

## Appendix H: Guide to Emission and Socio-Economic Spatial Model

### **Introduction**

This Appendix provides a detailed description of how to use and examples of output from ESESM. ESESM resides on a NIWA server which is accessible via the internet (<http://wrenz.niwa.co.nz/webmodel/emissions>). The following steps detail how to use the model.

### **Step 1: Navigating to Area of Interest**

Figure F1 shows a screen shot of the South Island from ESESM. A similar view will be found at <http://wrenz.niwa.co.nz/webmodel/emissions>. There are two ways to navigate to an area of interest:

- 1) Use “Find Place” box – See blue circle in Figure F.1
- 2) Use the move button and zoom bar – See red circle in Figure F.1.

It is also possible to move the map around the screen by right clicking on the map and dragging it with the mouse.

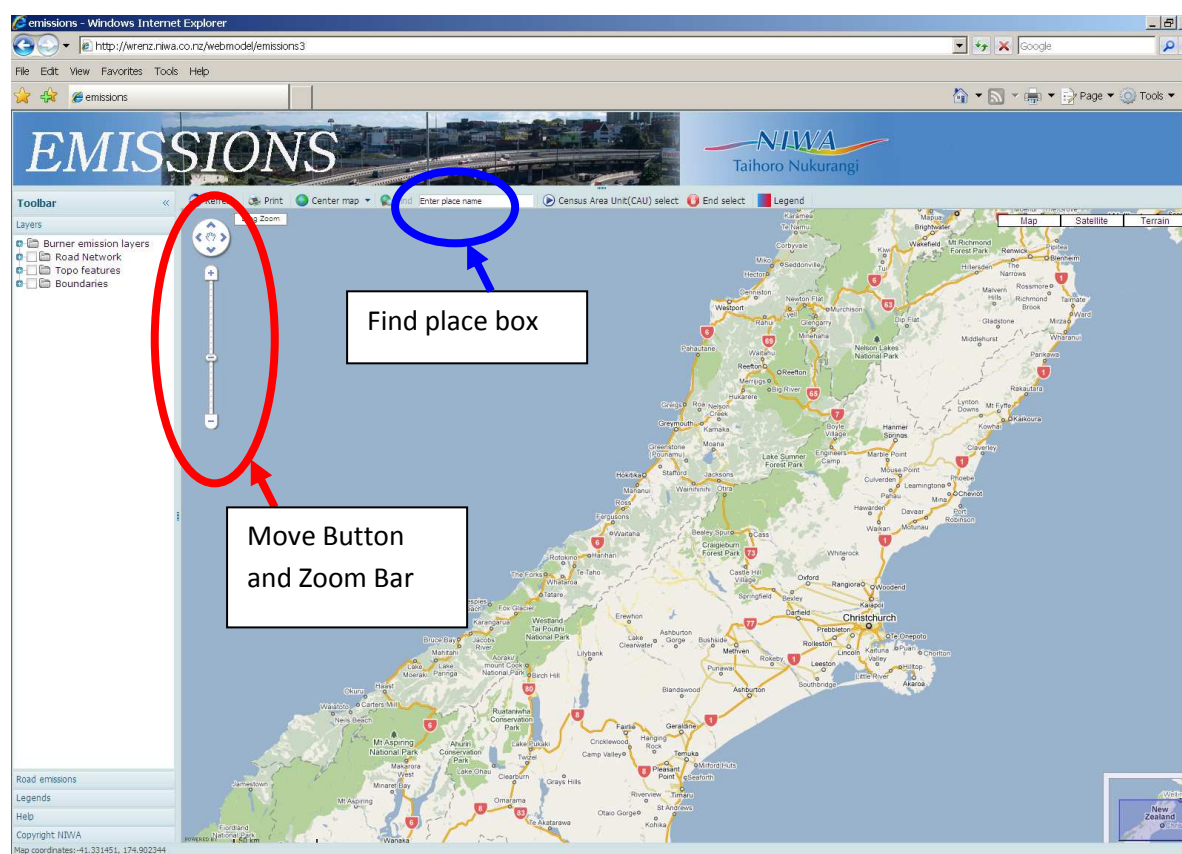


Figure F.1: Screen shot from ESESM showing the South Island.

Figure F.2 shows a screen shot from EESM showing Christchurch in map view. This map was generated by navigating to and zooming in on Christchurch from the map of the South Island shown in Figure F.1.

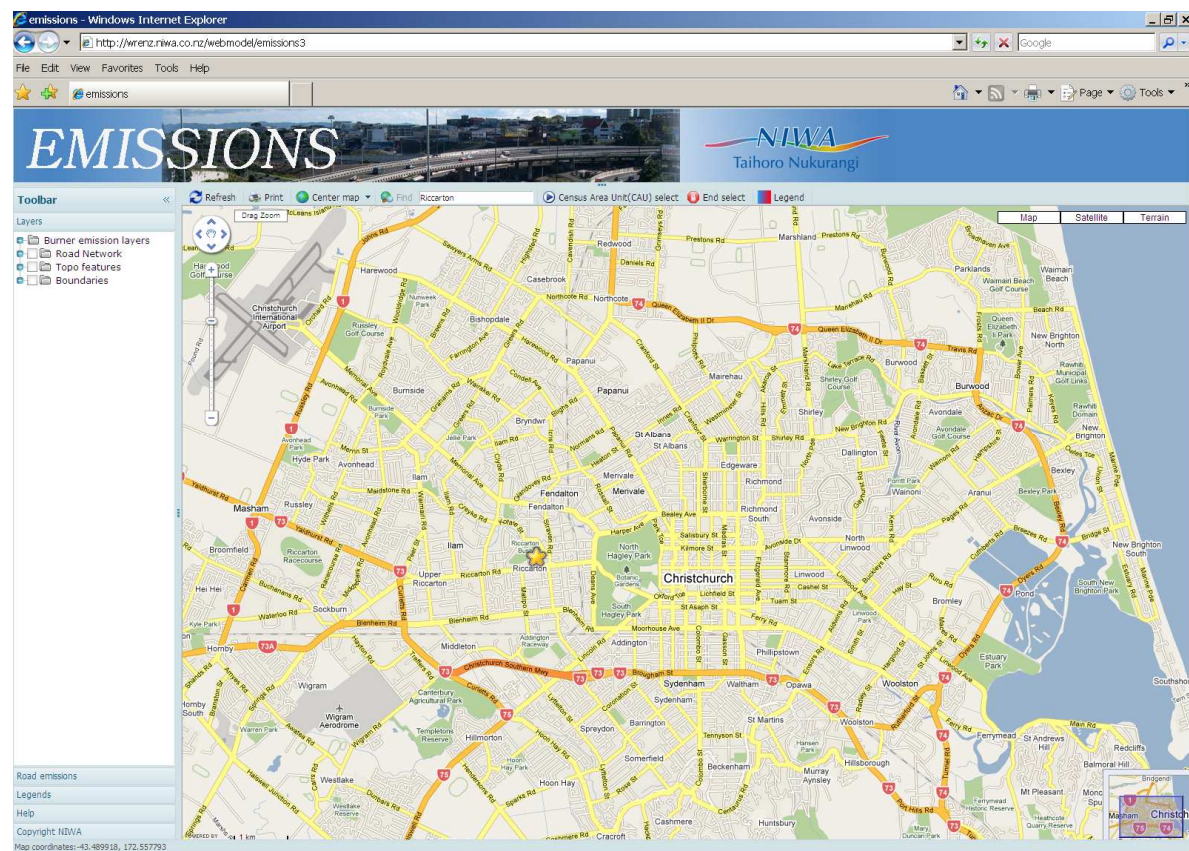


Figure F.2: Screen shot from EESM showing Christchurch in map view.

## Step 2: Selecting Emission Source and Scale

To get ESESM to display the PM<sub>10</sub> emissions from home heating, select the burner emission layer from the optional layers displayed in the drop down menu found on the upper left hand side of the screen (red circle in Figure F.3).

The emissions from ESESM can be displayed on two spatial scales: Mesh Block and Census Area Unit. Figure F.3 shows total (wood plus coal) PM<sub>10</sub> emissions by CAU. The boundaries of the CAUs are indicated by thin blue lines. The name of the CAU will be displayed if the cursor is moved within its' boundary. It is also possible to display wood or coal emissions on their own by checking the relevant box on the drop down menu.

While the emission data can also be displayed at mesh block level, emission and socio-economic data can only be extracted from ESESM at CAU level.

Note that the legend (blue circle in Figure F.3) is not displayed automatically. To display the legend click on the Legend Button on the tool bar which is displayed at the top of the map (green circle in Figure F.3) and then place mouse on the bright blue hyper-link (orange circle in Figure F.3).

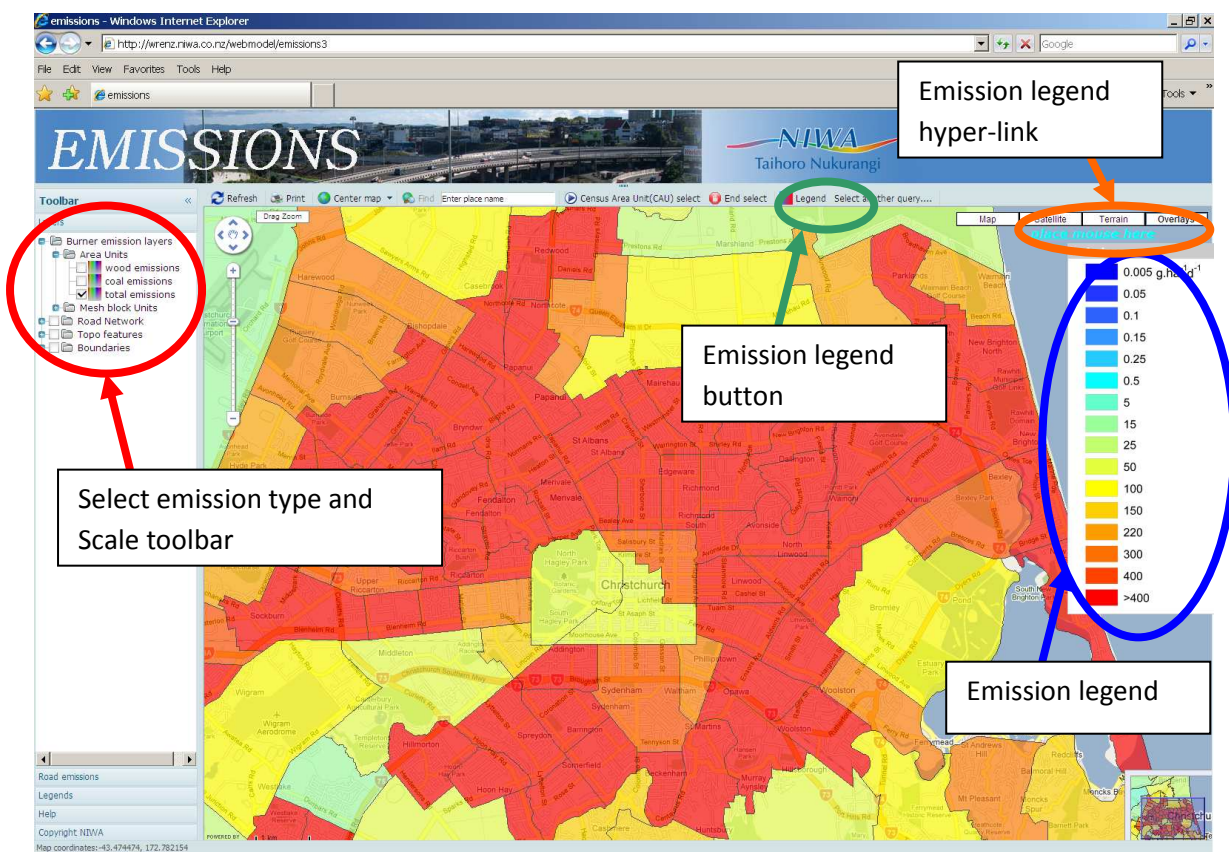


Figure F.3: Screen shot from ESESM showing Christchurch by CAU and PM<sub>10</sub> home heating emissions (g/h/d).



### Step 3: Selecting CAUs

To select the Census Area Units (CAUs) of interest click on the Census Area Select button found on the toolbar (green circle in Figure F.4). Then move the cursor to within the boundary of the CAU you are interested in and click. A pin will be displayed and the CAU will be named. Two CAUs have been selected in Figure F.4, Holmwood and Aranui (blue circles in Figure F.4). When you have finished selecting CAUs, click on the End Select button (red circle in Figure F.4).

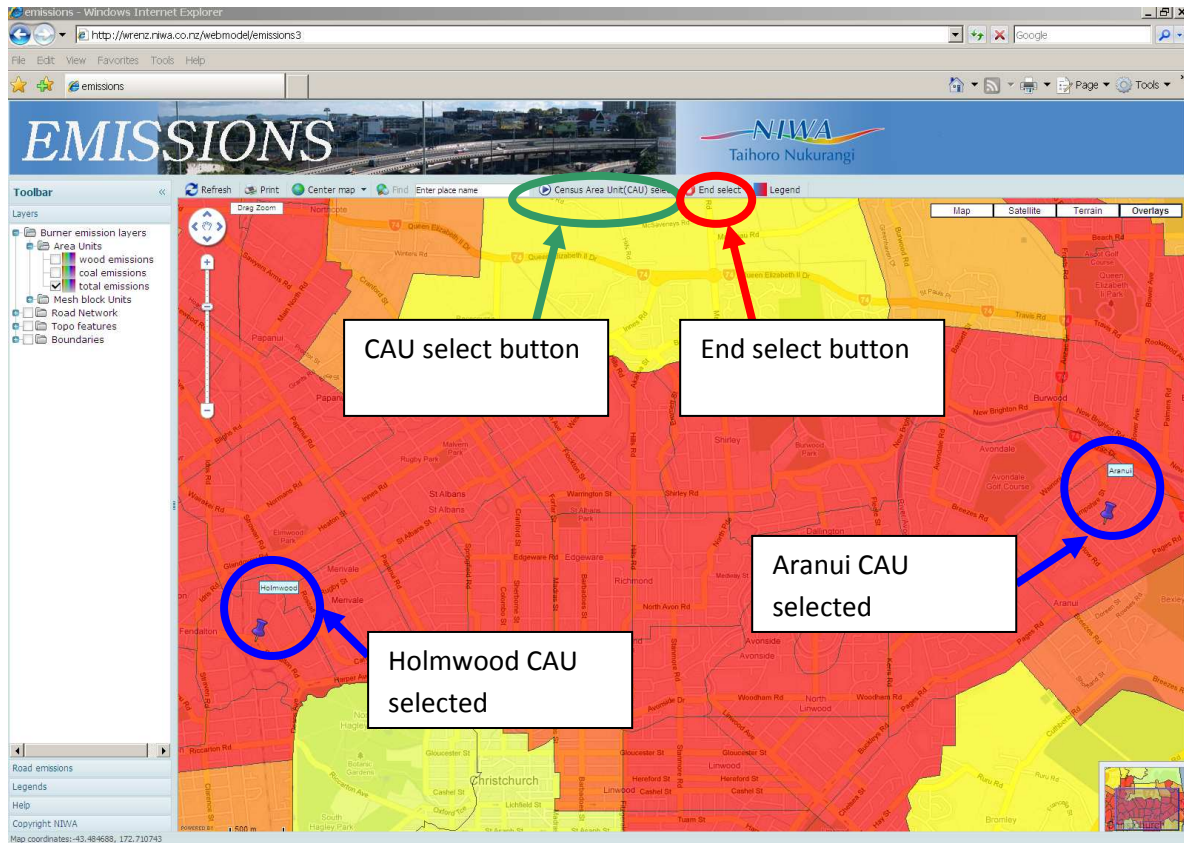


Figure F.4: Screen shot from ESESM showing the Holmwood and Aranui CAUs selected.

#### **Step 4: Requesting information from EESM**

When the End Select button has been clicked the Information Request Menu will appear (blue circle in Figure F.5). The Information Request Menu contains check boxes (e.g. green circle in Figure F.5) that when checked define the information that EESM will return on the selected CAUs. Check the required information boxes by clicking on them. Alternate clicks will toggle the check on and off. When all the required information request boxes have been checked, send the query to the database by clicking the Done Button (yellow circle in Figure F.5).

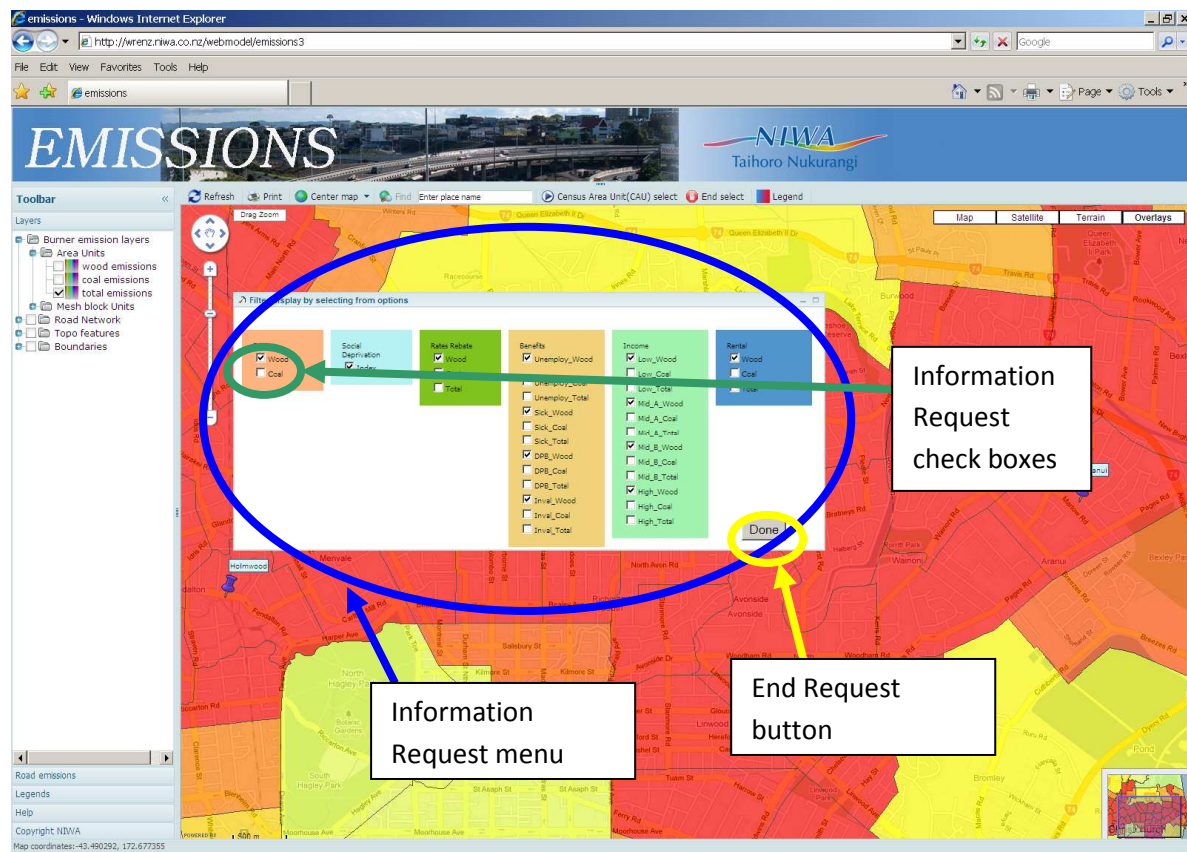


Figure F.5: Screen shot from EESM showing the Information Request Menu.

### **Step 5: Downloading Information from ESESM**

When the query has been processed by ESESM the Query Output box will be displayed (blue circle in Figure F.6). The query output information can be viewed by using the scroll bar at the bottom of the query output box. Alternatively the information can be downloaded from ESESM for analysis by other software (e.g. MS-Excel). The data can be exported by clicking on the data download button (green circle in Figure F.6). Click the Download box and use browse option to find a location/folder to save the data into.

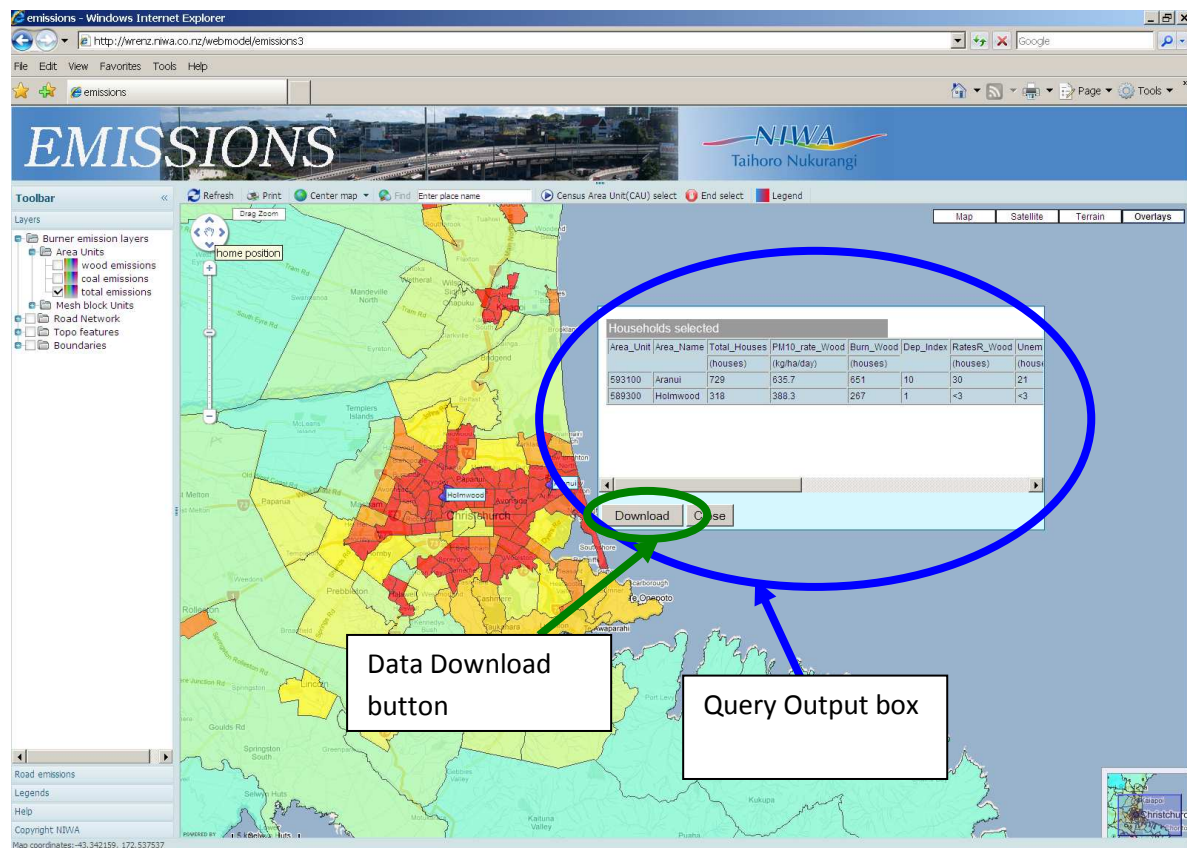


Figure F.6: Screen shot from ESESM showing the Query Output box.

### **Step 6: Analysing the Data**

The following figures show examples of the type of analysis that can be undertaken using data provided by ESESM. The following figures show a comparison between the CAUs of Holmwood and Aranui in Christchurch. These example results have been chosen to illustrate the type of analyses which may be useful to aid the development of suburb specific cost-effective incentives programmes that aim to maximise reductions in PM<sub>10</sub> emissions from domestic home heating. The example results presented here are not intended to be an exhaustive list of the type of analysis that can be undertaken using the data provided by ESESM.

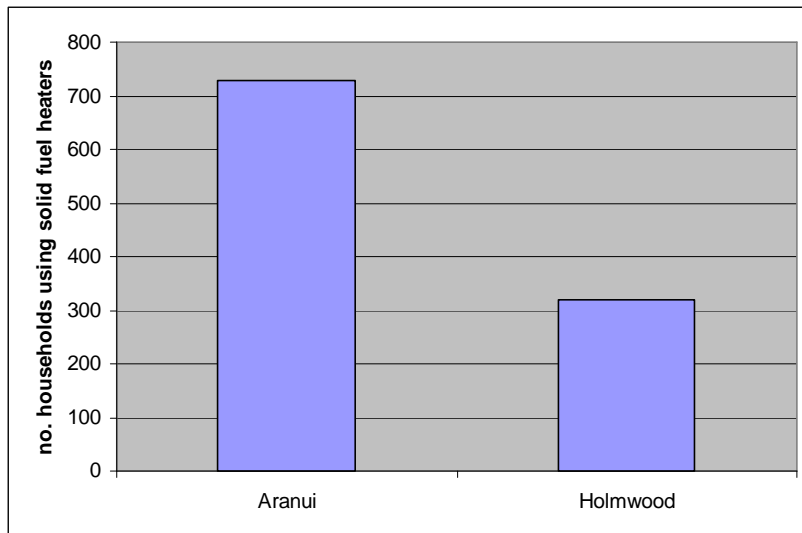


Figure F.7: Number of houses that burn wood or coal as the main source of heating.

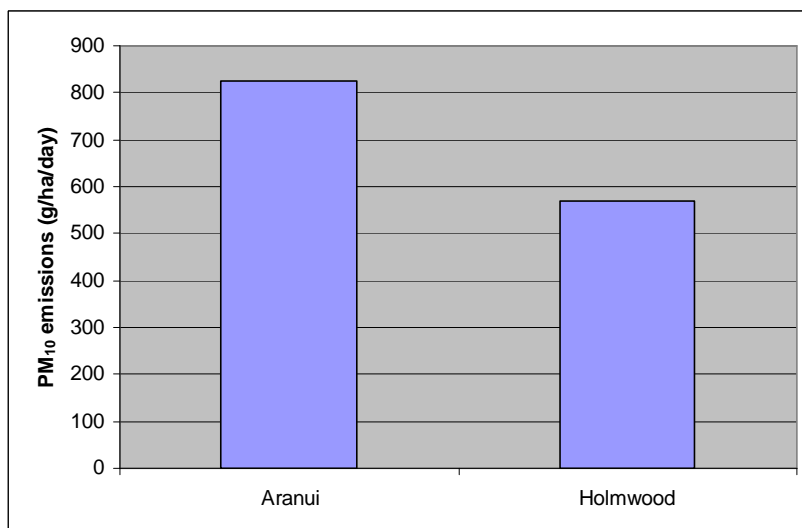


Figure F.8: A comparison of the CAU PM<sub>10</sub> emission rate from the burning of wood and coal in domestic heaters (g/ha/day).

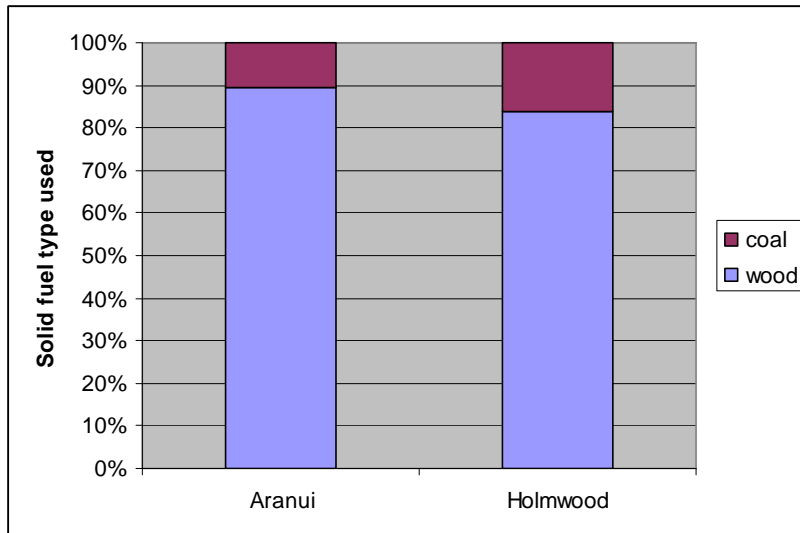


Figure F.9: Proportion of houses using wood or coal burned as principal solid fuel.

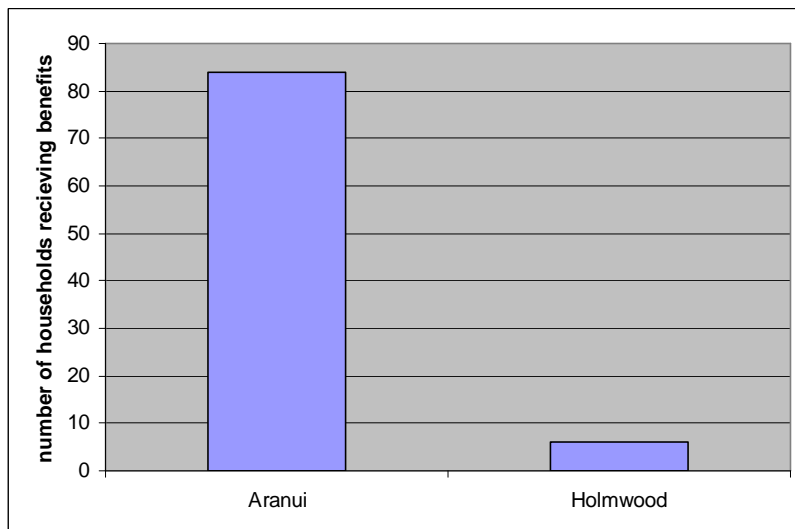


Figure F.10: Number of households burning solid fuels and receiving social welfare benefits as principal income source.



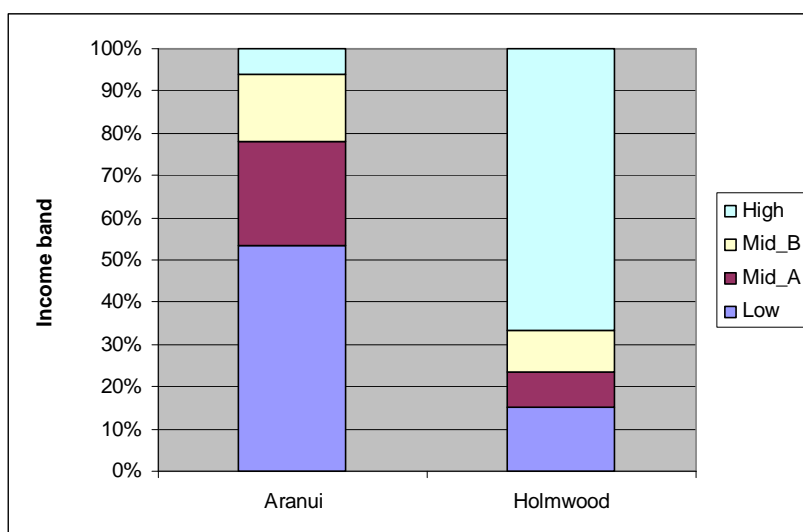


Figure F.11: Income profile of households burning solid fuels as main source of heating.

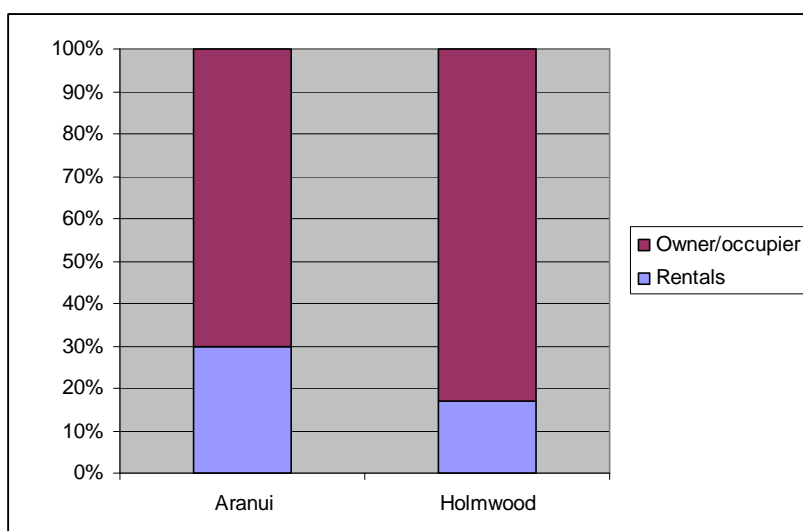


Figure F.12: Proportion of owner/occupier and rental properties that burn solid fuels as main source of heating.

## Using alternative display formats in ESESM

ESESM offers the option of displaying the background geospatial information in three formats; map, satellite or terrain. The map, satellite and terrain formats for Christchurch city and surrounding areas are displayed in Figures F13, F14 and F15 respectively. The format can be chosen by clicking the respective display option button (red circles in Figure F13).

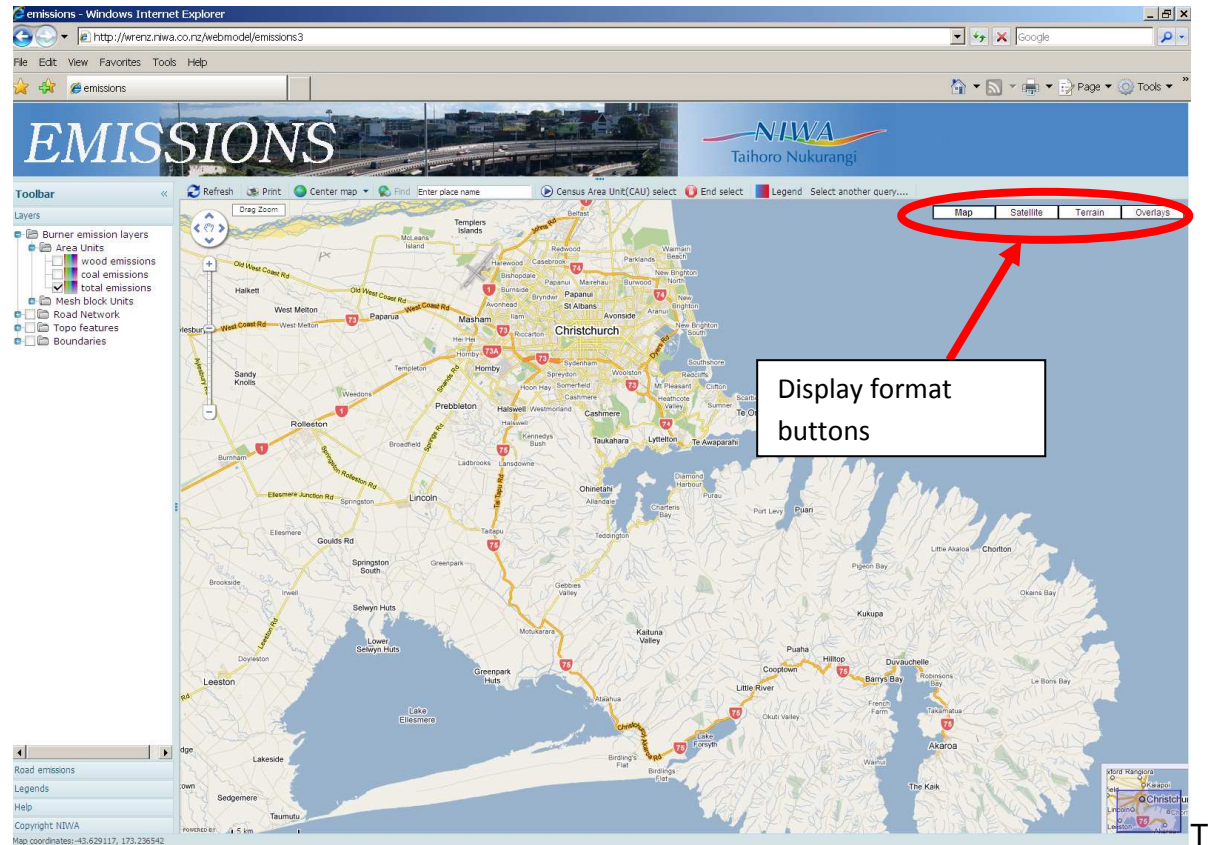


Figure F13. Map display format for Christchurch city and surrounding area.

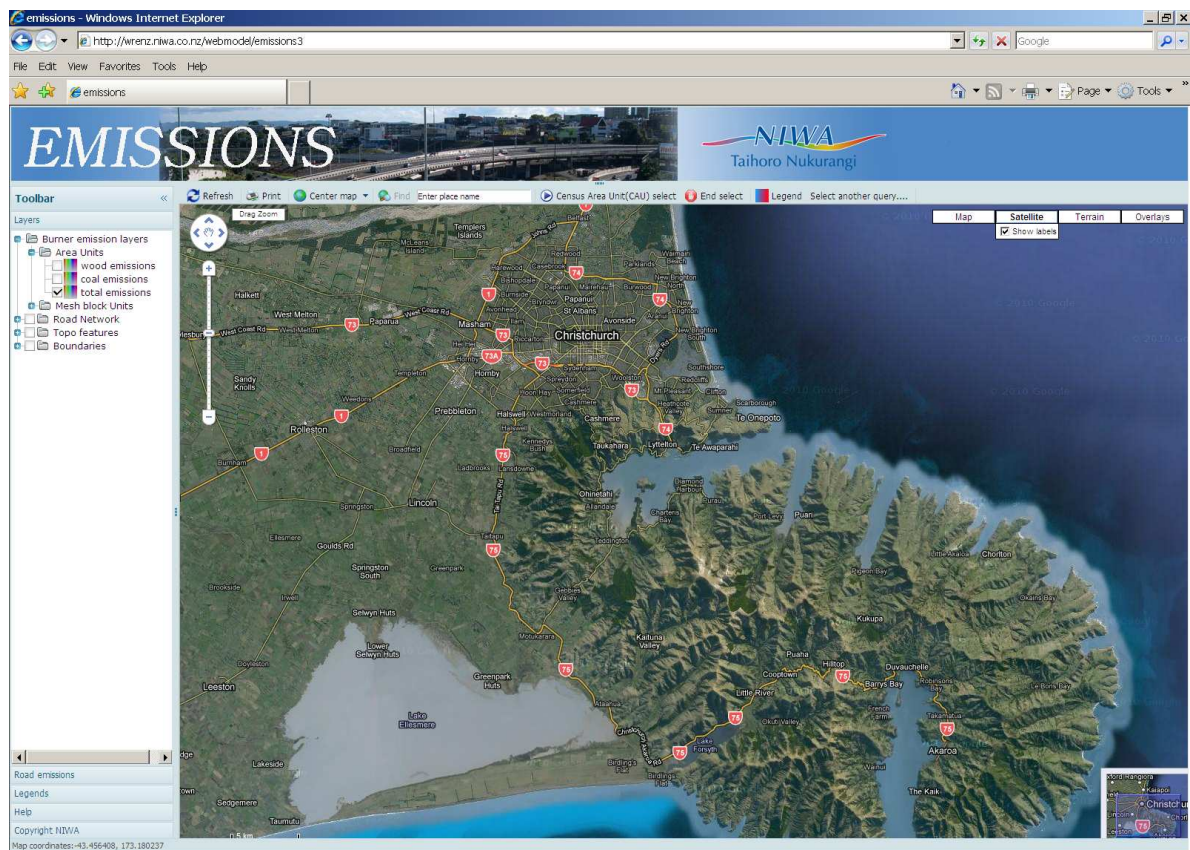


Figure F14. Satellite display format for Christchurch city and surrounding area.

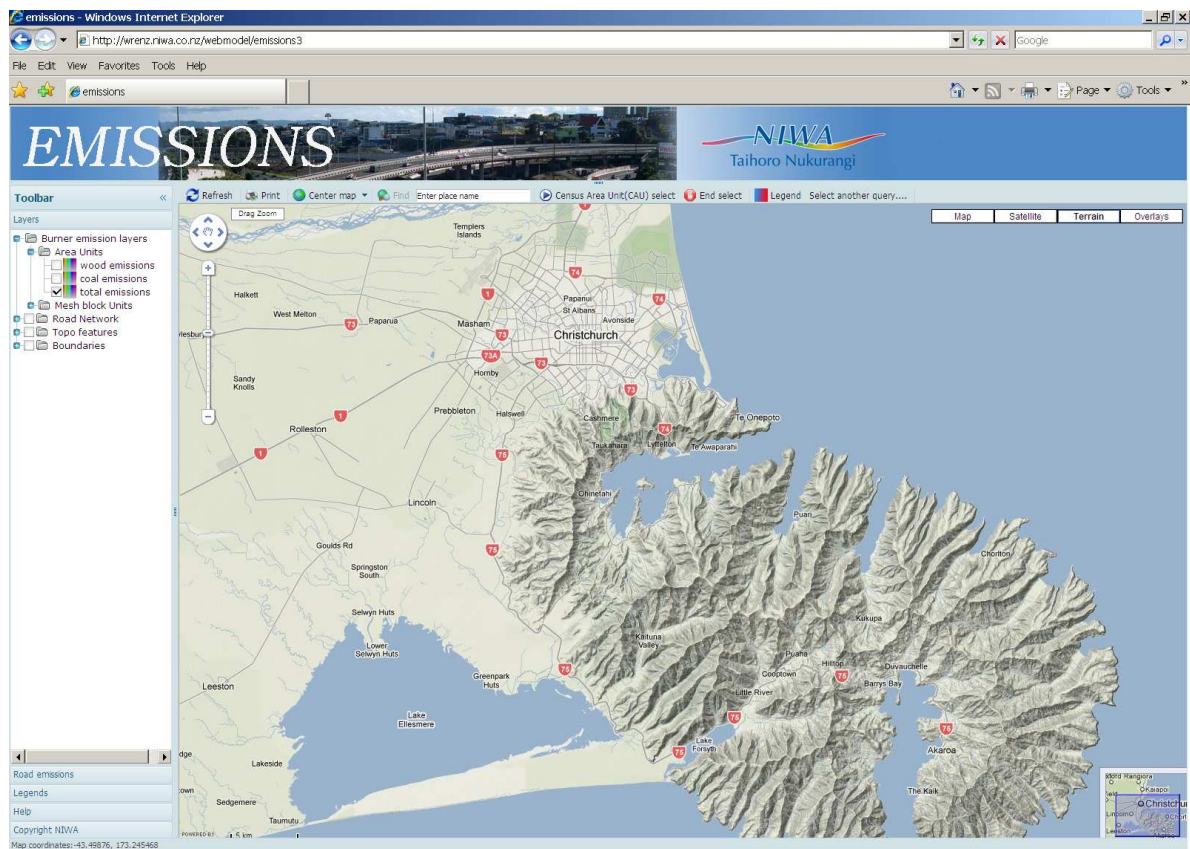


Figure F15. Terrain display format for Christchurch city and surrounding area.