

Airshed Action Plan for Hastings

Hawke's Bay Regional Council

Executive Summary

In Hastings concentrations of PM₁₀ exceed National Environmental Standards (50 µg m⁻³, 24-hour average, one allowable exceedence per year) on most years during the winter months.

The main source of PM₁₀ in Hastings is solid fuel burning for domestic home heating. This source contributes around 95% of the 2010 anthropogenic PM₁₀ emissions. Airshed dispersion modelling indicates that the highest PM₁₀ concentrations in Hastings are likely to occur approximately one kilometre from the St Johns air quality monitoring site. A 50% reduction in 2010 domestic home heating emissions is required to achieve compliance with the NES.

The Hawke's Bay Regional Council has introduced management measures to reduce PM₁₀ concentrations in Hastings to meet the NES by 2020. The Resource Regional Management Plan Change 2 – Air Quality Plan includes a prohibition on domestic outdoor rubbish burning, the use of open fires (from 2012), staged burner phase outs (2014 – 2018) and emission limits for new installations of solid fuel burners.

These measures have been effective in reducing PM₁₀ concentrations with 2012 data confirming reductions have occurred. A good correlation between measured PM₁₀ concentrations (adjusted for variability in meteorological conditions) and projected improvements associated with air plan measures is observed. If this correlation continues Hastings should be on target to achieve compliance with the NES by 2020.

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Air quality in Hastings

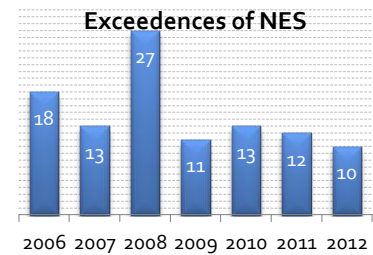
The main air contaminant of concern in Hastings is PM₁₀ (particles in the air less than 10 microns in diameter). Air quality monitoring for PM₁₀ in Hastings commenced in 2006 at the St Johns College monitoring site. Concentrations of PM₁₀ have been measured continuously (every day) using a beta attenuation monitor (BAM). The BAM method is an allowed method under the National Environmental Standards (NES).

The Hastings Airshed has been gazetted under the NES because it is non-complying with the NES for PM₁₀. The NES for PM₁₀ is set at 50 µg m⁻³ (24-hour average) with one allowable exceedence per year.

Exceedences of the NES in Hastings

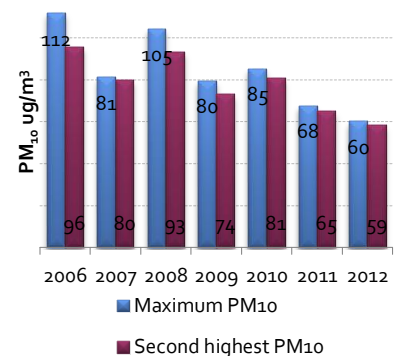
Concentrations of PM₁₀ in Hastings typically exceed the National Environmental Standard for PM₁₀ of 50 µg m⁻³ (24-hour average, one allowable exceedence per year) during the winter months. Typically in Hastings there are between 10 and 27 exceedences of 50 µg m⁻³ per year. In 2012 ten exceedences of 50 µg m⁻³ were measured.

Hastings has until 2020 to comply with the NES for PM₁₀.



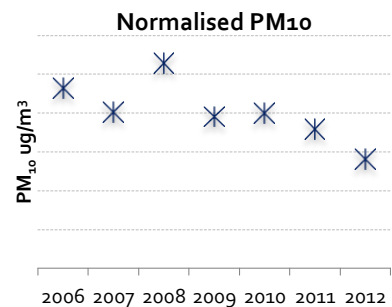
PM₁₀ concentrations in Hastings

The magnitude of PM₁₀ concentrations are important in deriving an action plan to reduce PM₁₀ because they influence the amount of reduction required to achieve compliance. The second highest concentration is an important indicator of the magnitude of reduction required because the NES allows one exceedence of 50 µg m⁻³ per year. In Hastings the largest second highest PM₁₀ concentration was 96 µg m⁻³ and was measured in 2006. Airshed modeling of PM₁₀ concentrations has also been used to refine the assessment of reductions in PM₁₀ required for Hastings (see over).



Trends in PM₁₀ concentrations in Hastings

Year to year variations in PM₁₀ concentrations are influenced by variations in meteorological conditions, making trends assessments difficult. An assessment of trends in PM₁₀ concentrations in Hastings, using statistical techniques to minimise for the impact of meteorological conditions has been carried out (Wilton, Zawar Reza, & Soltanzadeh, 2011) and was updated with 2012 data for this report. The graph to the right shows normalised PM₁₀ concentrations from 2006 to 2012 after adjusting for the impact of meteorological conditions. This suggests PM₁₀ concentrations have decreased since 2008.

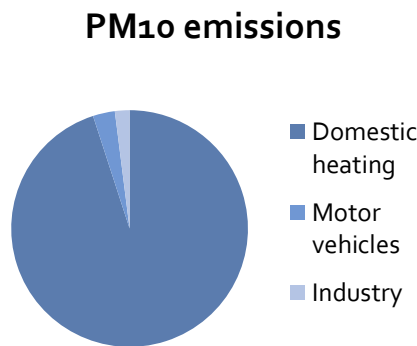


Managing air quality in Hastings

The Hawke’s Bay Regional Council has carried out numerous scientific studies of air quality in Hastings to determine the most effective methods of managing PM₁₀ concentrations. Sources of PM₁₀ have been identified using an emission inventory and a source apportionment study was conducted to confirm sources and to evaluate the contributions of natural sources such as sea spray and dusts to measured PM₁₀ concentrations. Airshed modeling has provided insight into spatial variability in PM₁₀ concentrations, potential airshed interactions and the likely contributions of different emissions sources to high PM₁₀ concentrations. The impact of different management measures on PM₁₀ concentrations has been estimated using a projections model and the results have been validated using airshed dispersion modeling

Sources of PM₁₀ in Hastings

A 2010 emission inventory indicates that solid fuel burning for domestic home heating contributes around 95% of the winter time PM₁₀ emissions. Motor vehicles were estimated to contribute 2% and industry was found to contribute 3%. Outdoor burning was excluded from the assessment as a result of regulations in force at the time the inventory was carried out.



Around 9000 households in Hastings use solid fuel for domestic heating.

Reductions required in PM₁₀ to meet the NES

The reductions required in PM₁₀ concentrations in Napier had been assessed at around 71% of 2006 concentrations using dispersion modeling of worst case meteorological conditions (Gimson, 2006). This modeling has been updated using 2010 emissions. This showed the highest PM₁₀ concentration in Hastings was likely to be around 96 µg m⁻³ and was likely to occur approximately one kilometers from the St Johns monitoring site (Gimson, 2012). The overall reduction in PM₁₀ required to meet the NES based on this concentration is 48%. This can be achieved by reducing domestic heating emissions by 50% (Gimson, 2012).

SOURCE CONTRIBUTIONS TO MAXIMUM PM₁₀ CONCENTRATIONS - 2010

	Emission Inventory	Modeled - worst case
DOMESTIC HEATING	95	96
TRANSPORT	3	<1
INDUSTRY	2	<1
NATURAL SOURCES	n/a	2

KEY TECHNICAL REPORTS

❖ AIR QUALITY MONITORING

Assessment of trends in concentrations and method for normalizing (Wilton et al., 2011)

❖ AIR EMISSION INVENTORIES AND SOURCE APPORTIONMENT

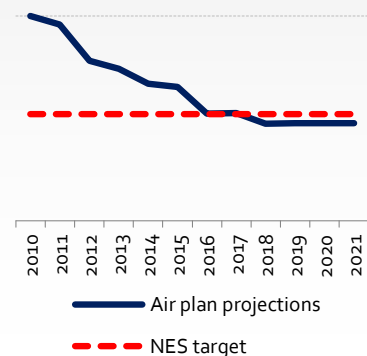
Source evaluations include emission inventories in 2005 & 2010 (Wilton & Baynes, 2010) and a source apportionment study (Wilton, Davy, & Smith, 2007)

❖ AIRSHED METEOROLOGY AND MODELLING

Reports on airshed modeling reports (Gimson, 2006), (Gimson, 2009), (Gimson, 2012).

❖ AIR QUALITY MANAGEMENT

Method and options documented (Wilton, 2007) and updated in 2012 (Wilton, 2012). Air plan measures are predicted to result in compliance with the NES by 2016.



Impact of regulatory measures in Hastings

Air Plan - Regulatory measures to reduce PM10

Measures to reduce PM₁₀ concentrations in Hastings were included in the Resource Regional Management Plan Change 2 – Air Quality Plan (operative 1 January 2012). In addition to the regulatory methods outlined in the table below non-regulatory methods such as education and communication, the introduction of a “dry wood scheme” and “Heat Smart” programme to assist with the conversion to clean heat have also been introduced.

REGULATORY MEASURES TO REDUCE PM10 IN HASTINGS

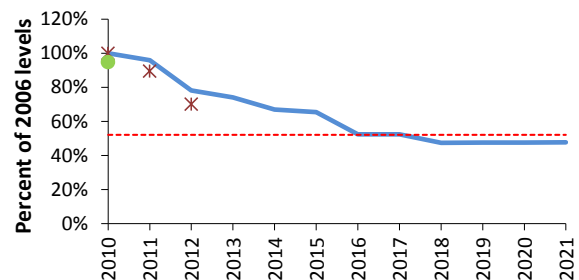
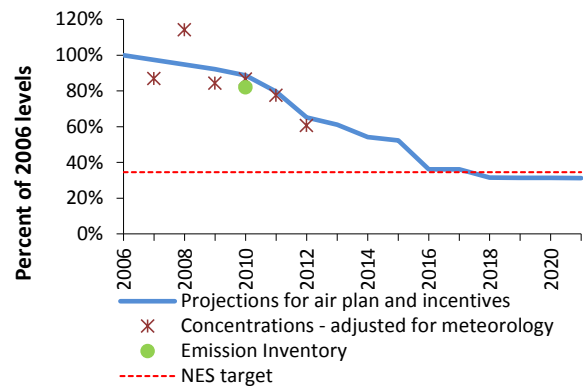
RULE	YEAR	COMMENTS
PROHIBIT DOMESTIC OUTDOOR BURNING	2010	Likely to contribute to reduced post 2010 data
PHASE OUT OPEN FIRES	2012	Likely to contribute to the reduced 2012 PM10
PHASE OUT PRE 1996 BURNERS	2014	Some change outs likely to occur prior to 2014
PHASE OUT 1996-2005 BURNERS	2016	
PHASE OUT POST 2005 NON COMPLYING WOOD AND MULTI FUEL BURNERS	2018	Most post 2005 burners will be NES compliant. The main exception is coal burners.
RESTRICT THE INSTALLATION OF ALL NEW BURNERS TO THOSE MEETING AND EMISSION LIMIT OF 1.0 G/KG OR 1.5 G/KG (WITH WETBACK)	2012	Under the NES any wood burners installed on properties less than 2 hectares were required to meet an emission limit of 1.5 g/kg from September 2005. This extends the limit to apply to coal burners as well.

Air plan projections - tracking progress

Monitoring the effectiveness of the plan in achieving its objectives is an important part of the planning process. In the case of PM₁₀ concentrations this can be done using a combination of air quality monitoring data (adjusted for the impact of meteorological conditions), air plan projections of the anticipated effectiveness and air emission inventories.

In the case of Hastings two comparisons are shown. The top graph illustrates air plan projections of the effectiveness of the regulatory methods targeting domestic heating and outdoor burning, trends in concentrations relative to 2006 and the estimated emissions from the 2010 inventory.

The bottom graphs tracks changes relative to 2010 using the updated assessment of reductions required. Both graphs show a good correlation between predicted changes and trends in PM₁₀ concentrations and suggest that Hastings is on target for NES compliance.



References

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