unless otherwise shown.

greater WELLINGTON
REGIONAL COUNCIL

Wellington Regional Council Airshed Boundaries for the purposes of giving effect to the National Environmental Standards for Air Quality.

Definition not adequate for issue of Title.

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Field Book — p. — Traverse Book - p. —

Reference Plans

Examined .... Correct ....

Approved as to Gazettal Purposes
by Land Information NZ

..../..../....

Deposited this.... day of ....

..../..../.... .... for Registrar-General of Land

Land District : Wellington

WAIRARAPA
AIR QUALITY MANAGEMENT AREA

TERRITORIAL AUTHORITY: Masterton, Carterton & South Wairarapa

Compiled by Sinclair Knight Merz Ltd

Scale 1:200,000

Date June 2005

File AE02581
Received
Instructions:

SO 355945

Water, air, earth and energy: elements in Greater Wellington's logo that combine to create and sustain life. Greater Wellington promotes **Quality for Life** by ensuring our environment is protected while meeting the economic, cultural and social needs of the community.

FOR FURTHER INFORMATION

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Greater Wellington is the promotional name of the Wellington Regional Council

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