LATROBE VALLEY
ASBESTOS TASKFORCE

ESTIMATING THE VOLUME OF LEGACY ASBESTOS IN NON-RESIDENTIAL PROPERTIES ACROSS THE LATROBE VALLEY REGION

A MODEL

ATTRIBUTION

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MARCH 2022

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Executive Summary

Australia had the highest apparent asbestos consumption per capita of anywhere in the world in the 20th century, estimated at 1.88 million tonnes.[1] Although a total ban on asbestos mining, manufacturing, imports/exports and the use of all asbestos products came into effect in Australia on 1 January 2004, much of it remains in the built environment, where asbestos was used as a key component in more than 3000 building products.[2]

Many asbestos-containing materials are now coming to the end of their service life, and it is important that all levels of government, community and industry understand the risks of asbestos exposure in our built environment. More than 4,000[3] people die each year in Australia from asbestos-related disease, which is almost four times higher than lives lost on Australia's roads. A commitment to raise awareness, expand training, and increase resources to target enforcement would see many new potential exposures reduced and lives saved.

In 2020, the Latrobe Valley Asbestos Taskforce initiated a project to understand the volume of legacy asbestos remaining in the residential built environment.[4] A model was developed to provide region-specific results with the intent that the methodology could be replicated in other localities.

This new study is being undertaken to estimate the legacy asbestos volumes in the non-residential buildings frequented by the community every day; our workplaces, schools and hospitals, shops, hospitality venues, accommodation, and numerous community and business services. The municipalities included in the analysis are members of the Latrobe Valley Asbestos Taskforce: Baw Baw Shire, Latrobe City, and Wellington Shire.

As shown in Figure 1, the findings of this report reveal a total of 1.9 million square metres of legacy asbestos-containing materials in the non-residential sector across the three municipalities studied. This is approximately equivalent to the land area size of Melbourne's central business district (CBD).[5] Almost 90% of legacy asbestos is asbestos cement sheet with the next highest amount being found in vinyl products such as sheets, tiles and adhesives (Figure 2, Figure 3). It is estimated that 43% of all non-residential properties have asbestos-containing materials (Figure 4).

The above figures do not include heavy industry, as the purpose of this study was to shine a light on the legacy asbestos volumes in areas that have not previously been considered. If heavy industry such as the energy generation companies across the Latrobe Valley region had been included, the resulting data would have shown Latrobe City as having the highest volume of asbestos-containing materials. However this would have been outdated not long after report publication, due to the near-completion of asbestos removal and disposal works at the former Hazelwood Power Station.[6]

While the total volume of legacy asbestos in the non-residential sector is considerable, the 2020 study[2] revealed a significantly higher volume of asbestos-containing materials in the residential built environment. As shown in Figures 5 and 6 on page 7, the volume of asbestos-containing materials in the residential sector outweighs the non-residential sector 62% to 38%. This clearly indicates the need to prioritise efforts on the reduction of risks of asbestos exposure in the residential sector.

1 Preparing an estimate of the national pattern of exposure to asbestos in cases of malignant mesothelioma, Australian Safety and Compensation Council, Australia Government, 2008

2 https://www.asbestos.vic.gov.au/in-the-workplace

3 National Asbestos Profile for Australia, Asbestos Safety and Eradication Agency, 2017

4 Estimating the volume of residential asbestos remaining in the Latrobe Valley – A model, 2020

5 The boundaries of Melbourne's CBD are not formally recognised however the map from the Australian Bureau of Statistics is based on what is known as the "Hoddle Street Grid" and is approx. 1.79 million m^2 https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/206041122

6 https://www.hazelwoodrehabilitation.com.au/

Significant effort has been focused on minimising the risks of asbestos exposure in workplaces and operations in the industrial sector, and today this area is highly regulated. By comparison, this is not so in the residential space, where the responsibilities of asbestos management and health risk prevention are not clearly defined. It is critical that programs and initiatives are developed and implemented as soon as possible to reduce asbestos exposures both in our workplaces and in our homes. We can reduce the risk of harm, and prevent more people succumbing to asbestos-related disease.

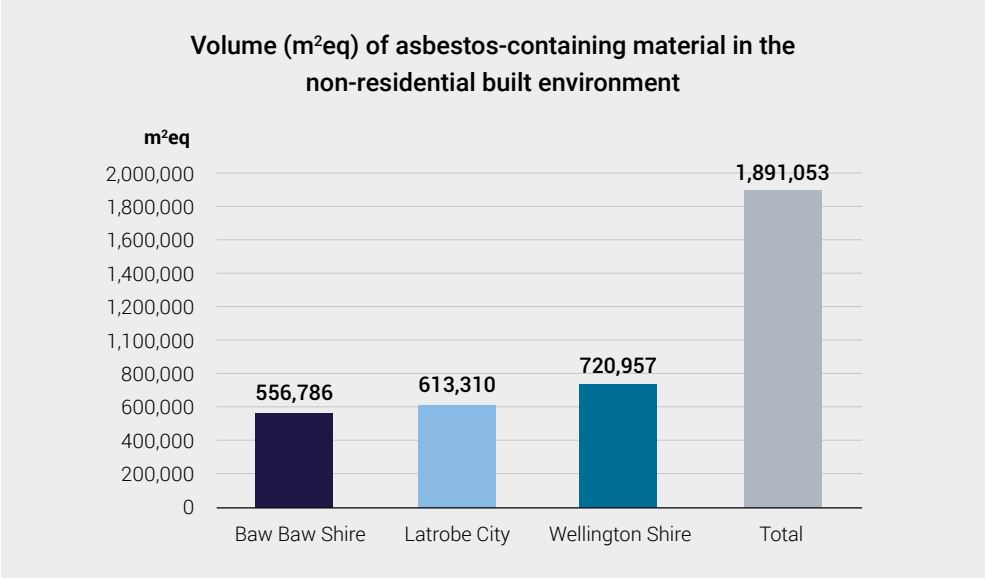


Figure 1. Volume (m^2eq) of asbestos-containing materials in the non-residential built environment in Baw Baw Shire, Latrobe City and Wellington Shire

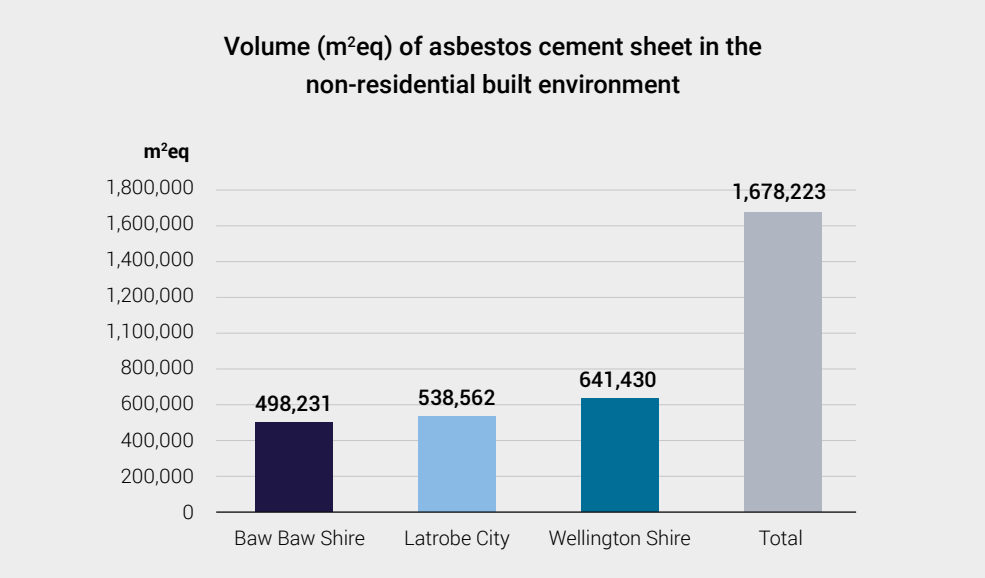


Figure 2. Volume (m^2eq) of asbestos cement sheet remaining in the non-residential built environment in Baw Baw Shire, Latrobe City and Wellington Shire

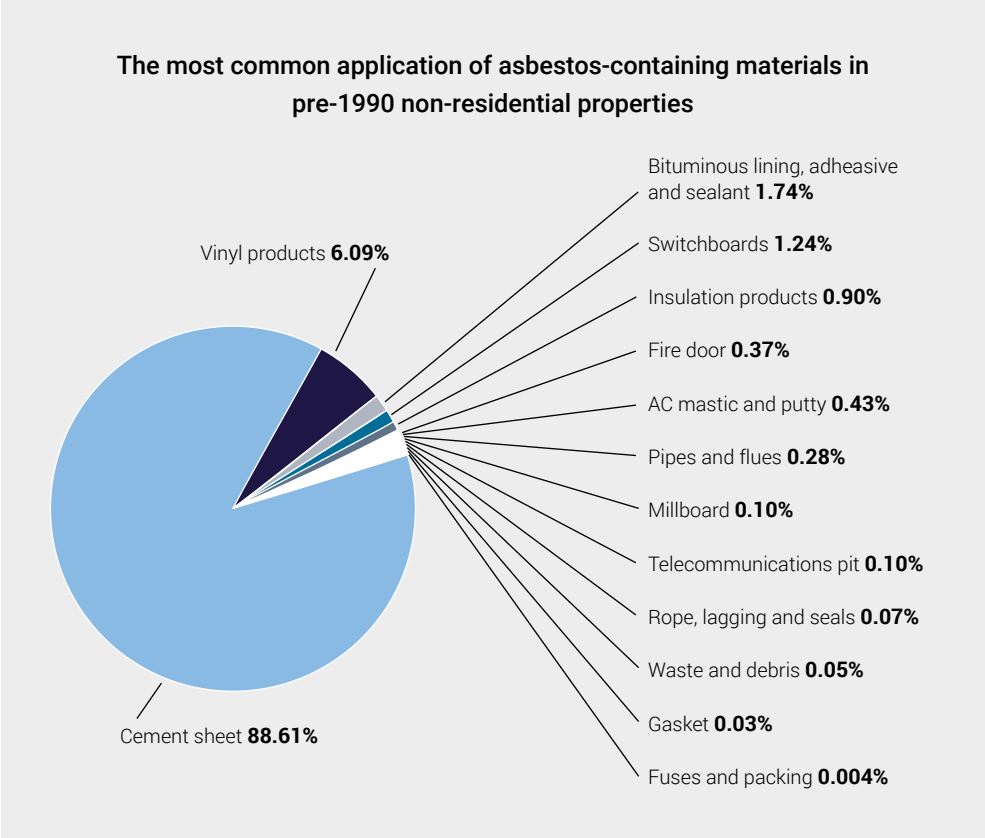


Figure 3. The most common application of asbestos-containing materials in pre-1990 non-residential properties in Baw Baw Shire, Latrobe City and Wellington Shire

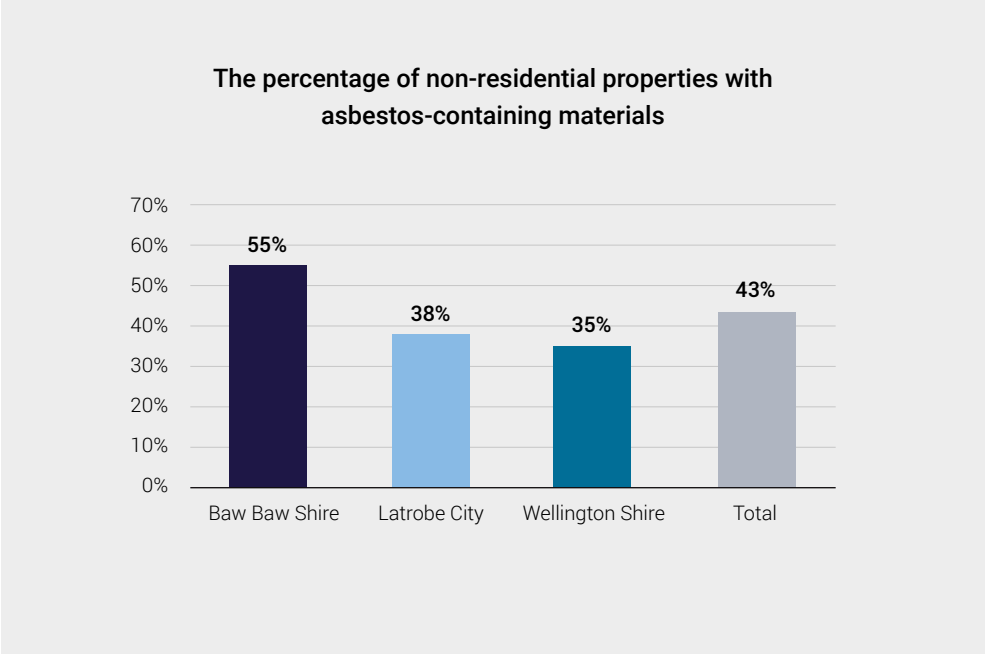


Figure 4. The percentage of non-residential properties with asbestos-containing materials in Baw Baw Shire, Latrobe City and Wellington Shire

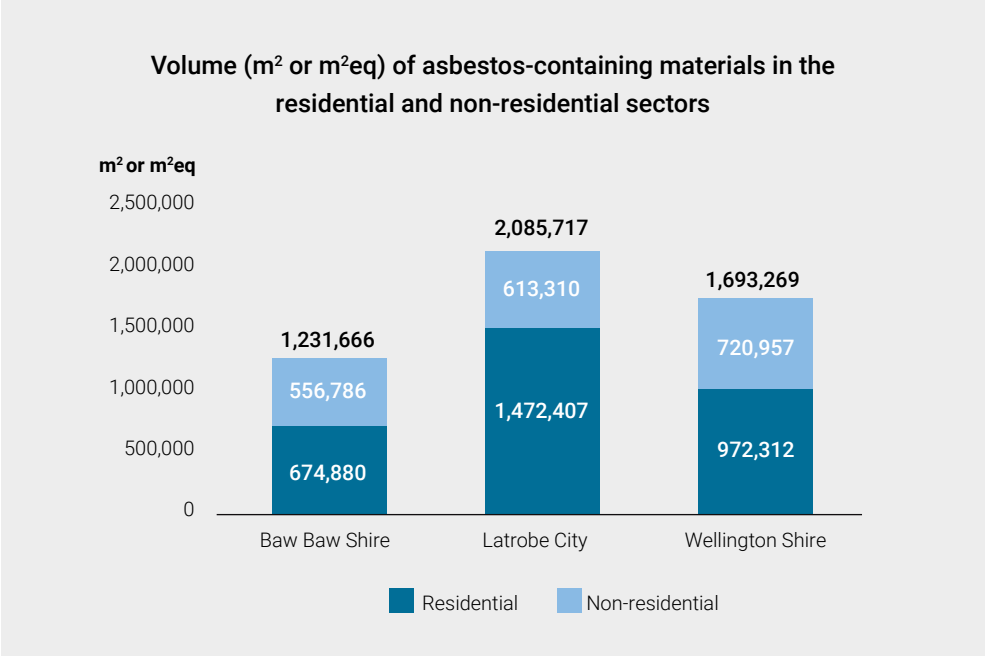


Figure 5. Volume (m² or m²eq) of asbestos-containing materials by sector in Baw Baw Shire, Latrobe City and Wellington Shire[7]

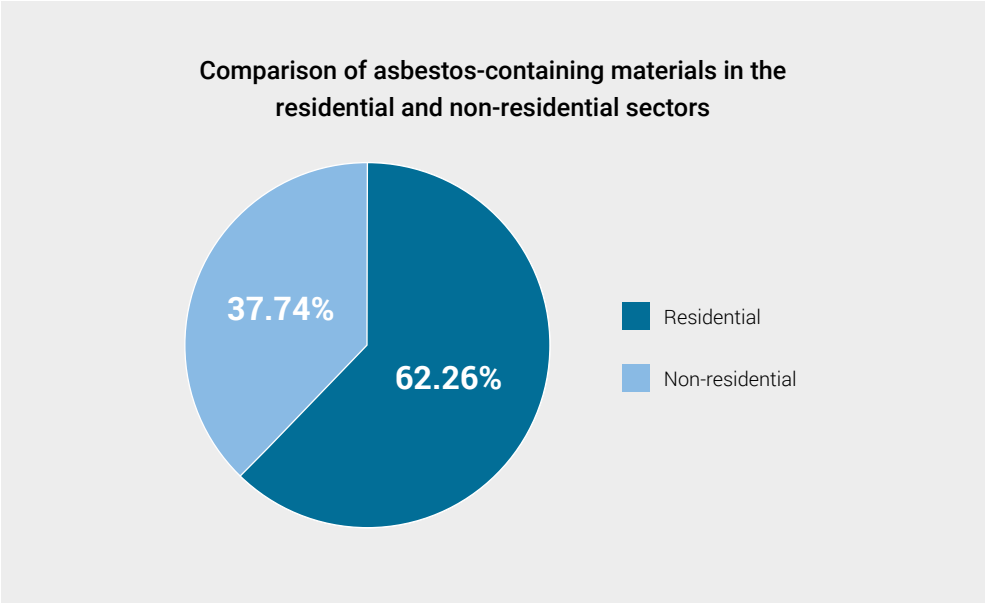


Figure 6. Comparison of asbestos-containing materials in the residential and non-residential sectors across Baw Baw Shire, Latrobe City and Wellington Shire

[7] Note that the residential sector did not account for removals.

About the Latrobe Valley Asbestos Taskforce

The Latrobe Valley community has a strong awareness of, and concern about, the management and disposal of asbestos waste. This is due to a long history of asbestos-related issues stemming from the power industry that arose in the middle of the 20th century.

The Latrobe Valley Asbestos Taskforce ("the Taskforce") was commissioned by the Victorian Government in 2019 to undertake a review into how asbestos is managed in the Latrobe Valley, including the safe identification, handling and disposal of asbestos across industrial, commercial and residential sites and locations.

The Taskforce brings together a diverse range of stakeholders including state agencies, local government, workers' representatives and community groups. It aims to bring about consistency, collaboration and improved community engagement and awareness for the management of asbestos.

As detailed in the Terms of Reference[8], the four key functions of the Taskforce are to:

1. **Enquire into and report to Government** on current asbestos waste handling processes and safety practices within the public and private sector.
2. **Design a plan** for the management, demolition, transportation and disposal of asbestos for all Latrobe Valley sites and locations.
3. **Make recommendations to Government** on the way asbestos waste material will be dealt with in a formal and consistent manner.
4. **Engage with and inform** the community and industry in the Latrobe Valley on the work and progress of the Taskforce.

The Taskforce has a four-year duration and is expected to conclude in December 2022. The Independent Chair of the Taskforce is the Latrobe Health Advocate, Jane Anderson. The Taskforce member organisations are:

- Department of Environment, Land, Water and Planning
- WorkSafe Victoria
- Environment Protection Authority
- Department of Families, Fairness and Housing
- Sustainability Victoria
- Latrobe City Council
- Wellington Shire Council
- Baw Baw Shire Council
- Resource Recovery Gippsland
- Latrobe Valley Authority
- Latrobe Health Assembly
- Asbestos Council of Victoria/Gippsland Asbestos Related Disease Support Group Inc.
- Australian Manufacturing Workers Union
- Construction, Forestry, Mining and Energy Union
- Electrical Trades Union
- Australian Workers Union
- Australian Services Union.

[8] Latrobe Valley Asbestos Taskforce Terms of Reference available at https://www.asbestostaskforce.net/terms-of-reference/

Introduction and aims

Understanding the actual volume of legacy asbestos across the broader Latrobe Valley is central to one of the functions specified in the Latrobe Valley Asbestos Taskforce Terms of Reference:

> *Identify the gaps in knowledge of where asbestos is and how it is managed in the Latrobe Valley across all jurisdictions.*

Known for its durability, fire-retardant properties and affordability, asbestos was regarded as a 'wonder product' in 20th century Australia and was used in over 3,000 building products. Australia was the highest per capita consumer of asbestos-containing materials in the world, with the identified peak occurring in 1975.[9] Production slowed in the 1980s and manufacturing ceased in 1987 as occupational health and safety regulations were introduced and the dangers became more widely understood. This study includes buildings constructed up until 1990, as many asbestos products were still in circulation until this time.

In 2020, the Latrobe Valley Asbestos Taskforce developed a model to estimate quantities of legacy asbestos in residential housing stock across the three municipalities that are members of the Taskforce: Baw Baw Shire, Latrobe City and Wellington Shire. The findings were published in the report titled *Estimating the volume of residential asbestos remaining in the Latrobe Valley – a model*. A total volume of 3.12 million m^2 of asbestos-containing materials remaining in the residential environment was estimated, primarily in the lining of eaves, verandahs and porches, and in the wet areas of the home.

This project aims to undertake a similar analysis within the non-residential sector in the broader Latrobe Valley region encompassing the same three municipalities, and to develop a model that may be replicated to estimate volumes in other regions. The scope of this study includes all buildings that can be described as 'non-residential', with the exception of heavy industrial facilities such as the power stations in the Latrobe Valley, the paper mill in Maryvale and the gas plant in Longford.

The Taskforce acknowledges that the Latrobe Valley is well known as a heavily industrialised region, and this has in the past led to the common assumption that more asbestos exists in the region than elsewhere in the state. While it is well understood that heavy industry contributes a large portion, a conscious decision was made to exclude heavy industry in the modelling, to allow a more balanced analysis between the three municipalities. Rather than the three large power stations skewing the results to the Latrobe Valley, and thus presenting the potential to ignore the lower volume results in the other municipalities, the observations in this report highlight the widespread use of asbestos-containing materials in non-residential buildings regardless of whether the area has heavy industry or not.

This study highlights the volume of legacy asbestos in non-residential buildings where no current estimation exists, and the exclusion of heavy industry is further supported by the current and future planned removal of asbestos as decommissioning and renewal takes place. Sites such as the former Hazelwood Power Station have asbestos removal and disposal management plans in place and are currently actively managing the removal and disposal of asbestos. Therefore the quantities will not be considered to still be in the built environment once these works are completed.[10]

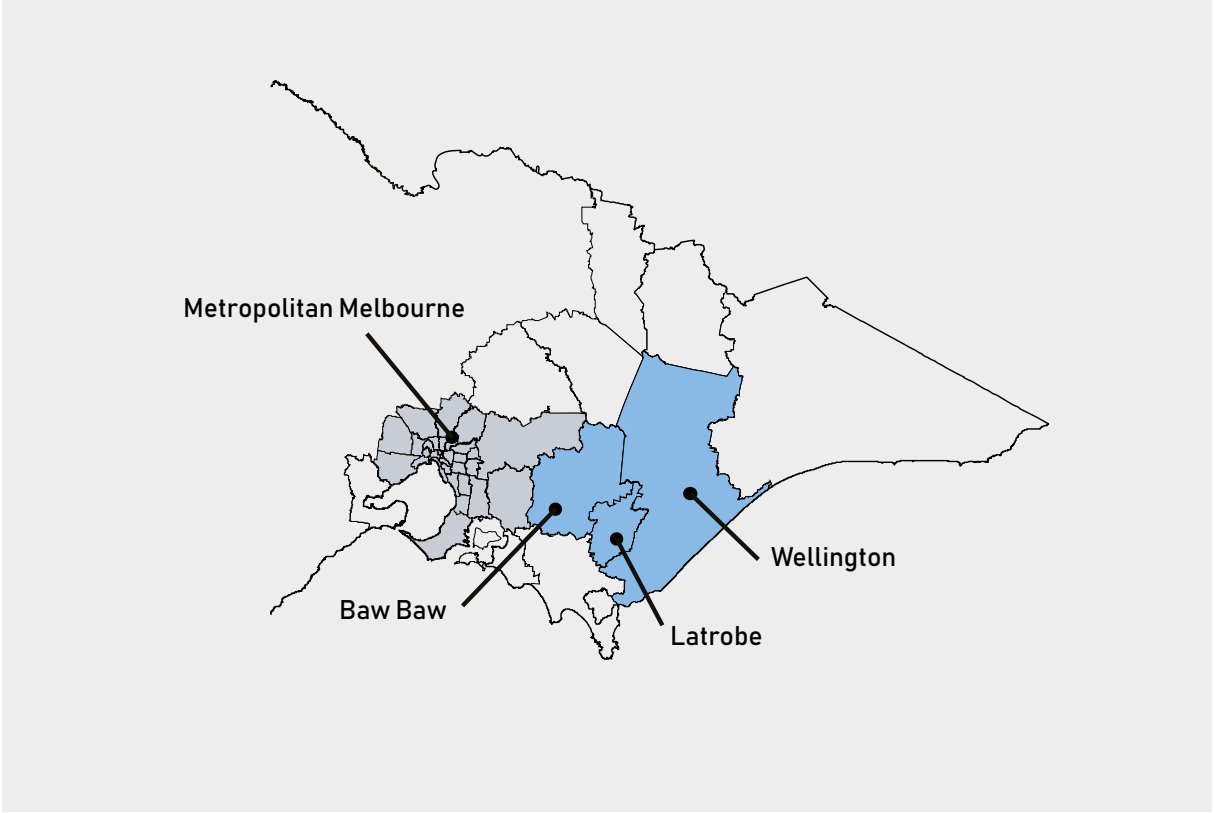
As was the case in the residential sector, the huge variety of asbestos products and the many non-standard uses to which these products were applied, means that the task of creating a model to predict the amount remaining in non-residential buildings requires a variety of assumptions to be made. The methodologies employed here can be adapted to suit available data or may even be superseded by better methods as they are discovered.

Information to support this study was sourced from the Australia Bureau of Statistics, various reports

[9] Asbestos Safety and Eradication Agency. (2017). National Asbestos Profile for Australia. Australian Government.

[10] Removal and disposal of all asbestos-containing materials at the former Hazelwood power station is due for completion in 2022; https://www.hazelwoodrehabilitation.com.au/

commissioned by the federal Asbestos Safety and Eradication Agency, Geographic Information Systems (GIS)[11] mapping, the Victorian Asbestos Eradication Agency's Asbestos Identification and Rating System, property cadastres and ratings systems from local government, property asbestos registers, open-source datasets, and historical imagery from Geoscience Australia.



The local government areas of Baw Baw, Latrobe City and Wellington in Gippsland, Victoria

[11] GIS is a framework for gathering, managing and analysing spatial data.

Methodology

An initial desktop assessment was undertaken to arrive at a high-level estimate of the likely quantity of asbestos-containing materials (ACMs) in each of the three municipalities. This high-level assessment was used to check the final results obtained via the more thorough techniques outlined in the methodology.

As was the case for the residential study,[12] a key assumption was that asbestos use in properties post-1990 was negligible, despite the total ban only coming into effect on 1 January 2004.[13] Data from the widely-cited British Geological Survey[14] shows minimal asbestos consumption in Australia (apparent consumption = Production – Exports + Imports) from 1990 until the ban came into effect. Therefore it is reasonable to assume that any commercial building or works constructed post-1990 is asbestos-free. It is recognised that asbestos was still used after this time in some forms including in various defence applications, or specialised industrial applications where no other product had the necessary properties for purpose. Due to the strict regulation around use, management and disposal of these items, they are not considered.

The modelling utilised six pillars of information:

1. Local council rating systems
2. Local council property cadastres and GIS systems
3. Historic aerial imagery from the Geoscience Australia online repository, which informed building age[15]
4. Building footprint data from an open-source dataset published by Microsoft Bing[16]
5. The Asbestos Identification and Rating System developed by the Victorian Asbestos Eradication Agency (VAEA)[17], which features a consolidated asbestos register of government-owned buildings
6. Asbestos registers from other sources (such as from councils and licensed asbestos removalists).

A business survey yielded limited qualitative data, which nonetheless supported the quantitative modelling.

The consolidated model was then applied to properties in each municipality based on land-use and total floor area of buildings.

Further proposed methods could not be undertaken due to public health restrictions imposed during the COVID-19 pandemic at the time of this study. These included a series of site inspections in the farming and retail sectors to view asbestos registers and to gain an understanding of renovation and asbestos removal rates in these environments. In conjunction with these inspections, council planning permits for commercial premises had also been proposed as a source to predict renovation and removal rates.

[12] 'the residential study' or 'the residential sector' throughout this report refers to the Latrobe Valley Asbestos Taskforce publication: Estimating the volume of residential asbestos remaining in the Latrobe Valley – A model, 2020

[13] Donovan, S. and Pickin, J., An Australian stocks and flows model for asbestos, Waste Management & Research, 2016, p.6.

[14] British Geological Survey (2015) World mineral statistics archive. Retrieved from https://www.bgs.ac.uk/mineralsuk/statistics/worldArchive.html on 25/06/2020

[15] Accessible on request to Geoscience Australia

[16] Retrieved via GitHub https://github.com/microsoft/AustraliaBuildingFootprints

[17] For more information visit the VAEA website: https://www.vaea.vic.gov.au/our-purpose

Scope

As specified above, the objective of this study was to *identify the gaps in knowledge of where asbestos is and how it is managed* as outlined in the Taskforce Terms of Reference, and so heavy industrial facilities were excluded from the modelling.

The scope with respect to building types excluded the following:

- All residential buildings, including dwellings on farms, as these fell within the scope of the residential project
- The current and former energy generation facilities in Latrobe City and Wellington, and the Maryvale paper mill
- Water distribution networks, as there is little publicly available data as to the extent of these, recognising the fact that the majority of these utilities will remain underground into the future, even as they are decommissioned.

All other buildings fell within the scope of the analysis and are described as non-residential properties. The term 'commercial' has not been used as not all buildings included in the analysis could be readily considered commercial properties, such as government-owned public buildings.

The scope of this analysis was bound temporally, geographically and by building type. The temporal bounds remain the same as with the residential analysis; being properties built before 1990. The geographical bounds were the municipalities of Baw Baw Shire, Latrobe City and Wellington Shire.

Desktop assessment

A complete list of all properties in each municipality was obtained from respective council property rating systems. Each property record had an associated property number as an identifier, and a land category code that described the land use for that particular property. The number of current non-residential properties was calculated by taking this list, sorting alphabetically by land-use description and manually removing all entries that constituted a dwelling.

Due to there being no readily available data on the number and type of buildings constructed during the study period, it was assumed that the proportion of growth in the non-residential sector was in line with that in the residential sector. Therefore the estimated number of non-residential premises existing in 1990 was calculated using census data from the Australian Bureau of Statistics.[18]

Using the VAEA Asbestos Identification and Rating System, a frequency distribution of ACM quantities in buildings was graphed. For simplicity, all units were treated as m^2 without any conversion; the resultant units were considered as m^2eq. Buildings fell into three size categories in this distribution:

1. Small (less than 250m^2eq ACMs)
2. Medium (between 250-500m^2eq ACMs)
3. Large (more than 500m^2eq ACMs)

The average quantity of ACMs in each category was also calculated for each municipality. Assuming that the distribution of ACM quantities in the broader built environment mirrors that in government-owned buildings captured in the VAEA Asbestos Identification and Rating System, the percentage – and thus the number – of premises falling into each size category was calculated.

[18] https://www.ausstats.abs.gov.au/ausstats/free.nsf/0/6FD042C8ABF4B16BCA2574BE0083CC33/$File/27302_1991_170_Census_Counts_for_Small_Areas_-_%20Victoria.pdf

The estimated volume of ACMs in a given municipality was then calculated as the sum across the three size categories of the number of properties in the category, multiplied by the average quantity of ACMs in properties of that size category. A final conversion factor of 0.0075 tonne/m^2 was applied to convert the estimates into tonnes. The results of this assessment can be seen in Table 1.

Table 1. Initial desktop estimate of volumes of asbestos-containing materials in the non-residential sector, excluding government-owned buildings

	Baw Baw Shire	Latrobe City	Wellington Shire
Number of non-residential properties, current	5,904	6,161	5,246
Number of non-residential properties as at 1990 (estimated)	3,601	4,929	3,882
Percentage of non-residential properties existing in 1991	61%	80%	74%
Small premises (%)	83%	83%	88%
Medium premises (%)	10%	9%	9%
Large premises (%)	6%	8%	3%
Average qty ACMs in a small non-residential premise (m^2eq)	58	55	57
Average qty ACMs in a medium non-residential premise (m^2eq)	356	380	335
Average qty ACMs in a large non-residential premise (m^2eq)	844	777	1,549
Total ACMs in small non-residential premises (m^2eq)	174,336	224,998	194,433
Total ACMs in medium non-residential premises (m^2eq)	130,668	174,411	119,274
Total ACMs in large non-residential premises (m^2eq)	192,569	294,603	177,906
Total estimated ACMs (m^2eq)	497,573	694,011	491,613
Total estimated ACMs (tonnes)	3,732	5,205	3,687
		TOTAL (m^2eq):	1,683,197
		TOTAL (tonnes):	12,624

Categorising buildings

A complete list of all properties in each municipality was obtained from the relevant local council property and rates (or information management) team. This list was exported as an Excel spreadsheet with fields for each property record, a unique identifier for each property known as the property number, the associated land-owner and land category code, and the property address.

Properties that were deemed to be out of scope or government-owned buildings (for which estimated volumes of ACMs already exists), were removed at this point based on the 'owner' field. These could also be identified as they are classed by council under an 'exempt' rating class.

Properties with a land category code that were considered residential or non-commercial were removed from the list. A table of these land category codes is shown in Appendix A.

The remaining properties were mapped to a simplified building category based on their land category code. In cases where the building was a house, but used for non-residential purposes, this is reflected in the land-use description so these were considered to be in-scope for the purposes of the study.

The VAEA also classified buildings according to a typology developed for the Asbestos and Identification Rating System, which was applied in this study. To calculate the total building area for each property, the council rating database and cadastre, along with the Bing building footprint layer, was used to create a new building footprint layer. Building polygons from the Bing dataset and QGIS were used to match the properties in the council database using their unique geographic location. This then allowed for the addresses of each VAEA property to be identified and the building area associated with that property to be determined.

A conversion system was designed to translate the VAEA building typologies to one of the following six building categories used for this study:

1. **Industrial:** Premises such as factories, workshops, manufacturing, light industrial, transport, communications, defence and emergency services and, significantly, agricultural properties
2. **Accommodation:** Premises such as hotels, motels, hostels, caravan parks, lodges, tourist resorts, retirement villages and houses associated with a commercial property such as rectories, presbyteries and curator's cottages
3. **Community:** Premises such as non-government schools, universities, pre-schools, community centres, places of gathering, halls, cemeteries, places of worship, cultural and heritage sites, museums, libraries, sports facilities, reception venues, and correctional and justice facilities
4. **Health:** Premises such as private hospitals, clinics, consulting rooms, aged care complexes (when associated with a hospital, health clinic or palliative care centre), and community or maternal health centres
5. **Retail and office:** Premises such as shops, cafes, restaurants, clubs, cinemas, service stations, shopping centres, theatres, supermarkets, sales rooms and showrooms
6. **Government buildings:** All buildings owned by either the State or Federal Government and included in the VAEA Asbestos Identification Rating System register.

The mapping of different classification systems used to devise the above building categories for this study is shown in Appendix B.

The decision to include agricultural properties in the industrial category was made based on the relatively low number of asbestos assessments that were available for agricultural properties, given that they represent such a great majority of non-residential properties in the study area. Since statistically

significant results could not be obtained with the information available, and as the industrial category was the most alike to the agricultural sector, the two categories were merged. This illustrates both a key weakness of the model and also a key finding, in that the agricultural sector may constitute a blind-spot with regards to the maintenance of asbestos registers and awareness of asbestos-related risks.

Council property cadastres and Geographical Information Systems (GIS) mapping

A current property cadastre was obtained from council for each municipality. This cadastre included the property number for each property object. The cadastre was loaded in QGIS[19] and the list of commercial properties for the municipality was joined to the cadastre based on the property number field. This created a copy of the cadastre containing only those properties identified so far as being in scope.

Historic aerial imagery from the Geoscience Australia online repository

The purpose of this analysis is to refine the scope temporally to consider only those properties containing buildings constructed before 1990. Historic aerial imagery from as close as possible to 1990 was obtained from the Geoscience Australia online repository for all population centres in each municipality. Due to the geographic scale of the municipalities, it was impractical to cover the whole area. Imagery was compared to the property cadastre to see if properties had buildings that existed in 1990. If no buildings were present in the 1990 imagery, properties were deleted from the cadastre. If the imagery exhibited what appeared to be construction works on an otherwise vacant block, the property was retained.

Australian building footprint data

A spatial dataset containing building footprint objects for the entirety of Australia was obtained as an open-source download provided by the Microsoft Bing internet search engine via the GitHub platform.[20]

This dataset was adjusted to contain only the study area, and the building footprint layer was subsequently loaded in QGIS. The layer was joined to the list of in-scope premises using an 'intersection' function which detected when a building footprint object intersected a property, and added the area of the building footprint as a new field in the cadastral dataset. When multiple building footprints existed within a property, the function generated a new property record with the building area for that particular building.

The algorithm also generated two kinds of exceptions:

1. Due to a negligible misalignment between the spatial reference system of the cadastre and the building footprints layer, building footprints that in reality mated with a property boundary appeared to cross the property boundary in QGIS, and thus were double-counted as existing on both properties.
2. Since Bing created the building footprints layer based on aerial imagery, building footprints for buildings sharing a common wall were interpreted as a single building. This generated exceptions in townships where commercial premises share walls. The area of the single footprint was allocated against each property.

It is likely that the first type of exception can be remedied by realigning spatial reference systems within QGIS. Due to project time constraints, this was not undertaken. A random sample of 100 properties was observed for this type of exception. Only one building was identified as exhibiting the exception. Since this indicated a very low incidence, this type of exception was considered to be within acceptable limits.

[19] "Quantum GIS": a free, open-source GIS development software package

[20] https://github.com/microsoft/AustraliaBuildingFootprints

The second type of exception was handled as follows:

a. The dataset was exported and opened in Microsoft Excel.

b. A SUMIF function was used to add all building areas for each property number, to give a total area of buildings for each property record.

c. The records were sorted by the magnitude of the total building area field, and formatted to highlight duplicate values.

d. Duplicates were then deleted manually.

   This also removed duplicates generated when a single physical property had more than one property number which was associated with a past or subordinate land-use – for instance a farm that also provided bed and breakfast accommodation, or an aerodrome that had a fire station facility on the same property. In this first example, where the two land-uses fall within very different categories (Industrial and Accommodation), the decision was made to delete the bed and breakfast record since the agricultural use would clearly dominate the use of asbestos products on the property. In the second example, where the two land-uses are both industrial, whichever record was encountered first was deleted.

The resulting dataset represented all in-scope properties within the municipality, with an associated building category derived from the land category code, and with the sum of building areas on each property.

Categorising asbestos-containing materials

The VAEA Asbestos Identification and Rating System

The Victorian Asbestos Eradication Agency (VAEA) was established in 2016 to prioritise and plan for the removal of the asbestos from government-owned buildings including offices, hospitals, train stations, community centres, prisons and TAFEs. It has a consolidated register of all asbestos in government-owned buildings in Victoria.

Reports including asbestos registers for all state and Commonwealth government-owned premises in the three municipalities were obtained from the VAEA. These reports listed all ACMs identified in each building, along with the address and building use. The product type, friability rating and mass were also included. The VAEA developed a conversion system to calculate the mass in kilograms (kg) of ACMs based on the measurements used by asbestos auditors (i.e. m^2 for cement sheet or lineal metres for pipework). This system was utilised in this project to convert units to kilograms. The conversion chart for this can be found in Appendix C.

The information in these registers was extracted and placed into a new register which forms the basis of the model. ACMs were assigned to one of 14 product groups:

1. Cement sheet
2. Vinyl products
3. Pipes and flues
4. Millboard
5. Rope, lagging and seals
6. Fuses and packing
7. Fire doors
8. Switchboards
9. Gasket
10. Telecommunications pit
11. Bituminous lining, adhesive and sealant
12. Mastic and putty
13. Waste and debris
14. Insulation products.

Asbestos registers from other sources

An asbestos register for 217 properties was obtained from Latrobe City Council. This register was notable for several reasons. It was very detailed, and included documentation of all removals from premises, both partial and complete. It also included, in addition to buildings owned or managed in whole or in part by council, buildings that had any historic association with council works programs. This meant that a proportion of buildings in five of the six building categories determined for this study were present. The Council register did not appear to have information on government-owned buildings.

Since certain building categories seemed to be under-represented in both the VAEA and council registers, asbestos assessments were obtained from two private companies. One company was able to provide 58 registers in a spreadsheet file format with identifying information redacted, whilst the other required an on-site visit to physically transfer data from 55 registers to an electronic spreadsheet under direct supervision to maintain commercial-in-confidence provisions. The building-use and building footprint areas were also obtained from these companies. These registers were chosen to represent as much as possible both the Industrial and Retail and office building categories. Some registers were not from the municipalities included in the study, but were known to be from the Gippsland region and thus were included in the model; the municipality was listed as 'Other.' These registers were then consolidated into a new register in the same format as the VAEA reports.

The model

The model made the fundamental assumptions that asbestos quantities are proportional to the size of a building, and that the quantity and type of asbestos would be similar within building categories.

Of the 547 asbestos registers consolidated into a single register, with associated building categories and building areas, there were gaps in some registers where asbestos products were identified but not quantified. There were also some buildings that could not be identified where addresses were inaccurate or ambiguous.

A method was developed to fill these gaps, based on a similar method utilised in the VAEA Asbestos and Identification Rating System. This method took the average across all known data values, and the standard deviation of the known data values in order to gain an understanding of the spread of the data, and therefore how representative the average value was. If the standard deviation was considered to be too large,[21] all data values outside of the range of the average plus/minus a standard deviation were removed, and a new average and standard deviation calculated.

In the case of building footprints, this process was conducted by building category. The results can be seen in Table 2. Trimming of the data set to reduce the standard deviations was conducted for the Industrial and Community building categories. No average was calculated for the Health building category as all complete building area information was already available for this category.

Table 2. Replacement values for Retail and office building areas by building category

Building category	Total building area (m^2)	One standard deviation (m^2)
Industrial	1057	4087
Industrial 2.0	*529*	*1083*
Accommodation	454	691
Community	1418	3063
Community 2.0	*1031*	*1391*
Retail and office	559	924

In the case of asbestos quantities, the average was calculated within each product group. The results can be seen in Table 3. Since there is a much closer correlation between building area and quantities of products in the cement sheet and vinyl products groups, these averages were evaluated as a proportion of building area. Since there were no registers that gave measurements for insulation products, the value for this product group is taken from the VAEA mass conversion chart,[22] assuming a single unit of asbestos insulation product.

[21] If the standard deviation was greater than 250% of the average value then this was considered too large.

[22] Found in Appendix C

Table 3. Replacement values for quantities of asbestos-containing materials where no quantity was stated

Product Group	Units	Average value	One standard deviation	Number of items (in units as per asbestos audits)
Cement sheet	kg/m^2	0.85	1.2	-
Vinyl products	kg/m^2	0.74	1.3	-
Pipes and flues	kg	24.4	20.9	4.88
Millboard	kg	6.3	3.3	1.26
Rope, lagging and seals	kg	10.5	16.8	3.50
Fuses and packing	kg	3.6	3.9	1.20
Fire doors	kg	211.2	238	2.09
Switchboards	kg	61.5	84.6	2.05
Gasket	kg	6.2	7.9	2.07
Telecommunications pit	kg	38.1	41.7	2.54
Bituminous lining, adhesive and sealant	kg	22.6	31.5	4.52
Mastic and putty	kg	18.6	24.6	3.72
Waste and debris	kg	23.3	23.8	3.11
Insulation products	kg	120	N/A	1.00

Having applied these averages wherever there was a gap in the data, the quantity of the various asbestos product groups per square metre of building space could be calculated. Since the information on building category was included, the model could predict asbestos volumes in buildings according to building type.

The model was applied to the lists of non-residential buildings that had been created for each municipality.

Adjusting for farmhouses counted in the residential sector

The analysis of legacy asbestos in the residential sector accounted for all dwellings across the study area, including those on farms. The modelling for this study also counted these, since dwellings on farms would have been included in the total building footprint area for farm properties.

In order to adjust for this duplication, 150m^2 as an average dwelling size was subtracted from the total building area of each farm property. The model was run again with this new parameter. This had the effect of reducing the estimates of asbestos quantities in the Industrial category.

Adjusting for asbestos removal rates

Estimating removal rates across the non-residential sector is problematic, as it is difficult to know how much asbestos was originally installed in a building, and when and in what quantities it may have been removed.

The asbestos register obtained from Latrobe City Council provided a unique opportunity to estimate these removal rates. In this register, nine buildings had undergone a complete removal and 54 a partial removal. The registers with partial removals were analysed to gain an understanding of removal rates. Removal rates were calculated by asbestos product group, but not by building category, since there were not enough records in each building category to generate meaningful results. Instead, a uniform removal rate was applied across all building categories. The subsequent calculated removal rates can be seen in Table 4.

Table 4. Removal rates applied to the model

Buildings having undergone complete removal	4.4%
Buildings having undergone partial removal	26.5%
Average percentage of asbestos-containing materials removed in a premise where removal has been undertaken	41.1%

The calculated removal rates (partial or total) were then applied as additional parameters to the model using the approach outlined below.

Partial removals	=	Quantity ACMs in the municipality × percentage buildings likely to have had removal × proportion of ACMs to have been removed
Total removals	=	Quantity ACMs in the municipality × percentage total removals × average quantity ACMs on a single property

After accounting for removals, the final figures for the likely quantity of asbestos remaining in the non-residential sector in the study area were determined.

The incidence of removal of ACMs by product group was also calculated (Figure 7). It ought to be noted that the removal of asbestos does not always indicate complete removal: for instance, 74% of all removals involved removal of some cement sheet, but not necessarily complete removal.

Cement sheet, switchboards and vinyl products were most likely to have been removed, whilst telecommunications pits, insulation products, fuses and packing, fire doors and bituminous lining, adhesive and sealant all showed no removal. It is possible that in some cases, 'fuses and packing' removals occur at the same time as switchboard removals, but only the switchboard removal is recorded. Telecommunications pits are usually remediated if asbestos is discovered during works, however the degree to which this occurs has not been verified. Items such as fire doors, where asbestos is entirely encapsulated, and which do not degrade much over time, are not likely to be removed or replaced except in cases of demolition. They are also an expensive item to remove due to their weight, and are costly to replace. Bituminous linings, sealants and adhesives are difficult and costly to remove, and are generally considered to be non-friable. They are commonly applied in places such as urinal backings and sink underlays where they tend not to be removed. Insulation products tend to be left in place because they generally occur in roof spaces, where there is minimal access, or are encapsulated in hot water systems, heaters or incinerators and so the risk of disturbance is considered to be low.

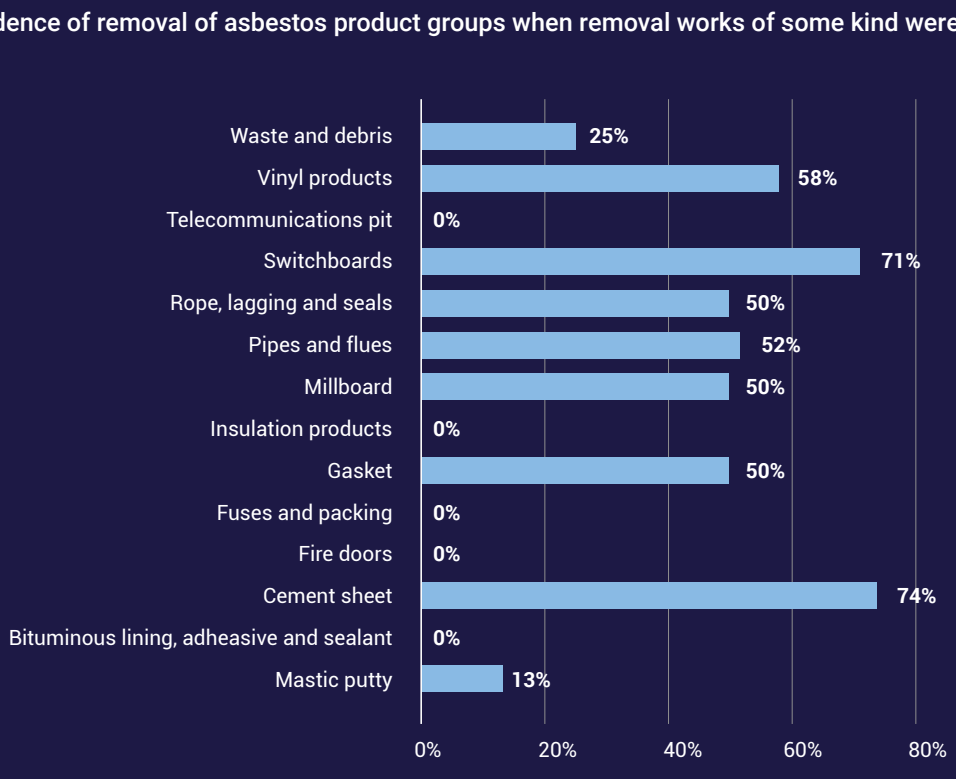


Figure 7. Incidence of removal of asbestos product groups when removal works of some kind were undertaken

Proposed location surveys to verify asbestos removal rates

A second method was proposed to establish removal rates within individual municipalities. This method was not undertaken in this study since on-site inspections were not permitted due to the public health restrictions imposed during the COVID-19 pandemic. This method could be useful in jurisdictions where no other data is available to calculate removal rates. A brief outline of this method is included below.

Firstly, a representative sample of non-residential premises known to have been constructed prior to 1990 is selected. Building permits for these are obtained from council records, and the kind and number of works undertaken is reviewed.

Then, an inspection is conducted at each premises (possibly in the company of the municipal building surveyor). This inspection seeks to gain an understanding of the kind and nature of works that have occurred in the premises. These are then compared to the works documented in the building permits.

Finally, an estimation of the removal rate in the sample can then be made and extrapolated by comparing it to the kind and number of building permits across all non-residential properties in the municipality.

This method is limited by the ability of the inspectors to identify when works are likely to have resulted in asbestos removal, and by the level of knowledge of historic works held by the owner or manager of the property.

Survey shared to businesses

A short online survey was promoted via council business and economic development newsletters in each of the three municipalities. This survey aimed to gain a high-level understanding of removal rates in commercial premises, and an indication of how many properties had an asbestos register.

Only 17 responses were received over a period of three months, and the responses showed a high degree of hesitancy and uncertainty. For this reason, and with such a small sample size, this data was not included in the report, except for the following statistics included here: 47% of respondents stated that there was no asbestos register and 47% did not answer the question. Only one respondent stated that the property had an asbestos register that had been updated in the last 12 months.

Limitations

A variety of factors either had a direct impact on how this project could be undertaken, or the interpretation of the results. Some of the more relevant factors are expounded here below:

- The COVID-19 pandemic prevented site inspections from occurring and also face-to-face interaction with stakeholders, including interviews which were substituted for online surveys.
- Only a relatively small proportion of registers used in the model were from the Retail and office building category, as few were available.
- Only a very small number of available registers used in the model were from industrial premises: 27% compared to 73% of properties in the study area falling into this category. This leads to the following limitation.
- A disproportionately high number of premises in the Industrial category were agricultural premises. This can be seen clearly in Figure 8 below.

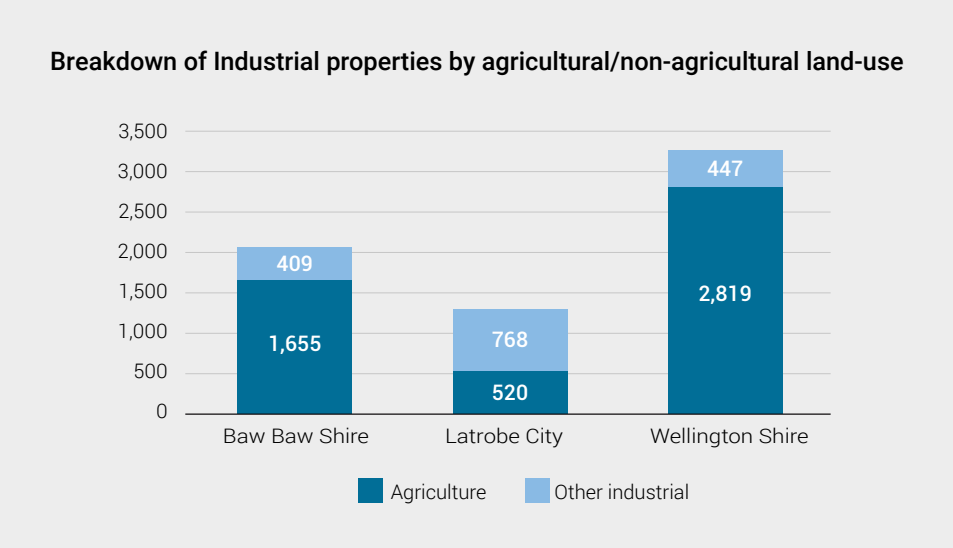


Figure 8. Breakdown of industrial properties by agricultural/non-agricultural land-use

Since there was no removal of properties outside of major population centres using aerial imagery, there may be farming properties established after 1990 included, which could possibly affect the results. While the number of new farms established since 1990 may be low, it is possible that renewal of buildings could be higher. Newer farms may abandon redundant infrastructure as business enterprises change from say, beef to horticulture or other farming activity. In addition, it is also possible that agricultural properties are not representative of the Industrial category on the whole, and should be treated as their own category. This would require more asbestos assessments for farms specifically, which were not available for this study.

- The model works for areas with no high-rise infrastructure such as regional areas. In urban areas with high-rise buildings, understanding the average number of storeys in a building would be required to adjust the model.
- The model only evaluates the quantity of ACMs directly. For disposal purposes, there are packaging factors, and also additional material that is disposed of. The typical example of this is asbestos-contaminated soil, but this phenomenon occurs regularly and to various degrees with all asbestos product groups: for instance, if a hot water unit contains asbestos insulation, the entire unit is disposed of. If a flange gasket is identified for removal, in practice the entire flange may be cut out of the pipework and disposed of.

Non-residential asbestos in the Shire of Baw Baw

The Shire of Baw Baw covers an area of 4,025km^2, bounded by the municipalities of Cardinia Shire to the West, South Gippsland Shire to the south, Latrobe City to the east, and Wellington, Mansfield and Yarra Ranges Shires to the north. The residential population as at 30 June 2020 is estimated at 54,88423 with 2,795 properties designated as non-residential (see Figure 9 below).

The major industry is construction, followed by agriculture, forestry and fishing.[24] Historically the area is known for farming – beef and dairy, along with significant potato farming in the south around the township of Thorpdale. There are several sawmills, small quarries, as well as other food manufacturing plants and various light industry.

The major towns are Drouin and Warragul, situated 98km and 105km east of Melbourne respectively. Other large townships are Trafalgar, Longwarry and Yarragon. Warragul, Yarragon and Trafalgar act, among other things, as service centres for the surrounding regional areas, specifically farms.

[23] https://profile.id.com.au/baw-baw/population-estimate retrieved 7 Oct 2021
[24] ibid

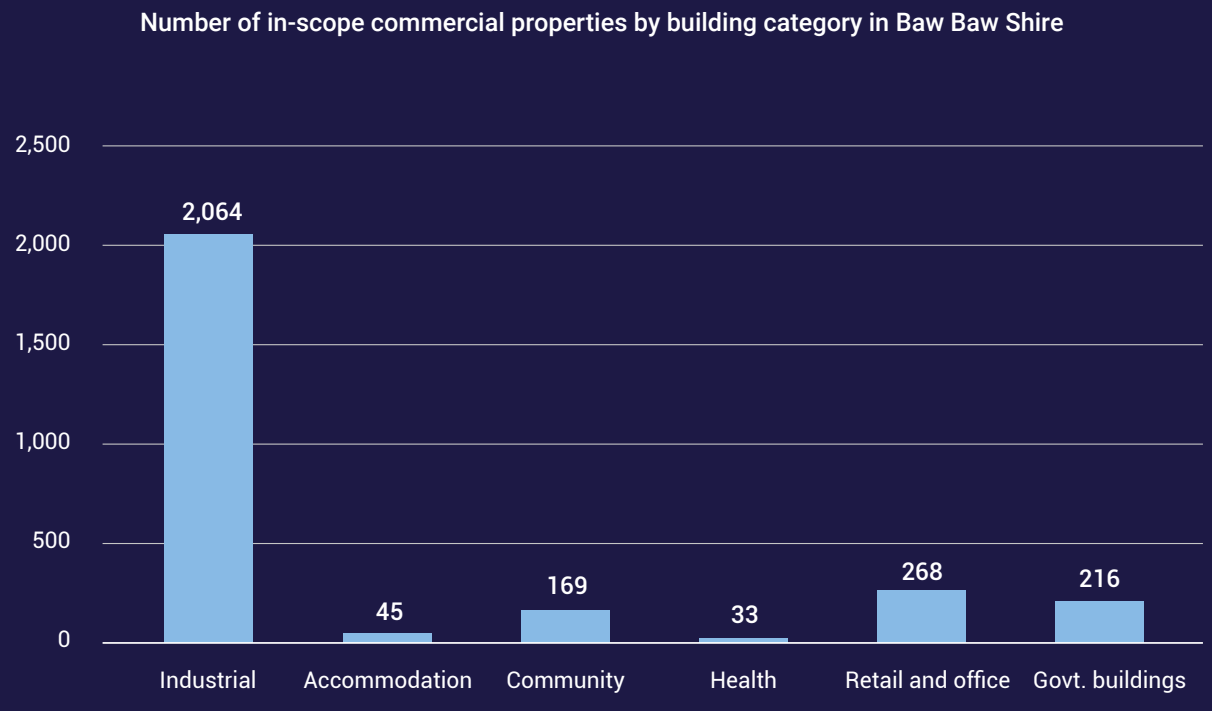


Figure 9. Number of in-scope commercial properties by building category in Baw Baw Shire

Results

The modelling calculated a total of 556,786 m^2eq (4176 tonnes) of ACMs to be present in non-residential buildings in Baw Baw Shire. This was the smallest quantity of the three municipalities, being less than both Wellington Shire and Latrobe City.

The Industrial building category was the largest contributor to asbestos quantities in Baw Baw Shire at 469,944 m^2eq (3525 tonnes), largely due to the high proportion of agricultural properties. This was followed at some distance by Government-owned buildings (25,602 m^2eq), and Retail and office buildings (25,529 m^2eq) as shown in Figure 10 below.

This reflects the function of Baw Baw Shire as both as a residential growth corridor and agricultural centre.

Volume of asbestos-containing materials by building category

Figure 10. Volume (m^2eq) of asbestos-containing materials by building category in Baw Baw Shire

Volume of asbestos cement sheet by building category

Asbestos cement sheet accounted for 89% of ACMs in Baw Baw Shire, totalling 424,899 m^2eq (3,737 tonnes).

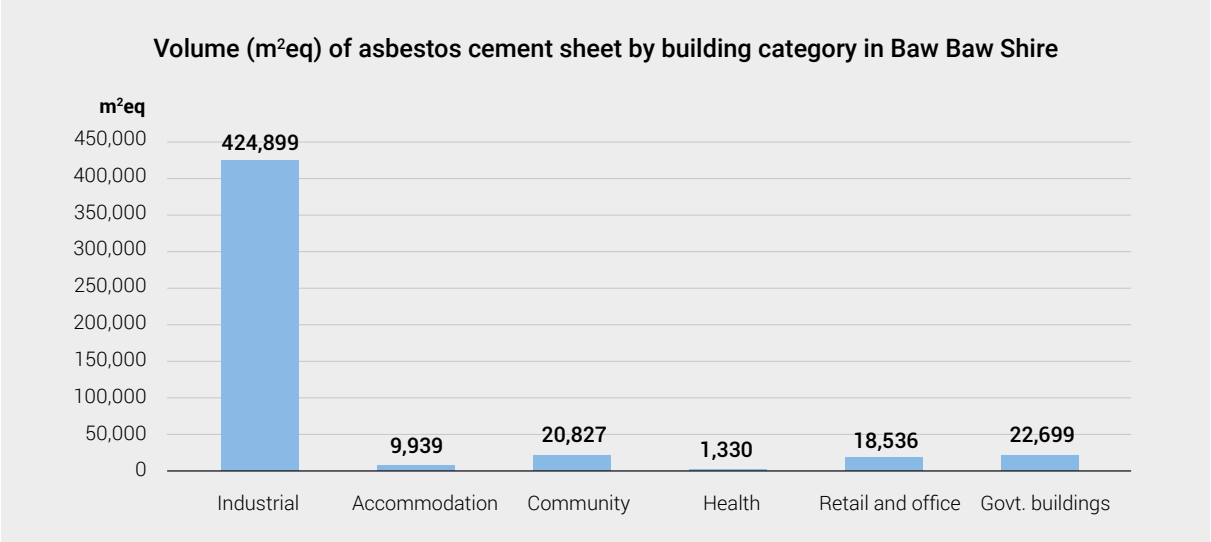


Figure 11. Volume (m^2eq) of asbestos cement sheet by building category in Baw Baw Shire

Volume of asbestos-containing materials by product group and building category

After asbestos cement sheet, the most popular application of asbestos-containing materials in Baw Baw Shire is vinyl products. However, in both community and government-owned buildings, there is a higher volume of mastic and putty products containing asbestos.

Compared to the other two municipalities, there is a significantly lower proportion of ACMs in government-owned buildings found in Baw Baw Shire.

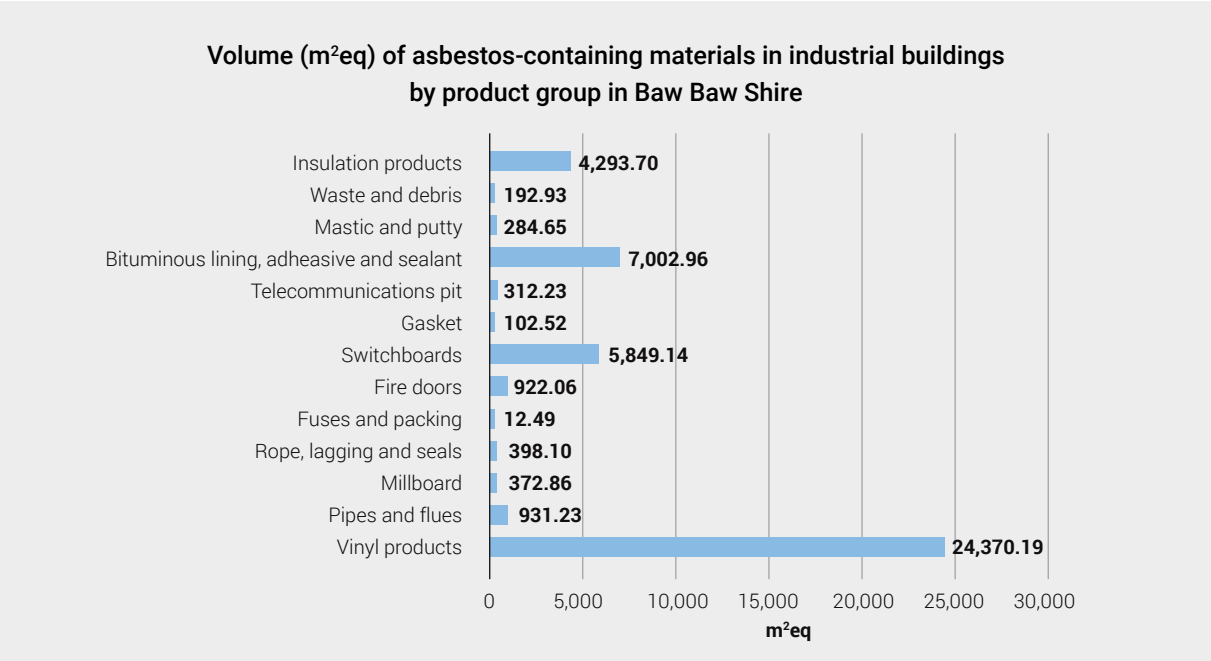


Figure 12. Volume (m²eq) of asbestos-containing materials in industrial buildings by product group in Baw Baw Shire

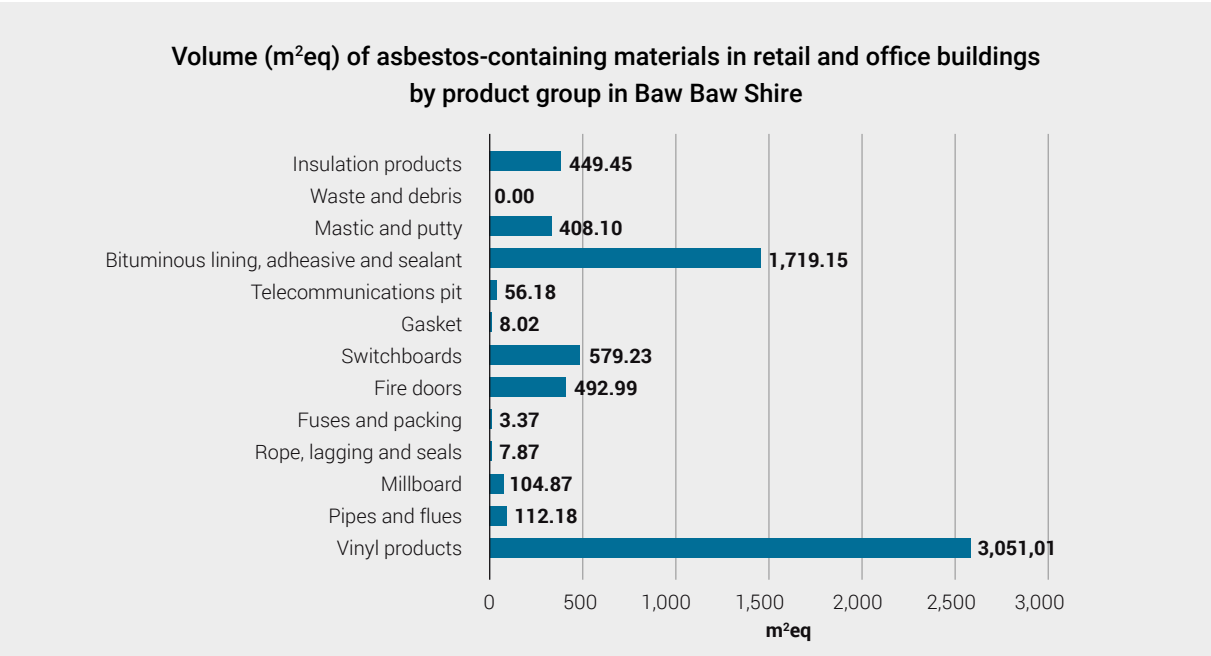


Figure 13 . Volume (m²eq) of asbestos-containing materials in retail and office buildings by product group in Baw Baw Shire

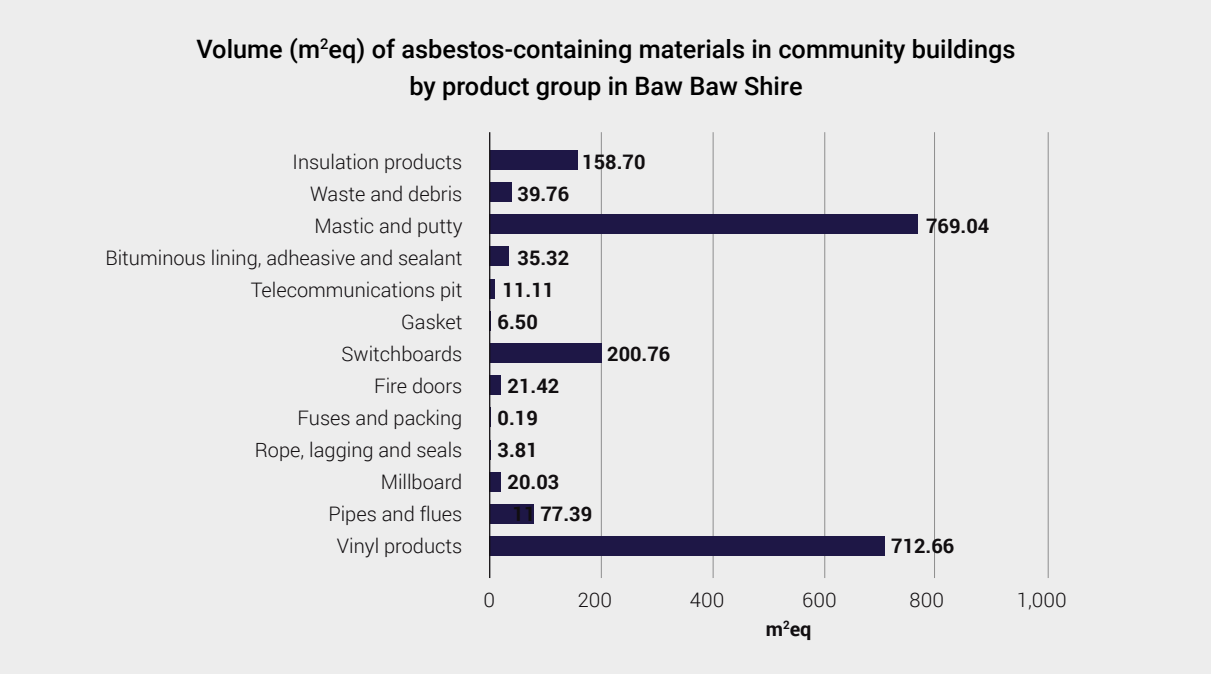


Figure 14. Volume (m^2eq) of asbestos-containing materials in community buildings by product group in Baw Baw Shire

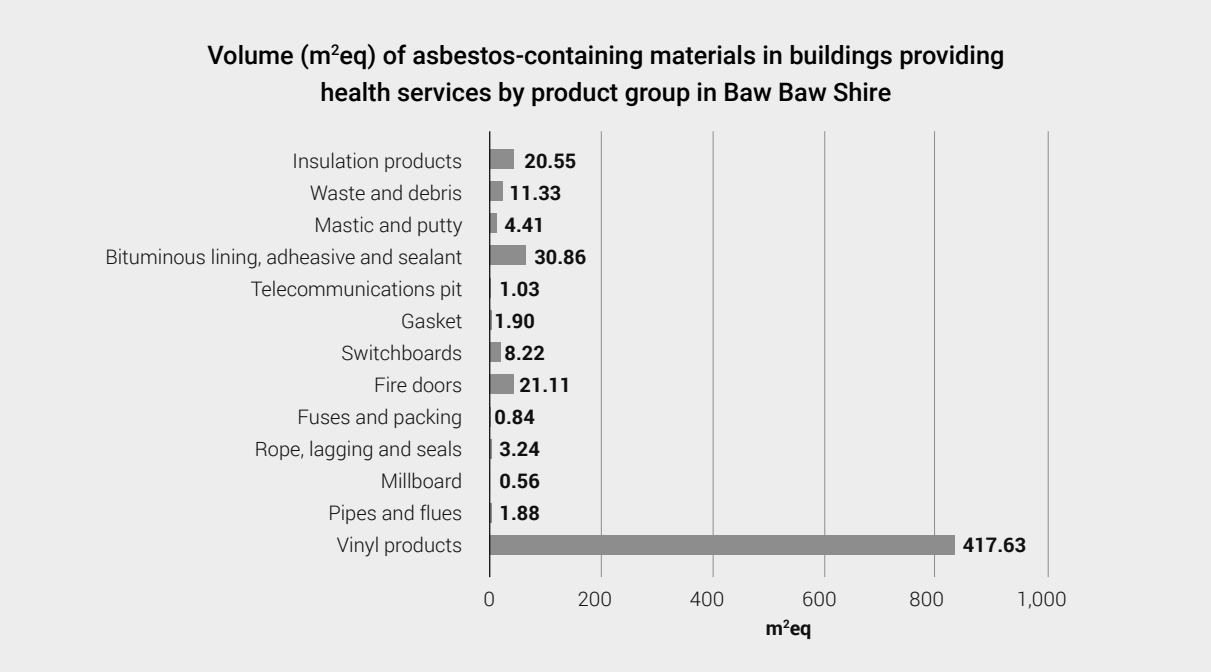


Figure 15. Volume (m^2eq) of asbestos-containing materials in buildings providing health services by product group in Baw Baw Shire

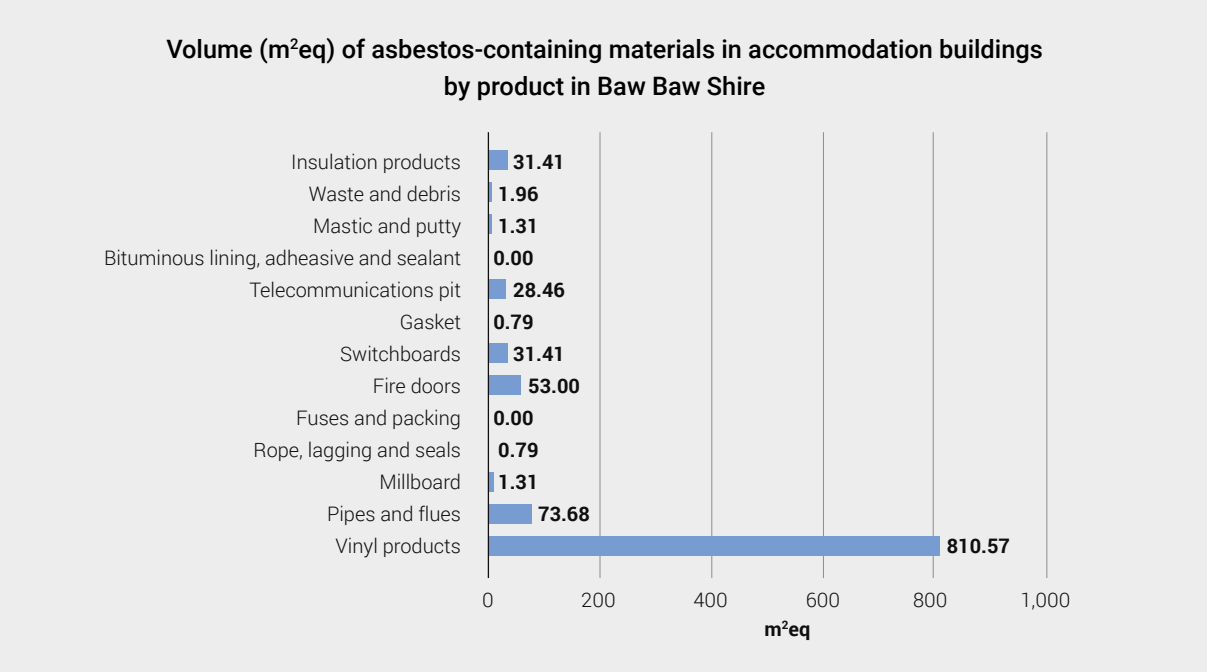


Figure 16. Volume (m²eq) of asbestos-containing materials in accommodation buildings by product group in Baw Baw Shire

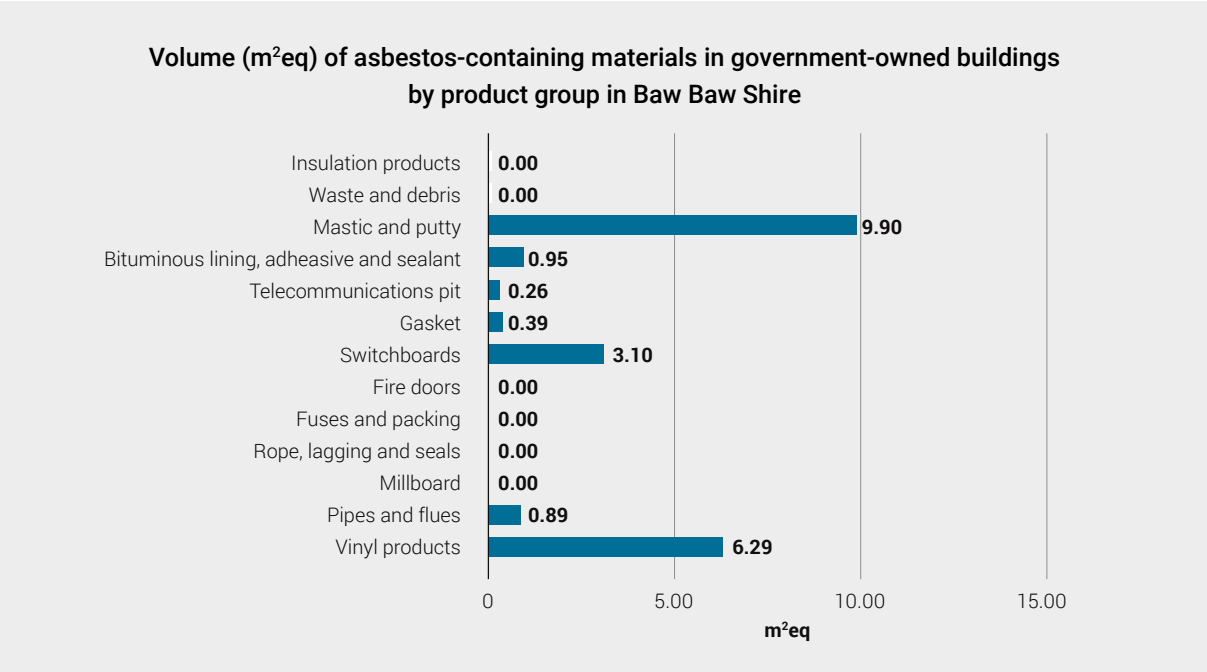


Figure 17. Volume (m²eq) of asbestos-containing materials in government-owned buildings by product group in Baw Baw Shire

Non-residential asbestos in the City of Latrobe

The City of Latrobe covers an area of 1,422km^2, bounded by Wellington Shire to the north and east, South Gippsland Shire to the south and Baw Baw Shire to the west. As at 30 June 2020, the estimated residential population is 75,915[25] with 2,376 properties designated as non-residential (Figure 18).

The major towns are Traralgon, Moe, Newborough and Morwell. Other large townships include Churchill and Yallourn North.

The majority of the population (78%) lives in the major towns along the freeway transport corridor and train line. These townships are heavily industrialised and support the Maryvale paper mill and the various Latrobe Valley power stations, which have heavily influenced much of the growth and development of the Latrobe Valley. Other industries within the area include forestry, beef and cattle farming, tertiary education and government administration. The municipality also boasts extensive medium-heavy industry including food manufacturers as well as the Latrobe Regional Airport.

[25] https://app.remplan.com.au/latrobe/community/population/

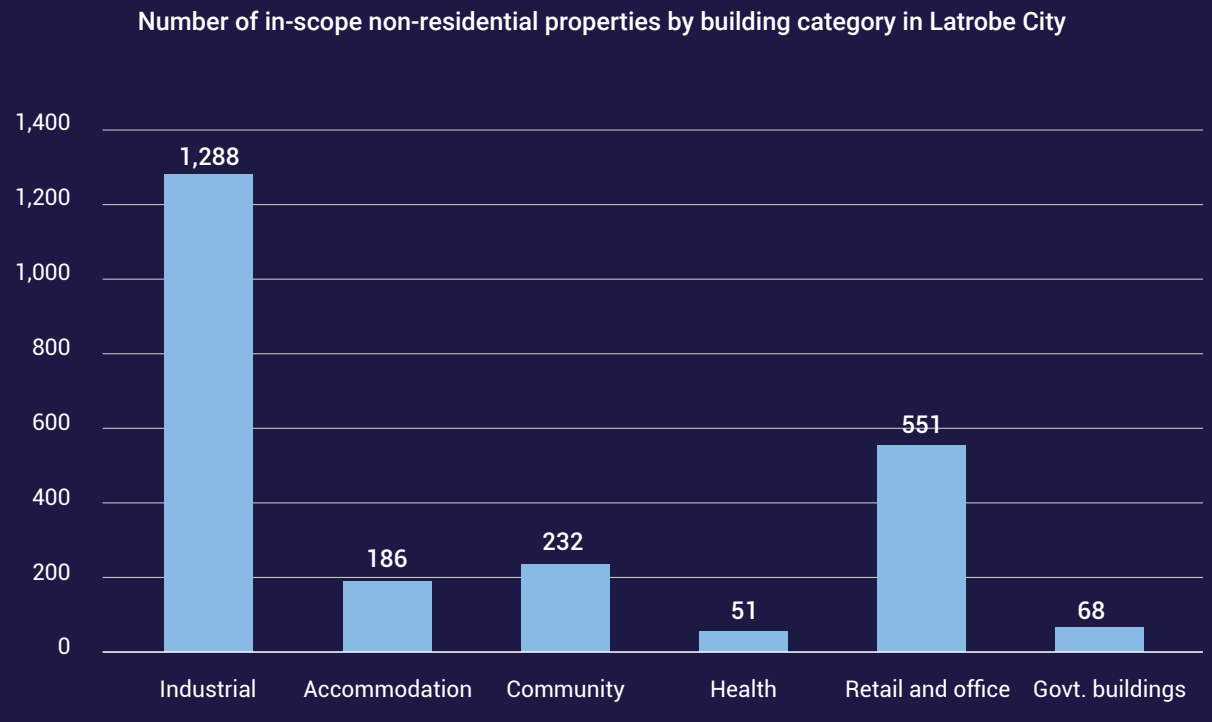


Figure 18. Number of in-scope non-residential properties by building category in Latrobe City

Results

The modelling calculated a total of 613,310 m^2eq (4600 tonnes) of ACMs to be present in non-residential buildings in Latrobe City. This was the second largest quantity of the three municipalities, being less than Wellington Shire but greater than Baw Baw Shire.

In Latrobe City, retail and office buildings accounted for a greater proportion of ACMs than in the other municipalities. The Industrial building category still accounted for the majority of ACMs in the municipality, despite Latrobe City having the lowest proportion of agricultural properties in the Industrial category. This reflects the high proportion of light and medium-heavy industry in the City of Latrobe.

The results accurately mirror the commercial make-up of the City and its position as a retail, administrative and industrial hub for the surrounding regions.

Volume of asbestos-containing materials by building category

In Latrobe, after asbestos in industrial buildings at 389,864 m^2eq, the next highest is the Retail and office category at 81,163 m^2eq, followed by Accommodation at 72,004 m^2eq. Whilst in Baw Baw Shire the volumes of legacy asbestos in retail and office buildings are on par with government-owned buildings, in Latrobe there is 10 times as much asbestos in retail and office buildings as there is in government-owned buildings.

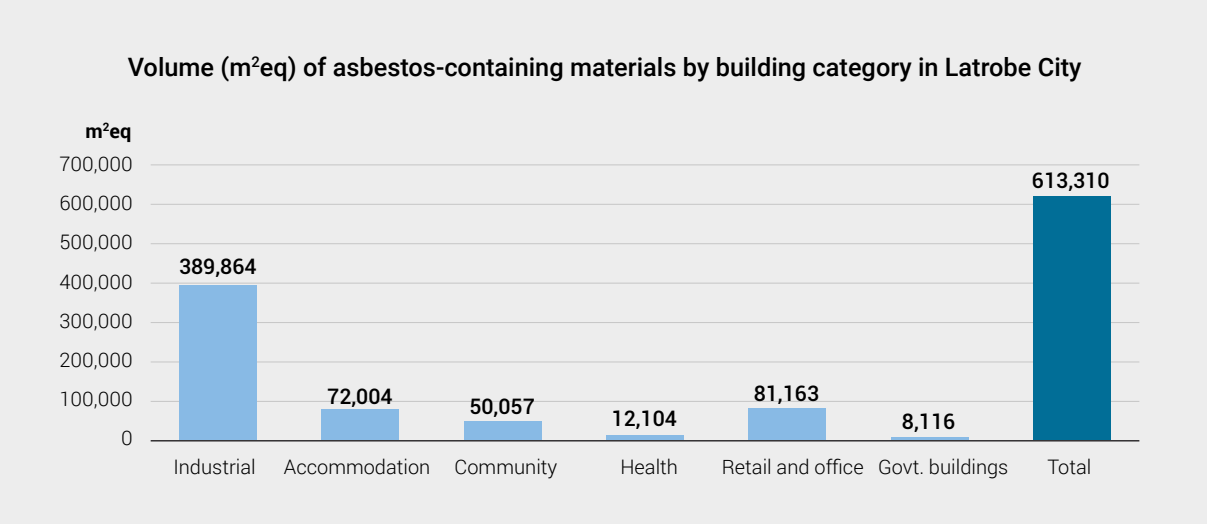


Figure 19. Volume (m^2eq) of asbestos-containing materials by building category in Latrobe City

Volume of asbestos cement sheet by building category

Of all the building products containing asbestos, cement sheet was as expected the greatest in terms of application and volume, with a total of 352,494 m^2eq in Latrobe City.

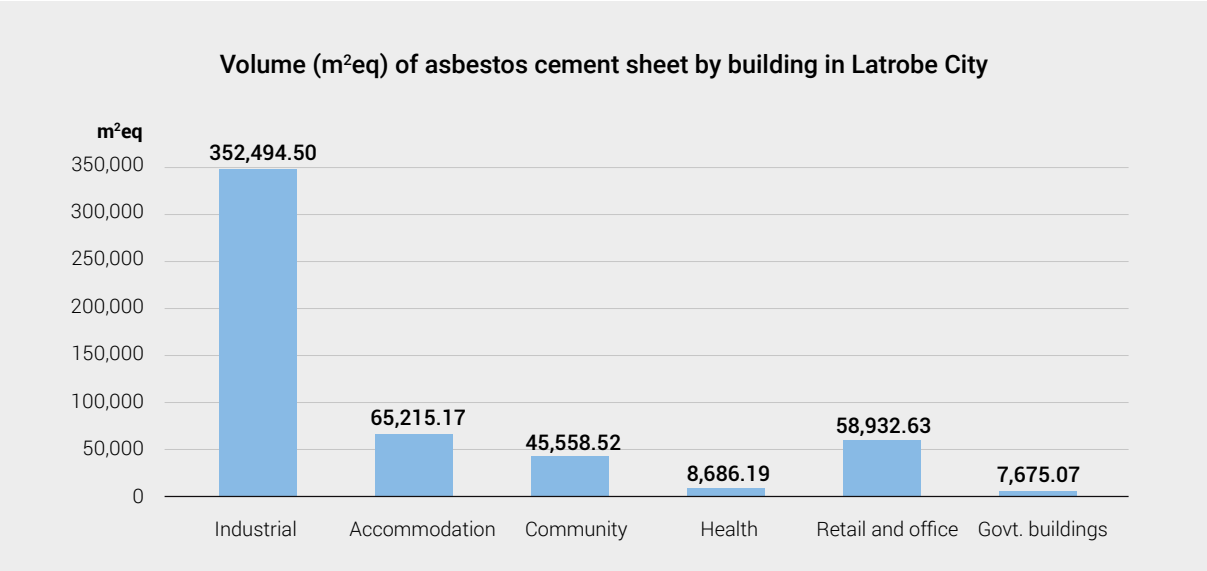


Figure 20. Volume (m^2eq) of asbestos cement sheet by building category in Latrobe City

Volume of asbestos-containing materials by building category and product group

In Latrobe City, vinyl products were the most common product group containing asbestos after asbestos cement sheet, however in community buildings, the highest volume was found in mastic and putty products with vinyl products following closely behind.

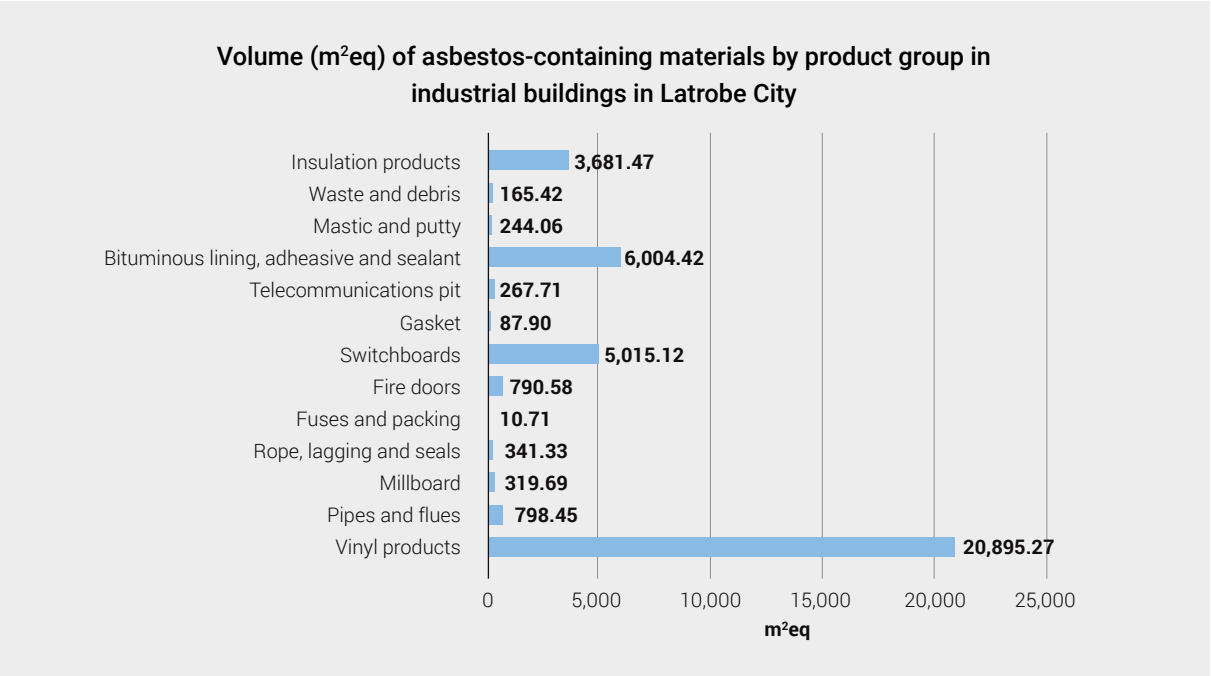


Figure 21. Volume (m^2eq) of asbestos-containing materials by product group in industrial buildings in Latrobe City

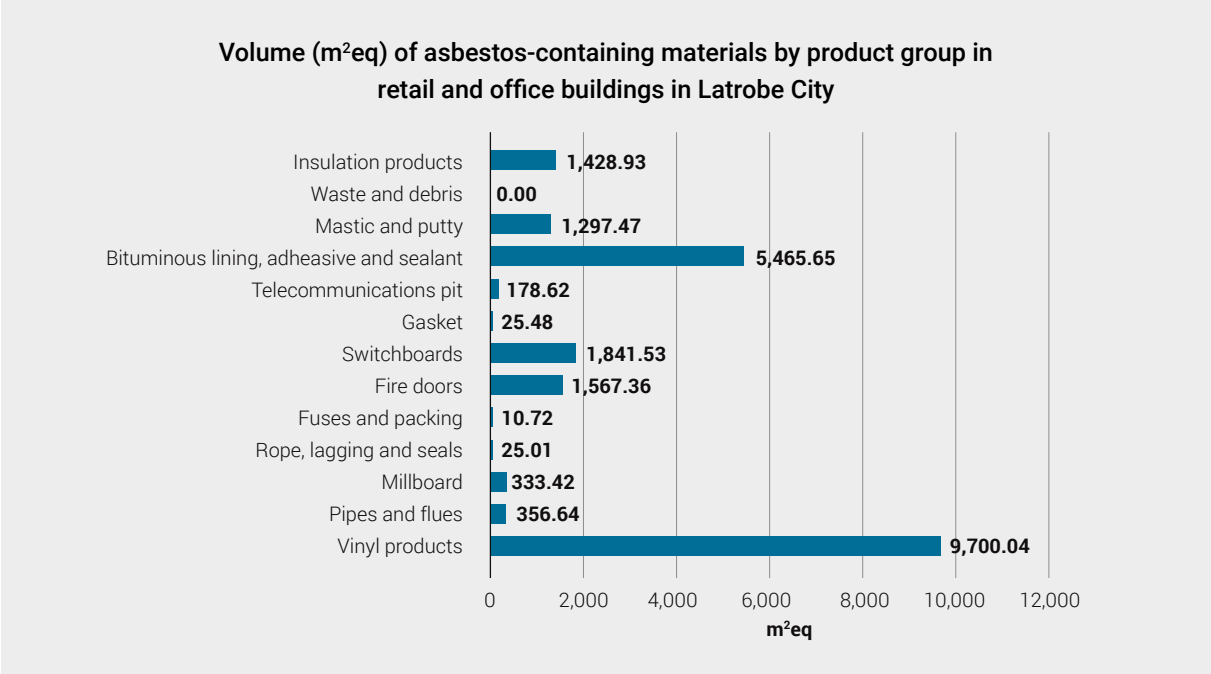


Figure 22. Volume (m^2eq) of asbestos-containing materials by product group in retail and office buildings in Latrobe City

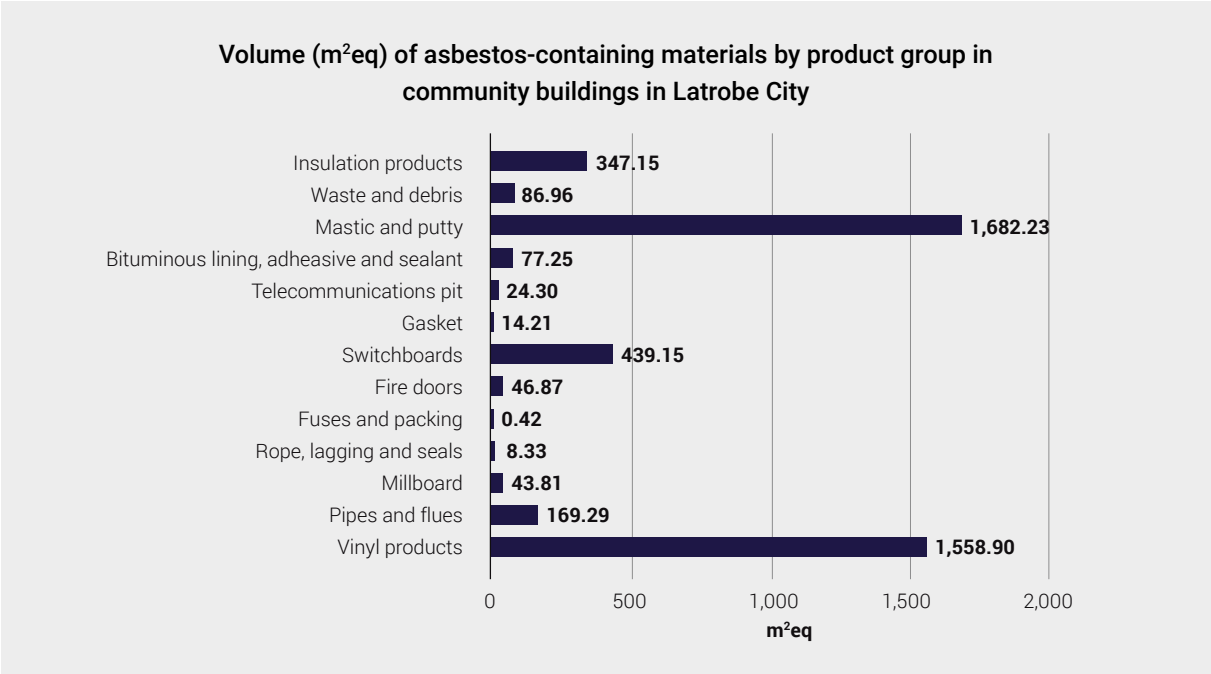


Figure 23. Volume (m^2eq) of asbestos-containing materials by product group in community buildings in Latrobe City

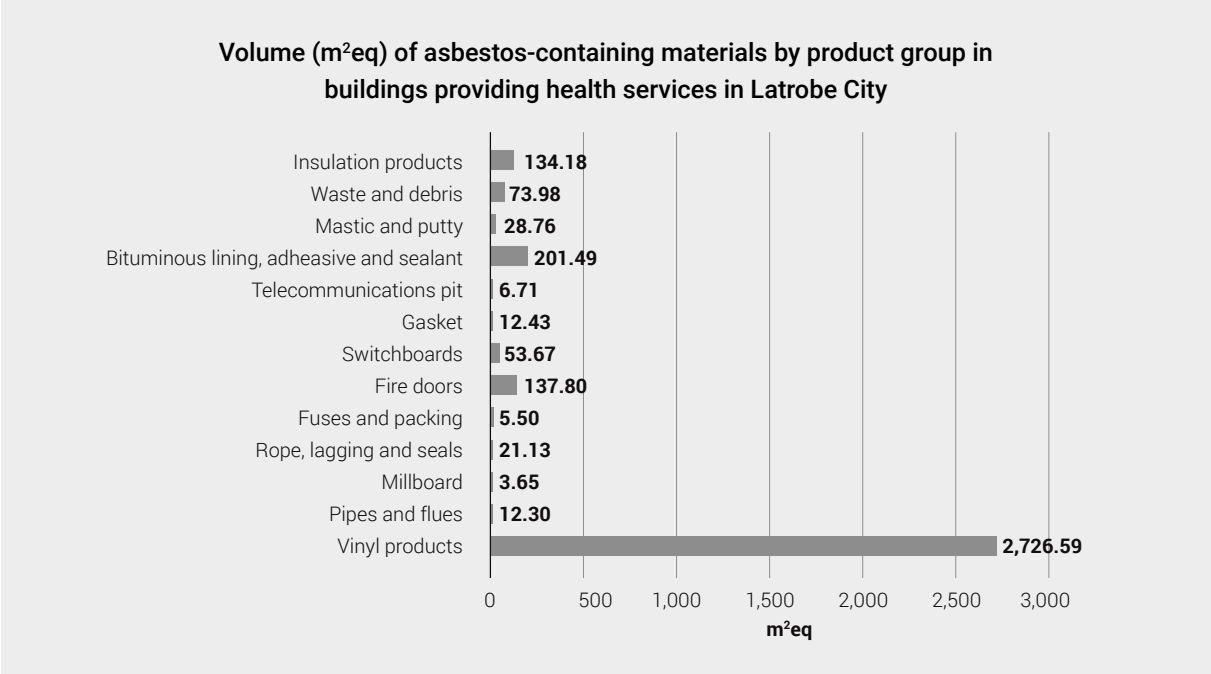


Figure 24. Volume (m^2eq) of asbestos-containing materials by product group in buildings providing health services in Latrobe City

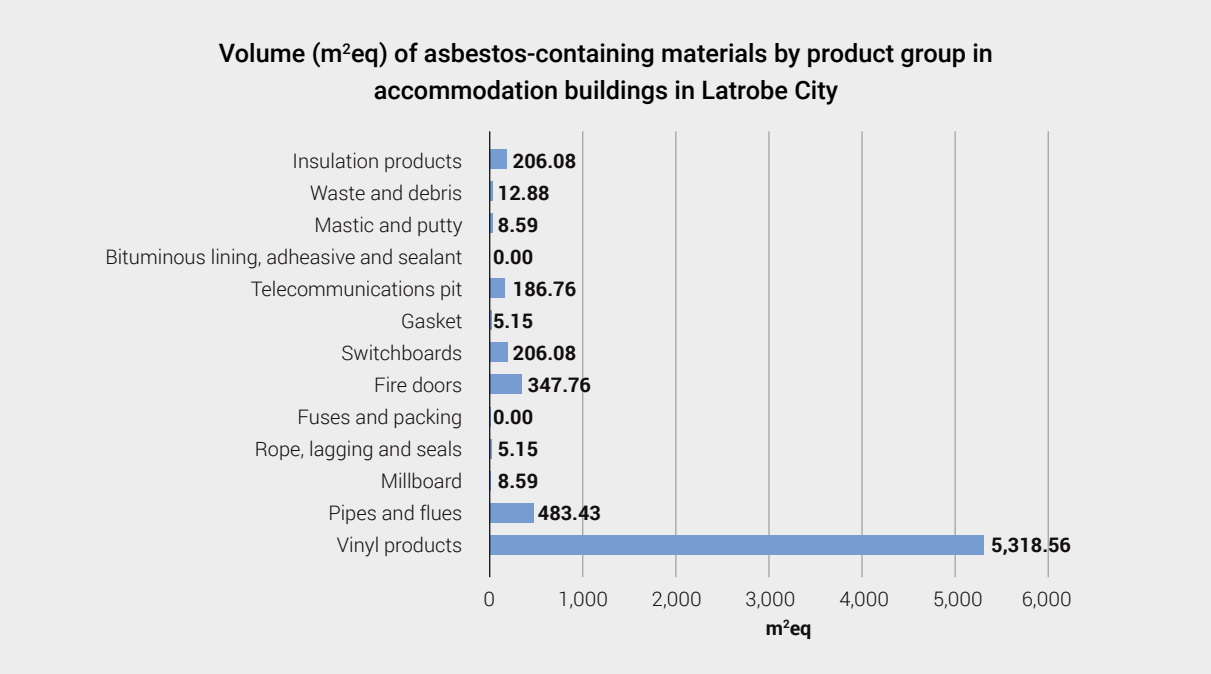


Figure 25. Volume (m^2eq) of asbestos-containing materials by product group in accommodation buildings in Latrobe City

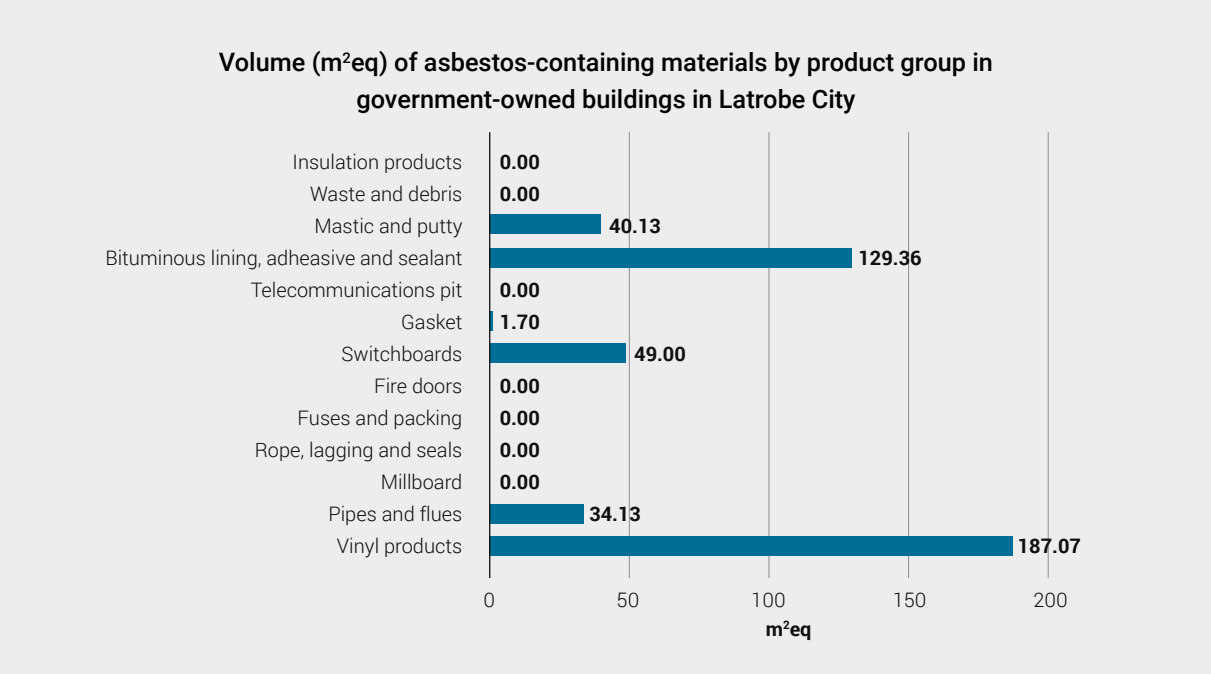


Figure 26. Volume (m^2eq) of asbestos-containing materials by product group in government-owned buildings in Latrobe City

Non-residential asbestos in the Shire of Wellington

The Shire of Wellington covers an area of 10,811 km^2, bounded by the municipalities of South Gippsland Shire, Latrobe City, Baw Baw Shire and Mansfield Shire to the west, Alpine Shire to the north and East Gippsland Shire to the east. The northern half of the Wellington Shire reaches into the Great Dividing Range and comprises mostly state and national parks with a large amount of managed logging. The major population centre is Sale. Large townships include Maffra, Yarram, Stratford and Heyfield.

The estimated residential population as at 30 June 2020 is 44,770[26] with 4,433 properties designated as non-residential (Figure 27); 2813 of these are listed as mixed farming and grazing with infrastructure.

The major industries are – and for much of the area's history have been – forestry and agriculture especially beef and dairy farming. Oil and gas have generated much economic growth since the 1960s, dropping off since the 1990s. The larger population centres have developed as commercial and service providers for the surrounding agricultural operations. Farming is the largest commercial operation in the Wellington Shire. Tourism to the alpine regions in the north and to the coastal regions in the south and east is also significant.

[26] https://profile.id.com.au/wellington-vic

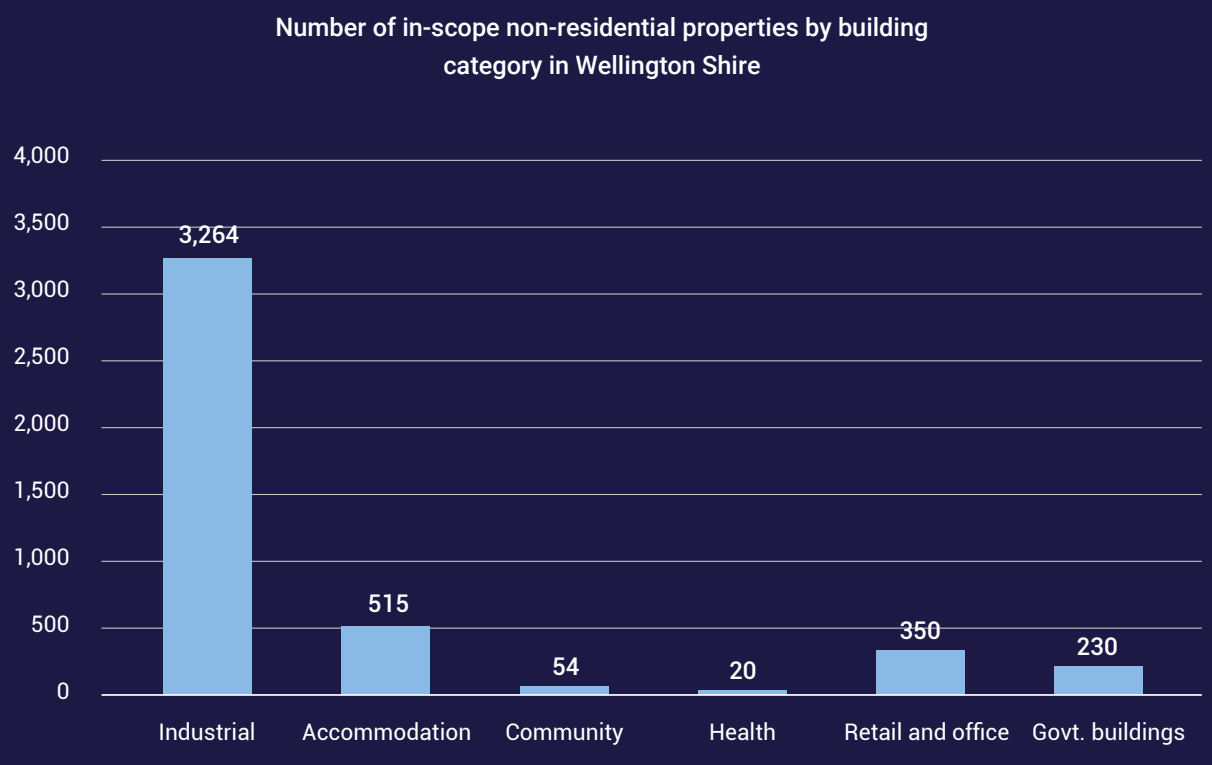


Figure 27. Number of in-scope commercial properties by building category in Wellington Shire

Adapted methodology

In Wellington Shire, the council rating system had no recorded information for state and federal government properties due to their exempt rating status. For this reason, properties in Wellington Shire listed in the VAEA Asbestos Identification and Rating System register could not be linked to a council property record to find the relevant building footprints in the Bing dataset. Instead, a web-based GIS application called Nearmap[27] was used to find addresses and measure the building areas for properties using its inbuilt area measurement functionality.

The VAEA registers were then incorporated into the model in the same manner as for the other municipalities.

Results

The modelling calculated a total of 720,957 m^2eq (5407 tonnes) of ACMs to be present in commercial buildings in Wellington Shire. This was the largest quantity of the three municipalities, being greater than both Latrobe City and Baw Baw Shire.

This was not unexpected as Wellington Shire has the highest number of non-residential properties built before 1990: 4,433 compared to 2,795 in Baw Baw and 2,376 in Latrobe City. As demonstrated, the industrial sector returns the greatest volume of ACMs of any building category and Wellington Shire also has a significant number of agricultural properties. Of all the in-scope properties in the Wellington Shire, 78% were categorised as industrial, and of these, 86% were agricultural.

On the whole, the results reflect the sheer size of the municipality, and its character as an agricultural food bowl.

Volume of asbestos-containing materials by building category

As with both Baw Baw and Latrobe, the highest concentration of legacy ACMs is found in the Industrial buildings category, with 544,249 m^2eq. The Accommodation category also registered a relatively high proportion of asbestos, with 91,420 m^2eq, likely driven by tourism in the southern coastal and northern alpine regions, as well as various bed and breakfast type businesses across the municipality.

[27] Nearmap is an Australian company that provides high resolution aerial imagery. https://www.nearmap.com/au/en

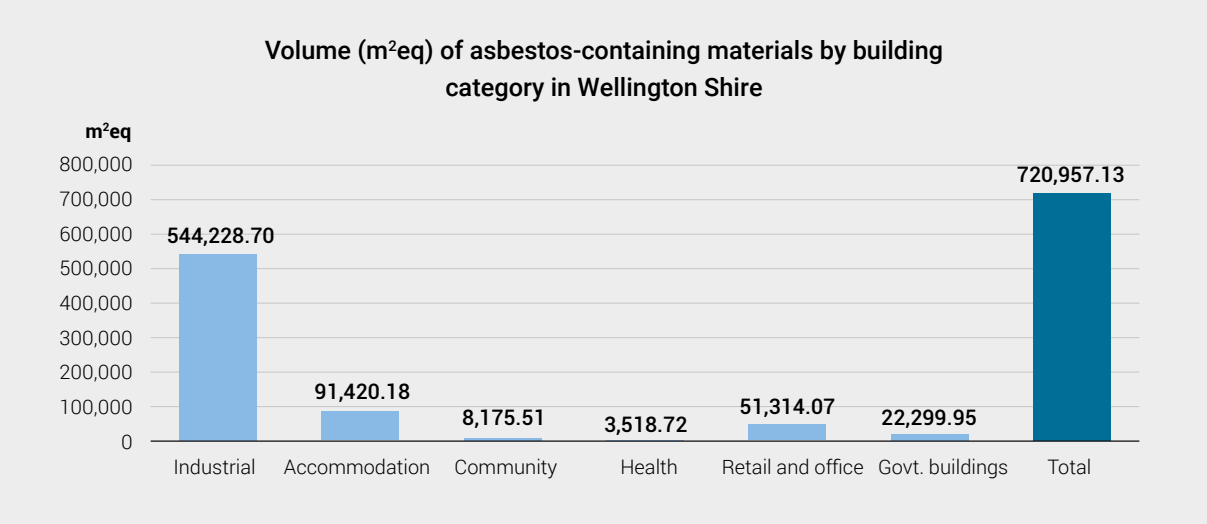


Figure 28. Volume (m^2eq) of asbestos-containing materials by building category in Wellington Shire

Volume of asbestos cement sheet by building category

Following on from the results shown above in Figure 28, the volume of asbestos cement sheet is also the highest in the Industrial category with 492,063 m^2eq, followed by the Accommodation category with 82,800m^2eq. Asbestos cement sheet represents 89% of the legacy asbestos volume in non-residential properties across the shire.

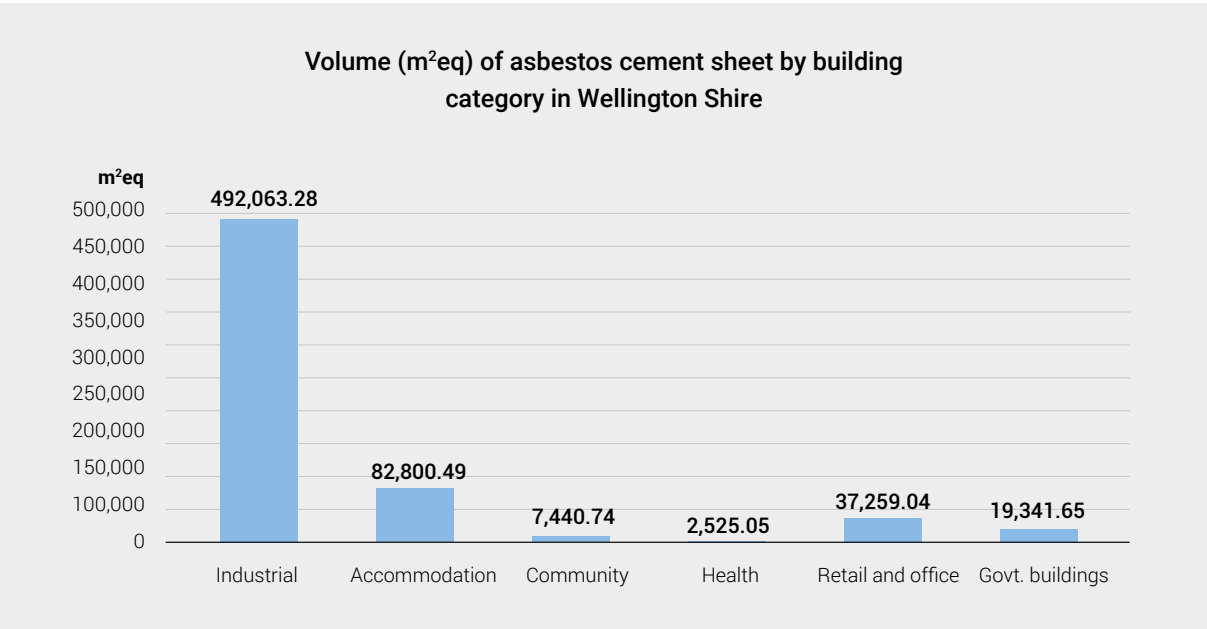


Figure 29. Volume (m^2eq) of asbestos cement sheet by building category in Wellington Shire

Volume of asbestos-containing materials by building category and product group

After asbestos cement sheet, the next highest proportion of asbestos products fall into the vinyl products category. Only in community buildings is vinyl products outweighed by the mastic and putty category, and then not by a lot: 275 m^2eq to 255 m^2eq.

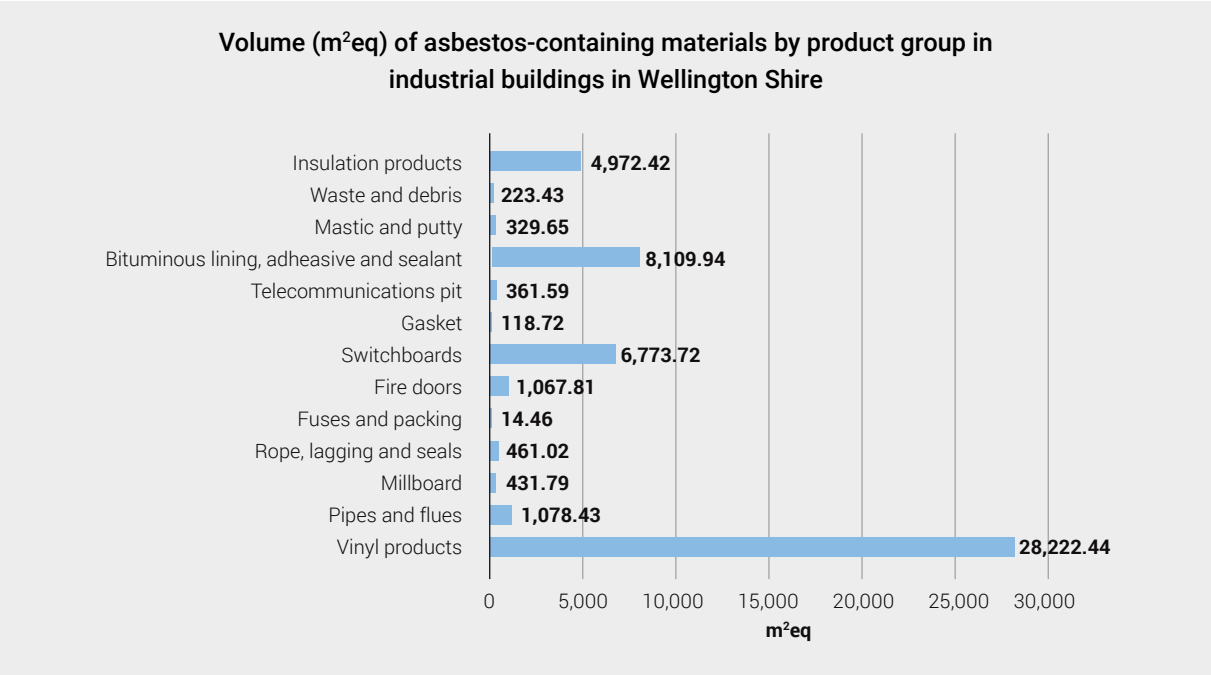


Figure 30. Volume (m^2eq) of asbestos-containing materials by product group in industrial buildings in Wellington Shire

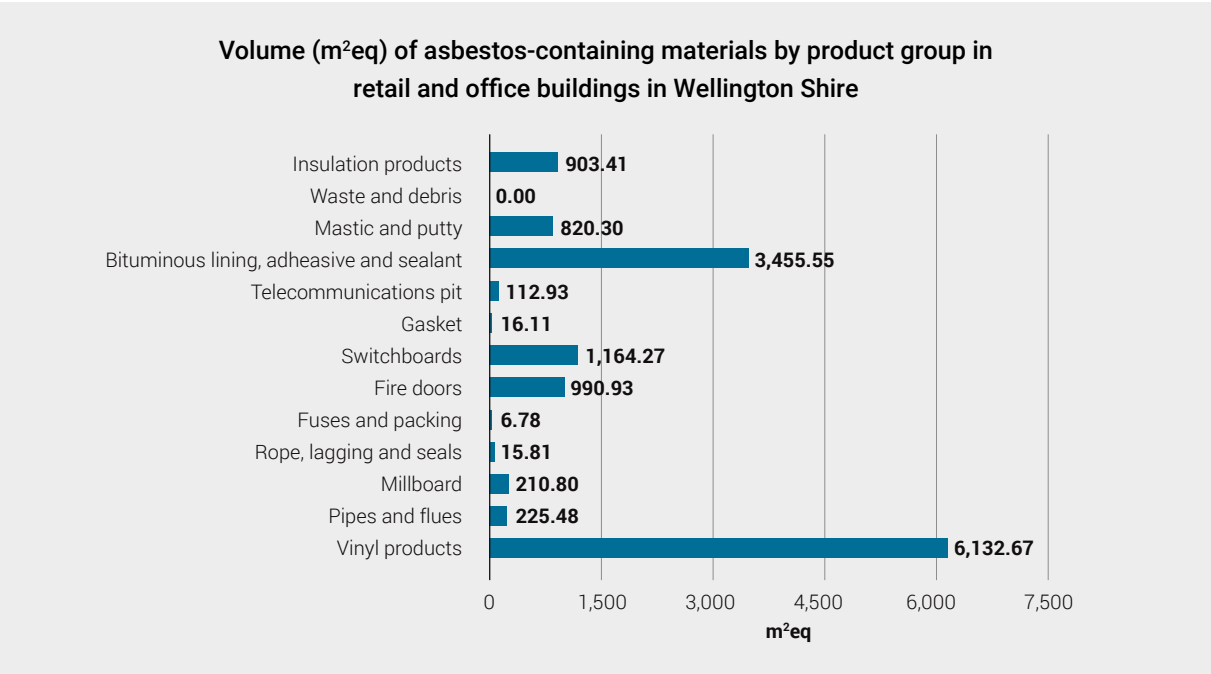


Figure 31. Volume (m^2eq) of asbestos-containing materials by product group in retail and office buildings in Wellington Shire

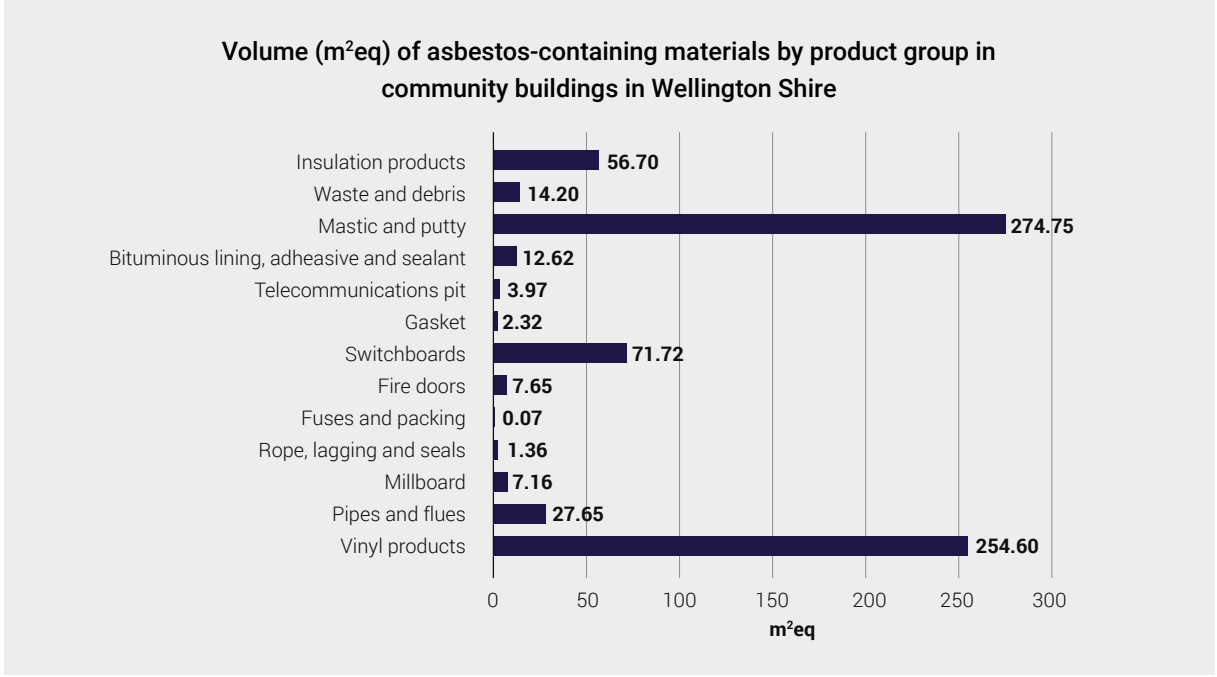


Figure 32. Volume (m^2eq) of asbestos-containing materials by product group in community buildings in Wellington Shire

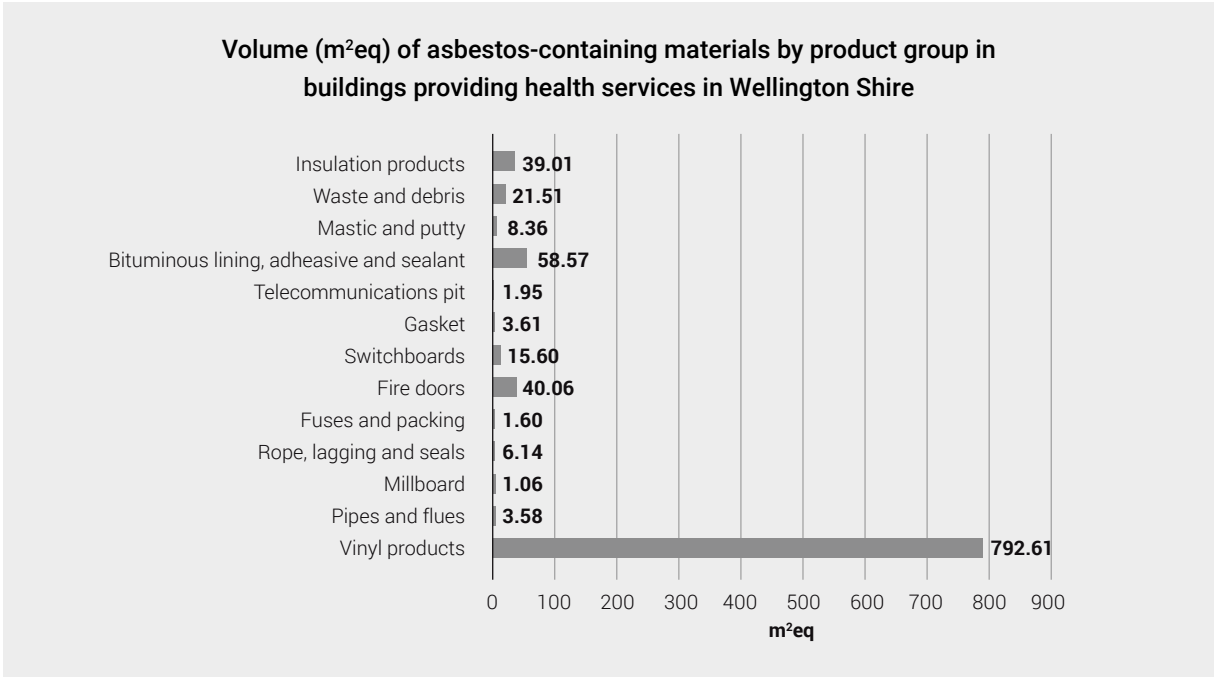


Figure 33. Volume (m^2eq) of asbestos-containing materials by product group in buildings providing health services in Wellington Shire

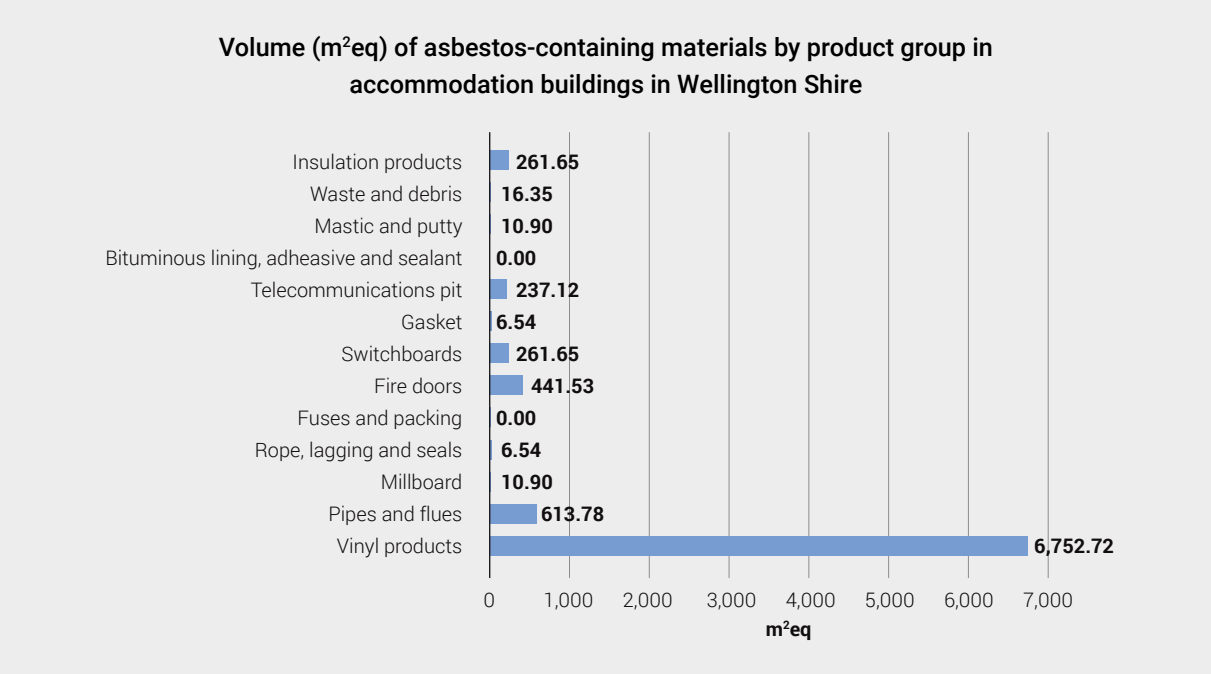


Figure 34. Volume (m²eq) of asbestos-containing materials by product group in accommodation buildings in Wellington Shire

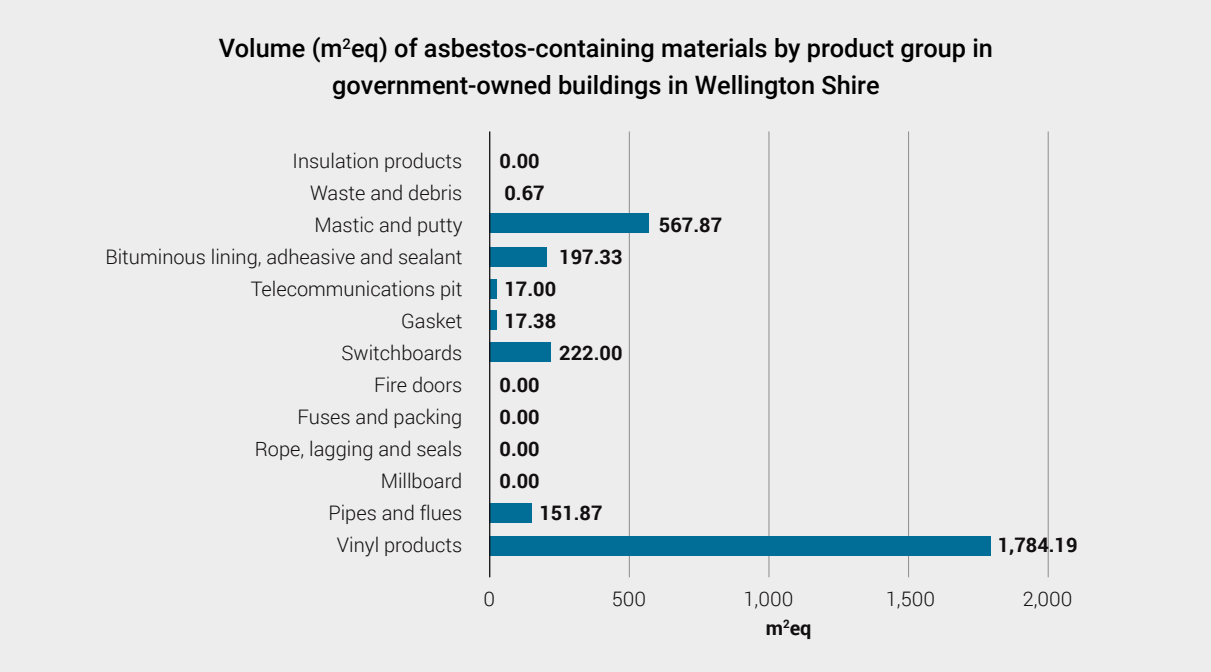


Figure 35. Volume (m²eq) of asbestos-containing materials by product group in government-owned buildings in Wellington Shire

Conclusion

Coupled with the findings from the first study of the residential sector, the legacy asbestos remaining in the greater Latrobe Valley region is significant, with an estimated total volume of 5,010,652 m^2eq (37,580 tonnes).

The Latrobe Valley is known for its heavy industrial power stations, and associated asbestos concerns due to the very high incidence of asbestos-related disease among former power station workers.[7]

This study highlights that the volume of legacy asbestos products in the broader commercial sector also presents a risk. This risk is not limited to the Latrobe Valley region, but is relevant to all non-residential buildings across the state that were constructed before 1990.

While asbestos cement sheet is the most common product type and is generally well known, it is suggested there is far less knowledge about the risks of asbestos exposure from legacy vinyl products. It is also likely that bituminous linings and sealants containing asbestos also represent a knowledge gap.

The lack of asbestos registers accessible for this study across a range of business categories, and in particular for farming properties and the retail sector, identifies areas in need of attention. Further work is recommended to highlight the risks of asbestos exposure and the responsibility of employers to understand where asbestos may be present, and to ensure that required asbestos registers are maintained.

The findings of this report affirm the decision taken by the Latrobe Valley Asbestos Taskforce in February 2019 to expand the scope of its work to include both the commercial and residential sectors. To date, a key focus area for the Taskforce has been to increase awareness of the risks of asbestos exposure among DIY[8] home renovators.

The importance of this objective is supported by the results of this study, which show that the proportion of asbestos-containing materials is far higher in the residential sector than in the non-residential sector (62% to 38%).

All levels of government have responsibilities with regards to the ongoing management of the legacy asbestos that our communities are burdened with, both in our workplaces and in our homes. To estimate the prevalence of asbestos-containing materials across the state, it is recommended that this study and the 2020 residential legacy asbestos study are replicated in other regions using the same (or similar) methodology.

The ongoing management of the legacy asbestos in our workplaces and in our homes requires action from all levels of government to reduce exposure and increase the safe removal and disposal of this material from our built environment. A necessary step to understand the magnitude of the effort required is to determine the size of the problem. It is recommended that this study and the 2020 residential legacy asbestos study are replicated in other regions using the same (or similar) methodology to assist in quantifying the amount of asbestos requiring management and ultimate disposal. It is considered this initiative will support planning for waste infrastructure and highlight the importance of increasing asbestos awareness across Victorian communities.

[7] Walker, H and LaMontagne, A. Work and Health in the Latrobe Valley: Community Perspectives on Asbestos Issues, Centre for the Study of Health & Society, University of Melbourne 2004

[8] Do-it-yourself

Appendices

A) Residential or Non-commercial land category codes

Land Category Code	Short Description	Long Description
100	Vacant Residential Dwelling Site/Surveyed Lot	Vacant Residential Site/Surveyed Lot
101	Residential Development Site	Vacant Residential Development Site
102	Vacant In globo Residential Subdivisional Land	Vacant In globo Residential Subdivisional Land
102.1	Unspecified	Vacant In globo Residential Subdivisional Land: Unspecified
102.2	Subdivisional Land (Multi Lot)	Vacant In globo Residential Subdivisional Land: Subdivisional Land (Multi Lot)
102.3	Subdivisional Land (In globo/Potential)	Vacant In globo Residential Subdivisional Land: Subdivisional Land (In globo/ Potential)
103	Vacant Residential Rural/Rural Lifestyle	Vacant Residential Rural/Rural Lifestyle
104	Vacant Residential Rural/Rural Lifestyle (with permit refused)	Vacant Residential Rural/Rural Lifestyle (with permit refused)
109	Residential Airspace	Residential Airspace
110	Detached Dwelling	Detached Dwelling
110.1	Unspecified	Detached Dwelling: Unspecified
110.2	Detached Dwelling (new)	Detached Dwelling: Detached Dwelling (new)
110.3	Detached Dwelling (existing)	Detached Dwelling: Detached Dwelling (existing)
111	Separate Dwelling and Curtilage	Separate Dwelling and Curtilage
112	Semi-Detached/Terrace/Row House	Semi-Detached/Terrace/Row House
112.1	Unspecified	Semi-Detached/Terrace/Row House: Unspecified
112.2	Semi-detached	Semi-Detached/Terrace/Row House: Semi-detached
112.3	Terrace	Semi-Detached/Terrace/Row House: Terrace
112.4	Row House	Semi-Detached/Terrace/Row House: Row House
112.5	Half Pair or Duplex	Semi-Detached/Terrace/Row House: Half Pair or Duplex
113	Granny Flat/Studio	Granny Flat/Studio
114	Dwelling and Dependant Unit	Dwelling and Dependant Unit
115	Shack/Hut/Donga	Shack/Hut/Donga
117	Residential Rural/Rural Lifestyle	Residential Rural/Rural Lifestyle
118	Residential Land (with buildings that add no value)	Residential Land (with buildings that add no value)
120	Single Strata Unit/Villa Unit/Townhouse	Single Strata Unit/Villa Unit/Townhouse
120.1	Unspecified	Single Strata Unit/Villa Unit/Townhouse: Unspecified
120.2	Single Strata Unit	Single Strata Unit/Villa Unit/Townhouse: Single Unit
120.3	Villa Unit	Single Strata Unit/Villa Unit/Townhouse: Villa Unit
120.4	Townhouse	Single Strata Unit/Villa Unit/Townhouse: Townhouse
121	Conjoined Strata Unit/Townhouse	Conjoined Strata Unit/Townhouse
121.1	Unspecified	Conjoined Strata Unit/Townhouse: Unspecified
121.2	Half Pair or Duplex	Conjoined Strata Unit/Townhouse: Half Pair or Duplex
121.3	Conjoined Strata Unit	Conjoined Strata Unit/Townhouse: Conjoined Strata Unit
121.4	Townhouse	Conjoined Strata Unit/Townhouse: Townhouse
123.1	Unspecified	Residential Company Share Unit (ground level): Unspecified
125	Strata unit or flat	Strata unit or flat
125.1	Unspecified	Strata unit or flat: Unspecified
125.2	Strata Dwelling	Strata unit or flat: Strata Dwelling
126	Individual Car Park	Individual Car Park
127	Individual Berth	Individual Berth
128	Individual Flat	Individual Flat
129	Common Land associated with a residential development	Common Land associated with a residential development
131	Residential Investment Flats	Residential Investment Flats
135.1	Unspecified	Dormitory Accommodation/University Residential College: Unspecified
142.1	Unspecified	Aged Care Complex: Unspecified
143	Special Accommodation	Special Accommodation
144	Disability Housing	Disability Housing
150	Miscellaneous Improvements on Residential Land	Ancillary Improvements on Residential Site/Surveyed Lot
150.1	Unspecified	Ancillary Improvements on Residential Site/Surveyed Lot: Unspecified
150.2	Storage Area	Ancillary Improvements on Residential Site/Surveyed Lot: Storage Area
150.3	Garage/Outbuilding	Ancillary Improvements on Residential Site/Surveyed Lot: Garage/Outbuilding
151	Miscellaneous Improvements on Residential Rural Land	Ancillary Improvements on Residential Rural/ Rural Lifestyle Land
151.1	Unspecified	Ancillary Improvements on Residential Rural/ Rural Lifestyle Land: Unspecified
151.2	Storage Area	Ancillary Improvements on Residential Rural/ Rural Lifestyle Land: Storage Area
151.3	Garage/Outbuilding	Ancillary Improvements on Residential Rural/ Rural Lifestyle Land: Garage/ Outbuilding
151.4	Site Improvements	Ancillary Improvements on Residential Rural/ Rural Lifestyle Land: Site Improvements
280	Ground Level Parking	Ground Level Parking

Land Category Code	Short Description	Long Description
282	Individual Car Park Site	Individual Car Park Site
282.1	Unspecified	Individual Car Park Site: Unspecified
282.3	Car park – Open Air	Individual Car Park Site: Car park – Open Air
290	Advertising Sign	Advertising Sign
290.1	Unspecified	Advertising Sign: Unspecified
290.2	Self-Standing Pole	Advertising Sign: Self-Standing Pole
290.3	Bridge Fixed	Advertising Sign: Bridge Fixed
290.4	Roof Mounted	Advertising Sign: Roof Mounted
290.5	Wall Fixed	Advertising Sign: Wall Fixed
293	Electronic Stadium/Street TV Relay Screen/Scoreboard	Electronic Stadium/Street TV Relay Screen/Scoreboard
500	Vacant Land - Native Vegetation/Bushland	Vacant Land - Native Vegetation/Bushland
501	Vacant Land - Native Vegetation/Bushland with Covenant/Agreement	Vacant Land - Native Vegetation/Bushland with Covenant/Agreement
530.3	Mixed farming and grazing without infrastructure	Mixed farming and grazing without infrastructure
570	Softwood Plantation	Softwood Plantation
571	Hardwood Plantation	Hardwood Plantation
572	Native Hardwood (standing timber)	Native Hardwood (standing timber)
600	Vacant Land	Vacant Land
601	Unspecified – Transport, Storage, Utilities and Communication	Unspecified – Transport, Storage, Utilities and Communication
650	Freeways	Freeways
651	Main Highways (including national routes)	Main Highways (including national routes)
652	Secondary Roads	Secondary Roads
653	Suburban and Rural Roads	Suburban and Rural Roads
654	Closed Roads	Closed Roads
700	Vacant Health Services Development Site	Vacant Health Services Development Site
701	Vacant Education and Research Development Site	Vacant Education and Research Development Site
702	Vacant Justice and Community Protection Development Site	Vacant Justice and Community Protection Development Site
703	Vacant Religious Purposes Development Site	Vacant Religious Purposes Development Site
704	Vacant Community Services Development Site	Vacant Community Services Development Site
705	Vacant Government Administration Development Site	Vacant Government Administration Development Site
706	Vacant Defence Services Development Site	Vacant Defence Services Development Site
707	Cemetery	Cemetery
850	Bathing Boxes	Bathing Boxes
851	Boat Sheds	Boat Sheds
900	Vacant Land	Vacant Land
910	Nature Reserve	Nature Reserve
920	World Heritage Area	World Heritage Area
921	Local Wilderness Area	Local Wilderness Area
930	National Park – Land	National Park – Land
931	National Park – Marine	National Park – Marine
940	Natural Monument – Land	Natural Monument – Land
941	Natural Monument – Marine	Natural Monument – Marine
950	Forest Reserves – Public	Forest Reserves – Public
951	Forest Reserves – Private	Forest Reserves – Private
960	Conservation Area – Public	Conservation Area – Public
961	Conservation Area – Private	Conservation Area – Private
970	Protected Landscape – Public	Protected Landscape – Public
971	Protected Landscape – Private	Protected Landscape – Private
972	Protected Seascape – Public	Protected Seascape – Public
973	Protected Seascape – Private	Protected Seascape – Private
980	River Reserve (fresh water)	River Reserve (fresh water)
981	Creek Reserve (fresh water)	Creek Reserve (fresh water)
982	River Reserve (salt water)	River Reserve (salt water)
983	Creek Reserve (salt water)	Creek Reserve (salt water)
984	Floodway Reserve	Floodway Reserve
985	Fresh Water Lake Reserve	Fresh Water Lake Reserve
986	Salt Water Lake Reserve	Salt Water Lake Reserve
987	Inland Low Lying Tidal Estuary Wetlands Reserve	Inland Low Lying Tidal Estuary Wetlands Reserve
988	Seabed – Open Sea/Ocean/Bays	Seabed – Open Sea/Ocean/Bays
990	Game Reserve – Public	Game Reserve – Public
991	Game Reserve – Private	Game Reserve – Private

B) Mapping of building categories

VAEA Building Category	VAEA Building Type	Land Category Code	Assigned report category
Agricultural	Building nursery Farm annexe Fruit shed Grain storage shed Hay shed Hothouse Poultry pen Shed Stables Stockyard	Animal shelter Aquaculture Breeding/Research Facilities/ Fish Hatchery Bulk Liquid Storage Fuel Depot/Tank Farm Commercial Flower and Plant Growing – (outdoor) Crop Production – Mixed/Other Domestic Livestock Grazing Equestrian Centre General Cropping Horse Stud Horse Stud/Training Facilities/Stables Kennel/Cattery Livestock Production – Beef Cattle Livestock Production – Dairy Cattle Livestock Production – Sheep Market Garden – Vegetables Market Garden – Vegetables (generally less than 20) Mixed farming and grazing Mixed farming and grazing with infrastructure Mixed farming and grazing with structural improvement Mixed farming and grazing without structural improvement Mixed Use Occupation Orchards, Groves and Plantations Piggery Plant/Tree Nursery Poultry (broiler production) Poultry (egg production) Specialised Cropping Stock sales yards Veterinary Clinic Vineyard	Industrial
Defence and emergency services	Airbase Ambulance garage Ambulance station CFA/MFB Crew room Fire pump shed Police station Shelter shed	Airport Hangar Building Airstrip Ambulance Station Facility Army Barracks/Administration Base Emergency Services Complex Fire Station Fire Station Facility	Industrial
Factories, warehouses and workshops	Depot Plant and equipment Pump house Plant room Warehouse Workshop	Abattoirs APM Beet factory Bulky Goods Bus Maintenance Depot Car Wash Concrete Batching Plant Container storage Crematorium/Funeral Services Dairy/food packaging and manufacture factory Depot Extractive less than 2 Metres Factory Factory Unit Food Processing Factory Garage/Motor Vehicle Repairs Garage/Outbuilding General Purpose Factory General Purpose Warehouse General Purpose Warehouse-Unspecified	Industrial
		Gravel/Stone Hardstand/Storage Yard Industrial Development Site Industrial Land (with buildings which add no value) Landfill/transfer station Major Industrial Complex – Special Purpose Improve Mines Multi-Storey Car Park Office/Factory Open Area Storage Petro-chemical Manufacturing Quarry -Gravel/Stone Quarry/Mine (open cut) – Exhausted (dry) Refuse Recycling Refuse Transfer Station Rendering Plant Sand Sanitary Land Fill Sawmill Timber Yard/Trade Supplies Vacant Industrial In globo Land Vacant Land mining unspecified Warehouse Warehouse/Factory Warehouse/Office Warehouse/Showroom Workshop Wrecking Yard	

VAEA Building Category	VAEA Building Type	Land Category Code	Assigned report category
IT and communications	Communication tower, Computer centre, Control room, Radio tower	Communications, including Print, Post, Telecommunication Telecommunication Buildings/Maintenance Depots Telecommunication Tower Telecommunication Towers and Aerials Telephone Exchange – Purpose Built Television/Radio Station – Purpose Built	Industrial
Transport	Bicycle enclosure Bus shelter Control building Control centre (train network) Control centre (tram network) Train maintenance facility Train station Train station precinct Train yard Tram depot Tram substation Tram track corridor Transport depot	Airport Hangar Building Airports Bus depot Car park – Open Air Car park – Under Cover Designated Bus/Taxi Stops/Stands/Shelters Freeways Ground Level Parking Port Railway Line Land and Improvements in use Railway Passenger Terminal Facilities (including s Railway/Tramway Line Closed/Unused Secondary Roads Suburban and Rural Roads	Industrial
Educational and training facilities	Classroom Education centre School TAFE Teacher house Training centre	Non-Government School Religious Study Centre School Primary - Public/Private School/College Secondary/Technical School - Public Secondary School/College Special Needs School Technical and Further Education Technical School University University - Private/Public University Residential College	Community
Correctional and justice facilities	Court	Court Facility	Community
Public and family services	Assembly hall Band room Child care Children's centre Community centre Community hall Gallery Gymnasium Information centre Leisure centre Library Multi-purpose hall Museum Pavilion Recreation and sport Recreation centre Rotunda Tennis pavilion Youth camp	Bowling Club Cemetery Child Welfare and Pre-School Church, Temple, Synagogue, etc. Community Facility Community/Neighbourhood Facility Cultural Heritage Centre Culture, recreation and sport Day Care Centre for Children Early Childhood Development Centre Early Childhood Development Centre - Kindergarten Golf Course Gymnasium/Health Club Hall Halls and Service Clubrooms Indoor Sports Centre Indoor Sports Centre etc (includes gymnasiums, Infant Welfare Centre Kindergarten Library/Archives Major Indoor Sports Complex Marinas and Yacht Clubs Member Club Facility Motor Race Tracks/Speedways Museum/Art Gallery Outdoor Park and Facilities Outdoor Sports Extended Areas/Cross Country Outdoor Sports Grounds town or suburban facilities Outdoor Sports Grounds/Complex (includes stadiums, Outdoor\Indoor Sports Complex - non major Place of worship Playhouse/Traditional Theatre Pre-School Public Conveniences Racecourse Racecourse/Tracks/Showground (sport involving animals Reception/Function Centre Reception/Function Room Recreation Camp Recreation Reserve Religious Hall Rural and Community Camps Ski lodge/ Member facility Squash Courts Swimming Pools/Aquatic Centres Tourism Infrastructure – Local Attractions Water Sports – Swimming Pools/Aquatic Centres	Community

VAEA Building Category	VAEA Building Type	Land Category Code	Assigned report category
Commercial and retail	Art centre, Basketball court Concert hall Conference centre Docklands studios Film vault Retail Theatre Visitor centre	Automatic Teller Machine Bottle Shop/Licensed Liquor Outlet Bowling Alley Brewery/winery Café Cinema Complex Club Club-Gaming - stand alone Commercial Development Site Commercial Land (with buildings that add no value)	Retail and office
		Convenience Store/Fast Food Department/Discount Department Store Fuel Outlet/Garage/Service Station Hotel-Gaming Kiosk Licenced Retail Premises Licensed Restaurant Multi-Purpose Fuel Outlet (fuel/food/groceries) National Company Restaurant National Company Retail Nightclub/Cabaret Pub Pub/Tavern/Hotel/Licensed Club/Restaurant/Licensed Restaurant/Nightclub Regional Restaurant Retail Premises (multiple occupancies) Retail Premises (multiple occupancies, usually sin Retail Premises (single occupancy) Retail Premises (single occupancy/single title/sin Retail Store/Showroom Service station Shop Shop and Dwelling (single occupancy) Shopping Centre Shopping centre (major/combined retail) Store Supermarket Tavern Vacant In globo Commercial Land Vehicle Rental Centre Vehicle Sales Centre	
Offices and professional services	Administration Business interruption Head office HQ Main building Office Ranger's office Reception	Bank Civic Buildings Local Government Low Rise Office Building Multi-Level Office Building Office Office (Converted dwelling) Office and Dwelling (single occupancy) Office Premises Office Premises (single occupancy/single title/sin Police Facility Police Station Post Offices Serviced Office This code is no longer used – Office	Retail and office
Health services	Aged care Community health centre Day centre Dental clinic Health centre Hospital Rehab Specialist clinic	Aged Care Amenities Buildings Aged Care Complex Aged Care Complex/Nursing Home Centre for the Mentally ill Community Health Centre Dental Clinic Diagnostic Centre/X-Ray Health Clinic Health Surgery Medical Centre/Surgery Nursing Home Private Hospital Public Hospital Retirement Village Complex Welfare Centre	Health

VAEA Building Category	VAEA Building Type	Land Category Code	Assigned report category
Housing and accommodation	Accommodation uni, Activities shelter Apartment Cottage Curator's house Flat Garage Hostel House Housing – disability Housing – other Lodge Residence	Bed and Breakfast Boarding House Boarding House/Private Hotel/Dormitory Accommodation Community Services Housing Conjoined Strata Unit/Townhouse Detached Dwelling - Unspecified Detached Dwelling Non-Conforming Use - Commercial Detached Dwelling Non-Conforming Use - Industrial Disability Housing Dormitory Accommodation/University Residential Farm Inc House Granny Flat/Studio Guest Lodge/Back Packers/Bunkhouse/Hostel Half Pair or Duplex Holiday Units Hotel House House and Flat/Studio Individual Flat Miscellaneous Improvements on Residential Land Motel OYO Subdivided Dwelling OYO Unit Rectory, Manse, Presbytery Religious Residence Residential Development Site Residential Hotel/Motel/Apartment Hotel Complex Residential Investment Flats Residential Land (with buildings that add no value Residential Rural/Rural Lifestyle Residential Use Development Land Retirement Village Complex Retirement Village Unit Semi-Detached/Terrace Home/Row House Separate Dwelling and Curtilage Separate House and Curtilage Serviced Apartments Serviced Apartments/Holiday Units Shack/Hut/Donga Short Term Holiday Accommodation Single Residential Accommodation Single Strata Unit Single Strata Unit/Villa Unit/Townhouse Strata unit or flat Studio Tourist Park/Caravan Park/Camping Ground Tourist Resort Complex Townhouse Vacant In globo Residential Subdivisional Land Vacant Residential Home Site/Surveyed Lot Vacant Residential Rural/Rural Lifestyle	Accommodation
Unknown/other	Building Building room Canteen Contents Cultural asset Facility Factory Hall Other Polyhouse Research facility Toilet Unknown	Not applicable	Not applicable

C) Mass conversion table for different classes of asbestos products

This conversion system was developed by the VAEA for use in the Asbestos Identification and Rating System.

ACM Product Type	Unit of measure	Kgs
Acoustic pad (underside of sink)	m^2	0.2
Adhesive/glue	m^2	2.5
Bitumen coated paper	m^2	1.0
Bitumen coated polystyrene	m^2	2.0
Bitumen coating	m^2	12.5
Bitumen coating to underside of sink	m^2	15.0
Bitumen product debris	m^2	12.5
Bitumen washer	number	0.2
Blackjack adhesive to flooring	m^2	2.5
Brake pads	number	0.25
Ceiling tiles	m^2	7.5
Cement flue cap	number	5.0
Cement flues/pipes	lm	5.0
Cement product debris	m^2	7.5
Cement strapping	lm	7.5
Circuit breaker	number	5.0
Clutch plates	number	0.25
Communications pit	number	15.0
Compressed electrical panels	m^2	30.0
Compressed flat sheeting	m^2	7.5
Concrete/levelling compound	m^2	30.0
Contaminated soil (non-friable debris)	m^2	25.0
Corrugated roof sheeting	m^2	10.0
Dust and debris	m^2	5.0
Dust/debris (Unknown source)	m^2	5.0
Electrical arc shields	number	0.1
Electrical cable coating	lm	2.0
Electrical components	number	3.0
Electrical meters	number	3.0
Faux brick cladding	m^2	5.0
Faux timber panelling/sheeting	m^2	7.5
Fire brick	number	22.0
Flange gaskets	number	0.1
Flat sheeting	m^2	7.5
Galbestos	m^2	10.0
Gasket debris	number	3.0
Gasket(s)	number	3.0
Hessian backed Vinyl sheet	m^2	5.0
Laminated cement sheeting	m^2	5.0
Linoleum (use Vinyl sheet for descriptor)	m^2	5.0
Malthoid	lm	5.0
Mastic	lm	5.0
Mastic (flange joints)	lm	15.0
Mastic debris	lm	5.0
Mastic/caulking/putty	lm	5.0
Moulded sheet	m^2	7.5
Other types of adhesive (usually in tube)	lm	5.0
Pebble dash coated cement sheeting	m^2	10.0
Pebble rendered cement sheeting	m^2	10.0
Radiator and sink tap hand wheels	number	0.2
Render	m^2	22.0
Resinous block	number	10.0
Rubber gasket	number	3.0
Rubber products	m^2	3.0
Stair nosing	lm	3.0
Strawboard	m^2	4.0
Tape	lm	5.0
Terrazzo	m^2	22.0
Textured coating	m^2	8.0
Toilet cisterns	number	10.0
Toilet seats	number	5.0
Unknown	m^2	30.0
Vinyl product debris	m^2	6.0
Vinyl sheet	m^2	5.0
Vinyl sheet and adhesive	m^2	5.0
Vinyl tiles	m^2	5.0
Vinyl tiles and adhesive	m^2	6.0
Waterproof membranes and damp proof courses	m^2	5.0

D) Examples of asbestos-containing materials

From the *Occupational Health and Safety Commission Code of Practice for the Safe Removal of Asbestos (2nd Edition, 2005)*. This is not an exhaustive list.

A

Air-conditioning ducts: exterior or interior acoustic and thermal insulation

Arc shields in lift motor rooms or large electrical cabinets

Asbestos-based plastics products - as electrical insulates and acid-resistant compositions or aircraft seat

Asbestos ceiling tiles

Asbestos-cement conduit

Asbestos-cement electrical fuse boards

Asbestos-cement external roofs and walls

Asbestos-cement in the use of form work when pouring concrete

Asbestos-cement internal flues and downpipes

Asbestos-cement moulded products such as gutters, ridge cappings, gas meter covers, cable troughs and covers

Asbestos-cement pieces for packing spaces between floor joists and piers

Asbestos-cement (underground) pits, as used for traffic control wiring, telecommunications cabling, etc

Asbestos-cement render, plaster, mortar and coursework

Asbestos-cement sheet

Asbestos-cement sheet behind ceramic tiles

Asbestos-cement sheet internal over exhaust canopies such as ovens, fume cupboards, etc.

Asbestos-cement sheet internal walls and ceilings

Asbestos-cement sheet underlays for vinyl

Asbestos-cement storm drain pipes

Asbestos-cement water pipes (usually underground)

Asbestos-containing laminates (e.g. Formica) used where heat resistance is required, e.g. ships

Asbestos-containing pegboard

Asbestos felts

Asbestos marine board, e.g. marinate

Asbestos mattresses used for covering hot equipment in power stations

Asbestos paper used variously for insulation, filtering and production of fire-resistant laminates

Asbestos roof tiles

Asbestos textiles

Asbestos textile gussets in air-conditioning ducting systems

Asbestos yarn

Autoclave/steriliser insulation

B

Bitumen-based water proofing such as malthoid, typically on roofs and floors but also in brickwork

Bituminous adhesives and sealants

Boiler gaskets

Boiler insulation, slabs and wet mix

Brake disc pads

Brake linings

C

Cable penetration insulation bags (typically Telecom)

Calorifier insulation

Car body filters (not common)

Caulking compounds, sealant and adhesives

Cement render

Chrysotile wicks in kerosene heaters

Clutch faces

Compressed asbestos-cement panels for flooring, typically verandas, bathrooms and steps for demountable buildings

Compressed asbestos fibres (CAF) used in brakes and gaskets for plant and automobiles

D

Door seals on ovens

E

Electric heat banks – block insulation

Electric hot water services – normally not asbestos but some millboard could be present

Electric light fittings, high wattage, insulation around fitting (and bituminised)

Electrical switchboards – see Pitch-based

Exhausts on vehicles

F

Filler in acetylene gas cylinders

Filters – beverage; wine filtration

Fire blankets

Fire curtains

Fire door insulation

Fire-rated wall rendering containing asbestos with mortar

Fire-resistant plaster board, typically on ships

Fire-retardant material on steel work supporting reactors on columns in refineries in the chemical industry

Flexible hoses

Floor vinyl sheets

Floor vinyl tiles

Fuse blankets and ceramic fuses in switchboards

G

GalbestosTM roofing materials (decorative coating on metal roof for sound proofing)

Gaskets – chemicals, refineries

Gaskets – general

Gauze mats in laboratories/chemical refineries

Gloves – asbestos

H

Hairdryers – insulation around heating elements

Header (manifold) insulation

I

Insulation blocks

Insulation in electric reheat units for air-conditioner systems

L

Laboratory bench tops

Laboratory fume cupboard panels

Laboratory ovens – wall insulation

Lagged exhaust pipes on emergency power generators

Lagging in penetrations in fireproof walls

Lift shafts – asbestos-cement panels lining the shaft at the opening of each floor, and asbestos packing around penetrations

Limpet asbestos spray insulation

Locomotives – steam; lagging on boilers, steam lines, steam dome and gaskets

M

Mastics

Millboard between heating unit and wall

Millboard lining of switchboxes

Mortar

P

Packing materials for gauges, valves, etc., can be square packing, rope or loose fibre

Packing material on window anchorage points in high rise buildings

Paint, typically industrial epoxy paints

Penetrations through concrete slabs in high rise buildings

Pipe insulation including moulded sections, water-mix type, rope braid and sheet

Pitch-based (e.g. Zelemite, Ausbestos, Lebah) electrical switchboard

Plaster and plaster cornice adhesives

R

Refractory linings

Refractory tiles

Rubber articles – extent of usage unknown

S

Sealant between floor slab and wall, usually in boiler rooms, risers or lift shafts

Sealant or mastik on windows

Sealants and mastics in air-conditioning ducting joints

Spackle or plasterboard wall jointing compounds

Sprayed insulation – acoustic wall and ceiling

Sprayed insulation – beams and ceiling slabs

Sprayed insulation – fire retardant sprayed on nut internally, for bolts holding external building wall panels

Stoves – old domestic type; wall insulation

T

Tape and rope – lagging and jointing

Tapered ends of pipe lagging, where lagging is not necessarily asbestos

Tilux sheeting in place of ceramic tiles in bathrooms

Trailing cable under lift cabins

Trains – country – guards vans – millboard between heater and wall

Trains – Harris cars – sprayed asbestos between steel shell and laminex

V

Valve, pump, etc. insulation

W

Welding rods

Woven asbestos cable sheath

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