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## Report of the Woodburner Working Party

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### 1. Purpose of Report

1.1 The purpose of this report is to:

- Provide Council with the findings of the Woodburner Working Party (WWP); and
- To seek agreement as to the actions that will be taken by Council to address options for managing air quality and home heating, insulation and ventilation.

### 2. Delegations

2.1 The members of the Woodburner Working Party are Councillors Acland (Chair), McGurk, Fulton, Barker and Skinner. Cindy Batt as an iwi representative, Mary-Anne Baker from Tasman District Council and Dr Ed Kiddle of the Nelson Marlborough District Health Board are key stakeholders of the Working Party. The Working Party has no powers to make decisions. The terms of reference are:

- To affirm the programme of research including air quality emission inventory, survey information and airshed monitoring work.
- To request, receive and consider any information relevant to the options under consideration.
- To provide a recommended option to the Planning and Regulatory Committee.
- To be an interface between community and sector groups so that interested members of the public can provide feedback.

### 3. Executive Summary

3.1 The Woodburner Working Party is tasked with assessing whether the current regulations, contained in the Nelson Air Quality Plan, for woodburners should continue.

3.2 In reaching a recommendation on this matter the Working Party has had to critically consider the tension between cold homes and the health impact on occupants versus the health impact from air pollution. Both issues are real, contentious and costly in terms of impact.

- 3.3 The Draft Position Statement from the Canterbury District Health Board (Attachment 1) notes this tension. The Statement acknowledges that home heating (temperature, humidity and ventilation), energy costs and fuel poverty are key housing issues with implications for health outcomes. The Statement also recognises that clean air is a requirement for health and wellbeing and that urban outdoor air pollution is the eighth most common risk factor for death in high income countries. There is no simple fix to the potential tension between these two issues.
- 3.4 The Working Party acknowledges there is a National Environmental Standard for Air Quality (NESAQ) which requires compliance with thresholds for PM<sub>10</sub> concentrations. This is a national regulation that must be complied with. Indications from Central Government at this point are there will be no change to the NESAQ.
- 3.5 The Working Party has considered modelling data that has been collected and analysed by Environet Ltd. There is potentially what has been termed “spare” capacity in Airsheds B2 and C. Spare capacity is somewhat of a misnomer. Whilst the NESAQ sets limits which must be met it does not mean that where an airshed is below the limit the full “resource or capacity” should be used up. The Working Party was cautioned that this “capacity” is not necessarily there given:
- Monitoring information is limited; and
  - Dispersion modelling indicates that emissions from Airshed C contribute to Airshed A and emissions from Airshed B2 contribute to Airshed B1. So by increasing emissions in the “spare” capacity airsheds there is the potential to adversely impact on airsheds where there is no capacity.
- 3.6 In addition, before any “spare” capacity was considered for allocation a minimum of an additional year of air quality monitoring would be required.
- 3.7 The Working Party is mindful that there are equity issues too. If changes are made to any regulatory approach then property owners who have already had to meet the cost of altering/removing woodburners or removing open fires would be penalised. In addition, Airshed C is the area where people could retain existing woodburners.
- 3.8 The Nelson Plan development process has commenced. As part of the development of the Plan it would be possible to include a review of the Nelson Air Quality Plan and combine the documents into one. This review process allows for a thorough examination of all air quality/woodburner issues at one time and enables thorough public consultation on the issue. The Nelson Air Quality Plan is due for review in 2018 so it means bringing forward the review of the Plan by approximately 3 years. The Working Party supports including a review of the Nelson Air Quality Plan within the Nelson Plan. The time for the development of any Plan provisions allows for necessary additional monitoring to be undertaken and the work recently completed will be current enough to feed into the Plan review. The Plan review process will require a thorough assessment of all alternatives and the costs and

benefits of any approach (refer RMA section 32)<sup>1</sup>. Even if a Plan Change was commenced now it would take the same time to prepare the necessary robust documentation and go through the hearing and appeal process. It seems prudent both in terms of time and cost to include the review as part of the Nelson Plan work and this has the added benefit of achieving one single plan which has been signalled to be a key goal for Central Government.

- 3.9 The Working Party also considers that a linked issue to air quality is cold homes. Included as a separate agenda item is a paper (A1248604) seeking Councils endorsement to provide financial assistance for insulation in homes and continuing to provide advice through Council's Eco Building Design Advisor. The health consequences of cold, damp homes can affect all age groups.

#### 4. Recommendation

***THAT the report of the Woodburner Working Party (A1262104) and its attachments (A1272248 and A23847) be received.***

#### Recommendations to Council

***THAT Council agrees that the review of the Nelson Air Quality Plan be brought forward 3 years, that it be incorporated into one single integrated document to be called the Nelson Plan and that this work builds on the modelling and monitoring work completed to date;***

***AND THAT Council agrees to support initiatives that improve home insulation and continue with the free service of Council's Eco Building Design Advisor (refer to the recommendations in the separate agenda item A1248604).***

#### 5. Terms of Reference for the Woodburner Working Party

- 5.1 The WWP has been tasked with guiding the development of the review of the woodburner provisions in the Nelson Air Quality Plan.
- 5.2 The WWP has considered the following in reaching the recommendations that are contained in this report:
- The current planning framework contained in the Nelson Air Quality Plan and the supporting non-regulatory programme;
  - The requirements of the National Environmental Standard for Air Quality and the latest indications from Government on the matter of air quality;
  - International approaches to managing air quality;

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<sup>1</sup> A section 32 report outlines the alternatives, costs and benefits and must set out how the proposed provisions are effective and efficient.

- Environment Canterbury approach to air quality;
  - Health effects;
  - Results of monitoring and modelling work;
  - Options for alternative technology;
  - Other home heating options;
  - The link to home insulation and building design;
  - Other matters.
- 5.3 The report will be structured using the same headings as outlined in section 5.2.
- 5.4 There were presentations to the Working Party from the following people:
- Dr Ed Kiddle, Medical Officer of Health.
  - Dr John Hoare, Association for Independent Research Inc.
  - Dr Emily Wilton, Environet Ltd – Air Quality Specialists.

## 6. Discussion

### The Nelson Air Quality Plan and Non-Regulatory Programme

- 6.1 Air pollution levels in 2001 in Airshed A were over three times the national standard. As a result the Council sought to manage air quality through provisions in the Nelson Air Quality Plan (NAQP) (Attachment 2). The provisions were targeted to the areas of the City and to those activities creating the greatest air quality impact.
- 6.2 The NAQP includes amongst other rules management measures for domestic home heating. In 2001 89% of particulates were coming from burning wood and coal for domestic heating and therefore controlling domestic home heating was an essential mechanism for managing air quality.
- 6.3 The management measures in the NAQP for domestic home heating are:
- A ban on the installation of solid fuel burners in new dwellings or existing dwellings using other home heating methods from August 2003;
  - A ban on outdoor rubbish burning from 2004;
  - Emission limits for new installations of solid fuel burners of 1.5 g/kg and an energy efficiency of 65% (when tested to NZS 4013);
  - A ban on the use of open fires from January 2008; and
  - Staged phase out of older burners in Airsheds A and B1 from 2010, 2011 and 2013. The latter phase out date of wood burners installed between 2000 and 2003 was withdrawn following 2011 revisions to the national standard. This resulted in approximately 500 burners in Airshed A and 200 burners in Airshed B1 not being phased out. There was also a staged phase out in Airshed B2 of older pre 1990 burners by 2010 and pre 1995 burners by 2012.

- 6.4 Policy A5-1.5 in the NAQP states the reduction in solid fuel fires (excluding low emission pellet burners) will be reviewed if new generation solid fuel burners become commercially available and can be shown to be consistently and significantly below a level of 1.5g of PM<sub>10</sub> emissions per kilogram of fuel burnt.
- 6.5 The regulatory approach is supported by a non-regulatory programme which includes:
- Subsidised home heating and insulation through the Clean Heat Warm Home scheme;
  - The Good Wood scheme which identifies and promotes suppliers of good quality firewood;
  - In conjunction with the 2004 ban on outdoor burning, a garden refuse scheme was implemented for 2 years; and
  - Energy efficiency, insulation and heating advice provided through Council's Eco-Design Advisor.
- 6.6 The programme of works has collectively resulted in the following outcomes:
- 2034 open fires and old enclosed burners (including 141 as mitigation for the then proposed Southern Link) being replaced with 1211 approved NES woodburners (59%), 698 heat pumps (34%), 92 gas burners (5%) and 33 pellet burners (2%); and
  - 1370 cold homes being insulated.
- 6.7 This programme of works has cost Council and the community approximately \$14 million to implement (includes \$12.6 million targeted rates under the Clean Heat Warm Homes scheme; \$454,000 staff costs; \$140,000 education campaign; \$26,000 Plan change costs; \$152,000 monitoring costs; \$31,700 enforcement staff costs).
- 6.8 The cost to individual property owners who have had to replace fires is more difficult to determine. Rates rebate recipients had all costs covered by Council up to \$4999 and others paid more than \$6000 including paying Council back \$4999 as a targeted rate.

### **The National Environmental Standard for Air Quality**

- 6.9 Environet Ltd's *Nelson Air Quality Assessment Report* dated October 2014 (page 2) contains a summary of the requirements of the National Environmental Standard for Air Quality (NESAQ) as follows:

*"The NESAQ for PM<sub>10</sub> specifies a limit of 50 µg/m<sup>3</sup> for PM<sub>10</sub> (particles in the air less than 10 microns in diameter) which can only be exceeded on one occasion per year. The NESAQ was introduced in 2004 (Ministry for the Environment 2004) and took effect from September 2005, although compliance for the PM<sub>10</sub> standard in non-complying airsheds was not required until 2013..."*

*In 2011 the NESAQ was reviewed. A number of changes were made including new compliance dates. An interim target of compliance with three exceedances of PM<sub>10</sub> was required by 2016 in Airshed A and full compliance with the NES was not required until September 2020. In Airshed B and C full compliance is required by 2016...”*

- 6.10 As set out in Policy A5-1.4 *Fine Particle Pollution* in the NAQP the standards that need to be met for each Airshed are as follows:

*“Airshed A*

- *1 September 2016 with not more than 3 exceedances in a 12 month period of the 24-hour mean NES up to and including 31 August 2020; and*
- *1 September 2020 onwards, not more than 1 exceedance in a 12 month period.*

*Airshed B*

- *1 September 2016 onwards, with not more than 1 exceedance in a 12 month period,*
- *Or sooner if practicable, towards ultimate compliance or better with the “Acceptable” air quality category as in Policy A5-1.3 by 2025.*

*Airshed C is expected to maintain its current compliance, subject to Policy A5-1.3d).”*

**Airsheds**

- 6.11 Airsheds defined under the NESAQ are primarily a management tool. Once an airshed is gazetted the process for removing or altering an airshed is complicated. A plan needs to be lodged with Land Information NZ with a request to the Minister for the Environment with supporting documentation as to why the change is proposed. Ministry staff provide advice to the Minister and if it is accepted the documents are forwarded to the Government Gazette Office where the airshed is gazetted and it comes into force from the date specified. There would also need to be a Plan change to make sure the Plan boundaries align with the newly gazetted airshed boundaries.
- 6.12 When the Nelson airsheds were established the following factors were used:
- Airsheds were grouped together where they had similar characteristics.
  - Airsheds often include geophysical boundaries such as hills and valleys. During cold winter nights in low wind conditions air tends to flow downhill much like water does in a river catchment.
  - Airsheds need to take into account the location of different activities and exposures.
  - Airsheds should take into account existing boundaries (e.g. council boundaries or census meshblocks).

- Airsheds should make sense on the ground and should follow roads and ridges and avoid cutting through land parcels.
- 6.13 Changing the airshed boundaries now, given the process required to make these changes, is not recommended. As part of the proposed Plan review process the airshed boundaries can be assessed and confirmed or altered as appropriate.
- 6.14 The indication from Government at this point is that there is unlikely to be any change to the NESAQ. It is unclear what the effect of non-compliance with the requirements of the NESAQ will mean for any individual community. Any Government changes will become clearer over the next year and can be accounted for in the Nelson Plan review. Some other regions in New Zealand do not yet comply with the NESAQ.

### **International Approaches to Managing Air Quality**

- 6.15 In many parts of the world including most of Europe and the United States standards are also set for PM<sub>2.5</sub> (less than 2.5 microns in diameter). As PM<sub>2.5</sub> is much smaller than PM<sub>10</sub> it penetrates deeper into the lungs. It is more strongly associated with adverse health effects than is PM<sub>10</sub> and hence the overseas maximum allowable concentrations for PM<sub>2.5</sub> are much lower than for PM<sub>10</sub>. Combustion sources such as woodfires and vehicles normally generate very fine particles in the PM<sub>2.5</sub> range.<sup>2</sup>

### **Environment Canterbury**

- 6.16 Environment Canterbury released their Draft Canterbury Regional Air Plan in October 2014. The Plan proposes:
- Introducing a policy that sets a long term target to achieve the health based guidelines set by the World Health Organisation for PM<sub>2.5</sub>.
  - Encouraging the development and introduction of “ultra low” emission wood burners although they acknowledge these are not yet available.
  - Continuing to require the installation of low emission wood burners in urban areas in Canterbury.
  - Continuing to not allow burners to be installed in new homes in many areas.
  - Potentially requiring regular maintenance of wood burners.

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<sup>2</sup> Nelson City Council has undertaken monitoring of PM<sub>2.5</sub> in Airshed A since 2008. During the winter period approximately 90% of the PM<sub>10</sub> measured in Airshed A comprises of PM<sub>2.5</sub> particles or smaller. As a consequence when a winter measurement of 50 µg/m<sup>3</sup> of PM<sub>10</sub> occurs (not a breach of the NESAQ) the corresponding concentration of PM<sub>2.5</sub> is about 45 µg/m<sup>3</sup>. That concentration is nearly twice the maximum permissible under the European or US standards.

- 6.17 Other Councils are addressing how they manage exceedances including controlling woodburners. For example, Tasman District Council requires phase out of woodburners at point of sale; West Coast is promoting the use of Oeko tubes for coal burners and Auckland Council are currently developing a bylaw.

### **Health Effects From Air Pollution and Cold Homes**

- 6.18 Environet Limited (Health and Air Pollution in Nelson – Outputs from HAPINZ 2006 and Evaluation of Impact of Changes from 2001 to 2013 - dated July 2014 (page 17) found:

*“Concentrations of PM<sub>10</sub> have decreased significantly in Nelson in Airshed A where the annual average PM<sub>10</sub> concentration has reduced from 45 µg/m<sup>3</sup> in 2001 to around 18 µg/m<sup>3</sup> in 2013. Concentrations in other airsheds have reduced also but not to the same extent. Health benefits will occur as a result of improvements in air quality. The most significant measure in terms of costs avoided is premature mortality. This analysis estimates that air pollution related premature mortality in Nelson has reduced from around 31 deaths in 2001 to around 26 in 2013, a total of five premature deaths avoided per year. The majority of these occur as a result of reductions in PM<sub>10</sub> concentrations in Airshed A. Total health benefits associated with this improvement in air quality are estimated at around \$27 million per year.”*

- 6.19 While air pollution has proven adverse impacts on human health so too have cold homes. Paul Sheldon (Monitoring Consultant) advised the Working Party that a review of the health impacts of cold homes was undertaken for the Friends of the Earth by the Marmot Review Team, Department of Epidemiology and Public Health, University College, London in 2010 and that review found (amongst other findings):
- Countries which have more energy efficient housing have lower excess winter deaths (EWD). EWD's are almost three times higher in the coldest quarter of housing than in the warmest quarter.
  - There is a strong relationship between cold temperatures and cardio-vascular and respiratory diseases.
  - More than 1 in 4 adolescents living in cold housing are at risk of multiple mental health problems compared to 1 in 20 adolescents who have always lived in warm housing.
- 6.20 The Canterbury District Health Board in its statement of 2012 (Housing, Home Heating and Air Quality: A Public Health Perspective) recognised the dual needs to improve indoor air temperatures and reduce air pollution levels both for public health benefits.

### **Results of Monitoring and Modelling Work**

- 6.21 Environet Ltd prepared a report for the Working Party (Nelson Air Quality Assessment – Meeting the NES for PM<sub>10</sub> 2014 Update – October 2014) which found:



- 6.21.1 The reduction required in PM<sub>10</sub> concentrations in **Airshed A** was originally evaluated at around 70% based on the maximum measured PM<sub>10</sub> concentration in Airshed A in 2001. Analysis of PM<sub>10</sub> concentrations from 2001 to 2014 suggest there has been a reduction of around 66% to 69% with the majority of the reduction occurring between 2001 and 2010.
- 6.21.2 A further reduction of around 14% of 2014 levels (equivalent to around 5% of 2001 levels) is still required to meet the NESAQ. A scenario was modelled of allowing the installation of ultra low emission burners (ULEB) and if all households were to install ULEB's then emissions in **Airshed A** would increase. It may be possible to allow the installation of ULEB's in **Airshed A** if a programme to reduce PM<sub>10</sub> emissions by 20% was successful and non-NESAQ compliant wood burners were all phased out. However, this would increase the risk of future non-compliance. In addition, a 20% reduction over and above what has already been achieved is a significant task. 35% of houses in Airshed A currently have a compliant woodburner.
- 6.21.3 The reduction required in PM<sub>10</sub> concentrations in **Airshed B1** was originally evaluated at about 45%. Results suggest a reduction in PM<sub>10</sub> concentrations of around 54% from 2002 to 2014. However, there is a large degree of uncertainty around this reduction owing to the absence of data for 2001 and 2003. A better statistic to base the reductions assessment is from 2006 which shows a reduction of around 40% from 2006 to 2014 and compares with a required reduction at 2006 of around 35%.
- 6.21.4 There is unlikely to be any spare capacity in **Airshed B1**.
- 6.21.5 The reduction required in PM<sub>10</sub> concentrations in **Airshed B2** was estimated at 24%. The maximum measured PM<sub>10</sub> concentration in 2010 was 40µg/m<sup>3</sup> which suggests the site is likely to be compliant with the NESAQ.
- 6.21.6 If any capacity was to be used by allowing the installation of new burners into **Airshed B2** then only a proportion should be allocated for the following reasons:
- 6.21.7 Monitoring in the Airshed is limited and it is possible that the most recent monitoring undertaken in 2010 does not represent worst case meteorological conditions. Therefore there is uncertainty about the magnitude of the capacity.
- 6.21.8 Dispersion modelling indicates that emissions from Airshed B2 contribute to PM<sub>10</sub> concentrations in Airshed B1.
- 6.21.9 Health impacts data indicates that PM<sub>10</sub> is a no threshold contaminant and a review by the World Health Organisation suggests that guidelines for PM<sub>10</sub> and PM<sub>2.5</sub> may be revised.
- 6.21.10 Environet Ltd recommend that before any capacity was considered for allocation one year of air quality monitoring be carried out at this site to ensure the predicted reductions in concentrations have actually occurred.

- 6.21.11 The reduction required in PM<sub>10</sub> concentrations in **Airshed C** was estimated at 24%. It is likely given the significant reductions in emissions in Airshed C since 2001 that concentrations are compliant with the NESAQ. Because of limited PM<sub>10</sub> monitoring at this site there is no trend data and indications of change only provide a rough indication of potential change.
- 6.21.12 Whilst there is the potential for capacity in Airshed C there is limited monitoring data to support the emissions estimates and there is the impact that Airshed C has on Airshed A.

### **Alternative Technology**

- 6.22 At present emission reduction technology suitable for domestic scale application is available (i.e. the Oeko Tube Electrostatic Precipitator). The cost of the purchase and installation is around \$2580. However, there is uncertainty around its effectiveness with wood burners.
- 6.23 Tests undertaken by the West Coast Regional Council regarding the Oeko Tube for coal burners suggest that requiring the installation and maintenance of the device on coal and multi fuel burners in Reefton in conjunction with a ban on the use of bituminous coals may be sufficient to meet the NESAQ in Reefton. There is however, uncertainty as the Tube needs to operate consistently as shown in test situations and the Tube requires ongoing maintenance to be effective.
- 6.24 As outlined in paragraph 6.16.2 above Environment Canterbury state there are currently no New Zealand tested ultra low emission burners available on the market. Overseas manufacturers of burners claim to achieve the limits specified for ultra low emission burners. The cost of purchasing and installing these systems is not known with accuracy although they appear to range between \$8000 and \$12,000 plus installation, which are around twice the cost of current NES compliant woodburners. This would not assist those struggling to afford heating.

### **Home Heating Options**

- 6.25 A report prepared for the Environment Canterbury and Canterbury District Health Board (A1272449 – page 10) concludes the following in relation to home heating options:
- Pellet fires – high capital cost, average operating cost.
  - Heat pumps – average capital cost, low operating cost.
  - Flued gas heaters – high capital cost, high operating cost.
  - Diesel burners – high capital cost, high operating cost.
  - Wood burners – high capital cost, low operating cost.
  - Other electric options – low capital cost, high operating cost.
  - Unflued gas heaters – low capital cost, high operating cost and negative health effects.

- 6.26 The ability to afford home heating (whatever option is selected) is a very real concern for some people including the elderly. Factors influencing heating costs are heating method, dwelling size, the amount of insulation and number of storeys. There is no one size fits all. Fuel poverty is an issue that is influenced by many factors.

### **Home Insulation and Building Design**

- 6.27 Philippa Howden-Chapman, Professor of the Housing and Health Research Programme at the University of Otago presented information to an Eco-Design Advisors Workshop in August 2014 which found that occupants in insulated houses use 23% less energy and people's health and wellbeing is improved.

### **Other Matters**

- 6.28 Dr John Hoare<sup>3</sup> attended a Working Party meeting and presented on *"New Zealand Urban Air Quality: Is NESAQ Compliance an Effective Answer to Whatever Ails Us?"* Dr Hoare stated that keeping warm comes first before air pollution. He said that in some towns and cities in New Zealand exceedences currently exceed the standard by a considerable margin. He advocates that Government recognise that New Zealand's standard is unreasonably stringent and compliance is not justified health wise.

## **7. Options**

- 7.1 A number of options were considered by the Working Party including retaining the current Plan provisions, non-regulatory approaches, initiating a Plan change to the Nelson Air Quality Plan or undertaking a Plan review by including the Air provisions within the Nelson Plan. The timeframes for a review of the Nelson Air Quality Plan and rolling the provisions into the Nelson Plan are similar. Central Government has indicated a desire for single integrated plans and this will be achieved by integrating the Air Plan provisions into a single Nelson Plan.

## **8. Assessment of Significance against the Council's Significance Policy**

- 8.1 This decision is not a significant decision in terms of the Council's Significance Policy. Potential social, cultural, environmental and economic impacts can be considered as part of the Nelson Plan process.

## **9. Alignment with relevant Council Policy**

- 9.1 There is money within the budget to commence work on a review of the Nelson Air Quality Plan.

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<sup>3</sup> Dr John Hoare is a member of the Association for Independent Research (AIR) Inc. A1262104

- 9.2 The ongoing management of air quality contributes to Councils outcomes, particularly healthy land, sea, air and water. Air quality management contributes to: Goal 3 of Nelson 2060: Our natural environment – air, land, rivers and sea – are protected and healthy; and Goal 9 of Nelson 2060: Everyone in our community has their essential needs met.
- 9.3 The objectives and policies of the NAQP and Nelson Regional Policy Statement support improvements in ambient air quality and as a minimum compliance with NESAQ Targets.

## **10. Consultation**

- 10.1 There were three key stakeholders involved in the Working Party to provide an iwi perspective, from Tasman District Council and the District Health Board. If Council accepts the recommendation to proceed to review the Nelson Air Quality Plan within the Nelson Plan there would be significant engagement and consultation with interested parties and the community.

## **11. Inclusion of Māori in the decision making process**

- 11.1 If Council agrees to proceed to review the Nelson Air Quality Plan within the Nelson Plan then Maori would be involved in the Plan development process.

## **12. Conclusion**

- 12.1 Nelson City Council is obligated to meet the NESAQ. On the basis of data received by the Working Party Nelson is tracking towards being able to meet NESAQ in our airsheds. Whilst there is the potential for “spare capacity” in Airsheds B2 and C the Working Party accepts monitoring information is limited and emissions from these airsheds impact on other airsheds that do not have capacity. It seems appropriate to consider these issues further as part of the Nelson Plan review which the Working Party consider should also include the Nelson Air Quality Plan. The Working Party consider the impact of cold homes on health is important and understand a separate agenda item will be presented to council on this matter.

Clare Barton  
**Group Manager – Strategy and Environment**

### **Attachments**

- Attachment 1: Canterbury District Health Board Position Statement Home Heating [A1272248](#)
- Attachment 2: Airshed Maps [A23847](#)