COMMUNITYCHANGE
Behaviour Environment Research Education

VICTORIAN LITTER MONITORING PROTOCOL

PILOT TEST AND BENCHMARKS

USING THE

CLEAN COMMUNITIES ASSESSMENT TOOL

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EcoRecycle Victoria

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ecoRECYCLE VICTORIA

Contents

List of Figures

List of Tables

List of Photographs

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Executive Summary

Victorian Litter Action Alliance (VLAA) required valid information on litter and its management to assist it in its strategic approach to long-term reduction in littering and promotion of a clean environment.

EcoRecycle Victoria commissioned a test of the Victorian Litter Monitoring Protocol (VLMP) as a robust and statistically valid approach to monitoring changes in litter, littering and bin use patterns.

The VLMP used Community Change's Clean Communities Assessment Tool (CCAT) to collect information on features of public spaces that contribute to a clean environment. The CCAT identifies what happens in a location and accounts for litter accumulation points as well as locations known to stay 'clean' most of the time. The Tool assesses the effects of four core factors, including:

i. Context (sense of community and overall 'cleanness' of the location).
ii. Facilities (quality of infrastructure and BINfrastructure).
iii. Attitudes and Perception (people's awareness, opinions and attitudes).
iv. Actions (indications of disposal activities in area).

Assessments of Context, Facilities and Attitudes and Perceptions are combined to provide a holistic assessment of each location - the Location CCAT score. The Location CCAT summarises the factors influencing disposal Actions in the area being investigated.

The pilot VLMP assessed 16 local government areas from Melbourne Statistical District (MSD), Greater Geelong and Greater Ballarat including areas nominated by the Highlands Regional Waste Management Group (HRWMG). The final sample consisted of 300 assessments collected from 262 locations and involved 682 observations of disposal actions and 745 surveys.

Overall the Location CCAT score for Victoria was 3.7, indicating substantial support for litter prevention across Victoria. Moderate to high levels of community involvement and support (Context), infrastructure and BINfrastructure (Facilities) and endorsement of local facilities and maintenance practices (Attitudes and Perceptions) were recorded as shown in Figure 1.

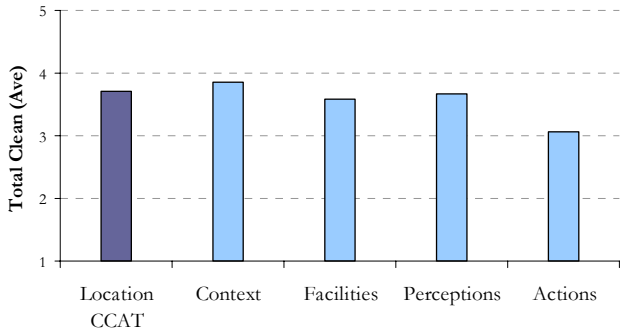

Figure 1 Average Summary Ratings Across the State

The moderate to high Location CCAT score was associated with disposal Actions scores that, overall, were at the 'moderately clean' level - 3.0, indicating a majority of positive actions but some way to go to improve disposals and prevent litter across Victoria.

Regional differences in CCAT outcomes in Figure 2 show that although Location CCAT scores were similar across MSD and regional areas, people in MSD were somewhat more likely to do the right thing in terms of their Actions than those in regional areas.

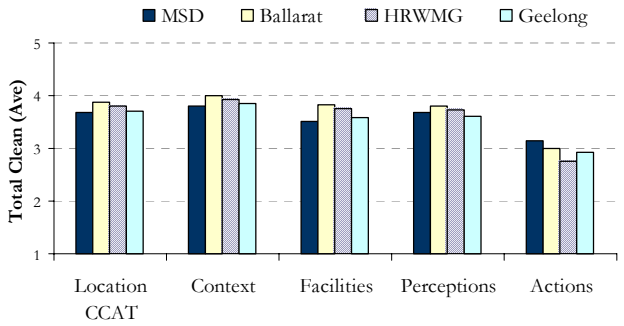

Figure 2 CCAT Summary Scores Across Census Districts

The sense of community (Context) in MSD was lower than that found in Ballarat and the HRWMG which also showed higher levels of performance for Facilities than those found in Melbourne and Geelong.

One limitation of the winter pilot was the variation in Actions observed in different sites due to seasonal factors. Figure 3 provides Location CCAT scores for all site types. Actions scores however, are indicative only due to insufficient numbers. More robust data would be available

if the VLMP were conducted during warmer months when people are more likely to be using outdoor spaces.

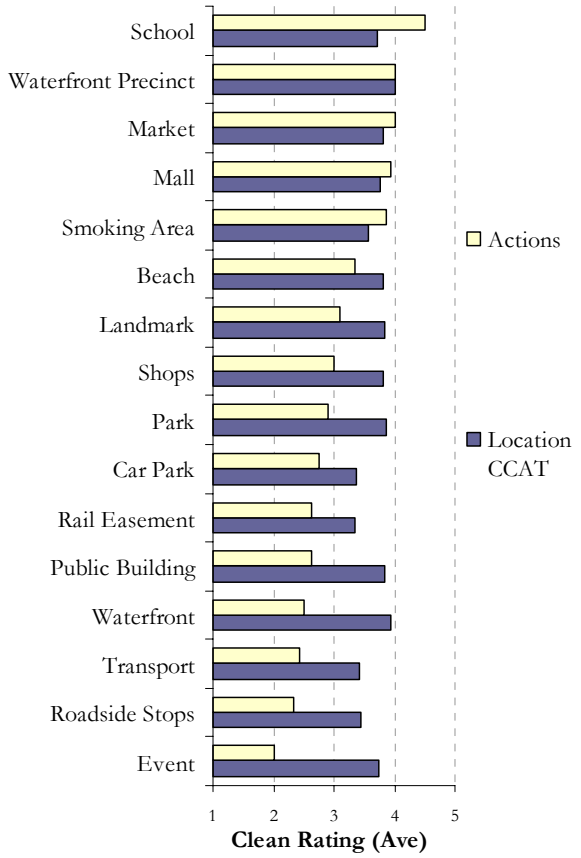

Figure 3 Summary Scores Across Site Types

Early findings may be useful for strategic decision making about what site types to target, what interventions to use and where to best direct resources. However more observations of Actions are required under conditions when Victorians are using outdoor areas more consistently.

Litter counts were converted into a CCAT clean score on a scale from '1' (not at all clean) to '5' (extremely clean). Figure 4 shows high clean ratings with relatively few items of litter on the ground recorded for Greater Geelong, Golden Plains, Moorabool and Melbourne.

Low clean ratings were found in the Pyrenees, Cities of Casey, Dandenong, Ballarat and Darebin, indicating the strong presence of litter on the ground, in the gutters and around sites assessed in these areas.

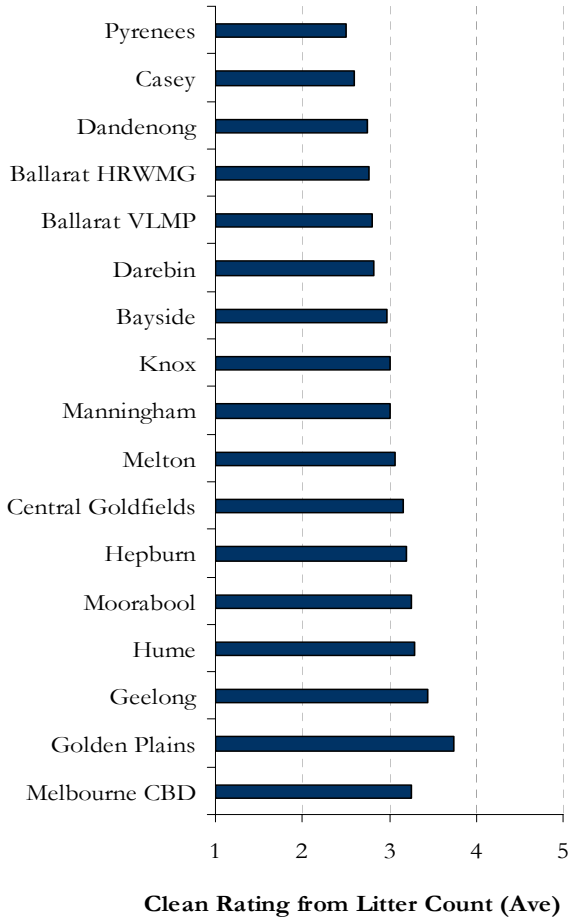

Figure 4 Clean Ratings of Litter Counts in Cities

The CCAT demonstrated solid reliability and face validity as a holistic assessment of how clean public places are throughout Victorian communities.

Using the CCAT, the VLMP provides integrated information on the community, its interaction with physical structures (BINfrastructure and infrastructure), as well as educational, incentive and sanctions programs aimed at modifying littering behaviour.

Results can be used to inform strategic planning, guide long term interventions, help target low performing areas and strategically determine where to focus attention and support.

On the basis of this report, EcoRecycle Victoria, in conjunction with the VLAA, will assess the viability of using CCAT scores as an analytical tool for monitoring littering in Victoria over time.

The Victorian Litter Monitoring Protocol

Litter Measurement in Victoria

Background

In 1995 Victoria's Litter Reduction Strategy set directions for litter reduction and management in the state. It adopted an integrated approach to litter addressing the areas of "products, people, places and players", and established the need for improved product design, education, infrastructure and data collection.[1]

Since the introduction of the strategy, local government, state agencies and industry have implemented a range of anti-litter programs and have sought a reliable method for monitoring litter reduction progress in the changing behaviours of individuals and organisations.

In 1995, the Environment Protection Authority of Victoria (EPAV) in conjunction with Recycling and Resource Recovery Council (RRRC), Waste Management Council (WMC) and Keep Australia Beautiful Victoria (KABV), commissioned Community Change (CC) to develop the Victorian Litter Count Methodology. At that time the methodology represented best practice for assessing litter on the ground and comparing different sites across the state. It was used by EcoRecycle Victoria to monitor litter in Victoria until 2000/2001 when doubts about the validity of litter counts, particularly as a measure of littering behaviour, emerged.

A review of the quality of Victorian Litter Count Methodology data raised questions about variables affecting the integrity and usefulness of litter count data, including the need to keep locations secret; an inability to provide individual councils with feedback on their litter prevention performance or to provide meaningful comparison of results from areas and sites types surveyed; problems in systematically implementing procedures over time with changes in personnel; and an inability to account for extraneous factors such as the effects of scavenging of bins by people and animals, changes to cleaning routines and practices in a site and the effects of weather on both litter accumulation points and the clean parts of a location.

The range of factors affecting this litter measurement method meant that the relationship between litter on the ground and people's actual littering behaviour in public places was, at best, weak.

Once the limitations of litter counts were evident in Victoria, state-wide litter counts ceased except for the EPAV beach litter reports. In 2001/2002, EcoRecycle Victoria initiated investigations into methods for improved measurement and comparisons of littering behaviour throughout Victoria. As part of the review, it investigated the direct observational methods that enable immediate analysis of behaviour patterns without waiting for years of data collection.

The Disposal Behaviour Index

In 2001, Minister for the Environment Sherryl Garbutt launched the report *Measuring Environmentally Desirable Behaviour In Australia* written by Community Change and sponsored and published by the Beverage Industry Environment Council (BIEC). The report described the use of the Disposal Behaviour Index (DBI), a valid and reliable measure of littering behaviour based on direct observational methods. For the first time, a measure of disposal behaviour existed that included an indicator of positive behaviours (such as bin use and public place recycling) as well as littering.

[1] Extracted from paper presented by M Power on behalf of EcoRecycle Victoria, February 2001.

The DBI has been widely recognized as comprising best practice in assessing behaviours and forms the basis for the BIEC Littering Behaviour Studies (LBS) providing an annual national littering benchmark. However the high level of skill and resources required to implement the methodology has made it somewhat prohibitive as a mass data collection method and some agencies have called for a more available standard for assessment.

Recent Developments

Recently VLAA members have made it a priority to obtain valid litter management information to help plan services efficiently, and to chart the impact of a coordinated campaign of effective activities to reduce litter.

During this time, CC has worked with key stakeholders[2] to develop an agreed data collection method based on CC's extensive experience in researching the effects of public place recycling facilities, litter prevention programs, local government litter management strategies, educational campaigns and the use of sanctions on disposal behaviour in Victoria, interstate and overseas.

The aim has been to develop a consistent and holistic litter data collection methodology to serve the needs of agencies involved in litter prevention. In order to develop a more holistic strategy to assess littering - particularly one more widely accessible in terms of available skills and resources - it was necessary to consider a wide range of factors affecting the likelihood that a location will remain clean and littering.

The Complexity of Littering[3]

An individual's disposal behaviour is a product of the types of items people are using, the location in which they use them(context), location specific factors (eg, cleanliness) the individual's motivation to control their disposal behaviour (eg, 'following the herd'), the type of BINfrastructure[4] made available for the containment of litter and recovery of resources, as well as the level of community awareness about disposal choices and the approach taken by packaging manufacturers to encourage environmentally desirable behaviour and responsible disposal of used materials.

Littering is no longer considered as an isolated action unrelated to the way the people use bins or other appropriate disposal options such as recycling or taking used items away to reuse. Littering is part of a complex phenomenon and people do not simply fall into stereotypical categories of being either 'litterers' or 'non-litterers'. Efforts at behaviour change need to take a variety of factors into account and seemingly simple solutions - such as the issuing of fines, for example - cannot on their own be expected to lead to sustainable long-term outcomes but must form part of an integrated approach to litter prevention[5].

Increasingly, programs will need to focus on the link between litter prevention and the sustainable use of resources. Success in controlling littering and helping with the recovery of resources from public places provides a positive experience for the community. Such experiences are of significant benefit in leveraging community commitment to environmental programs requiring greater levels of motivation and effort and represent a much broader contribution to the environment[6].

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[2] CC has worked with the Staff at EcoRecycle Victoria, the Litter Champion, the Highlands, Northern, Eastern Leastwaste, Calder, North Eastern Victorian NevRwaste and Gippsland Regional Waste Management Groups, Banyule, Croydon Litter Prevention Taskforce management groups in the development of litter hot spot assessments and monitoring, public place profiling and training in litter observational skills development.
[3] Methodology descriptions have been extracted from research reports written by Community Change, sponsored by BIEC. Titles of relevant publications are listed in the reference section of this report.
[4] BINfrastructure© is a term coined by CC in Melbourne (2002) to describe the characteristics of public place infrastructure applying to litter, recycling and butt bins. Readers are encouraged to use the term provided they cite the source appropriately.
[5] EcoRecycle Victoria *Toward Zero Waste: A Materials Efficiency Strategy for Victoria*, 2003. The strategy favours integrated litter reduction programs incorporating education, infrastructure, incentives, communication, partnerships, and enforcement.
[6] Much of our current understanding of disposal behaviour is summarised in Appendix A.

Consequently, CC developed the Clean Communities Assessment Tool (CCAT) as a more comprehensive and potentially widely available strategy for assessing situations where littering occurs. The structured piloting of the CCAT forms the foundation of the Victorian Litter Monitoring Protocol (VLMP).

Clean Communities Assessment Tool (CCAT)

What is the CCAT?

The CCAT, the principles for sustainable public place behaviour and a competency approach to facilitating change - are based on the knowledge that in public places most people are doing the right thing most of the time with their disposal actions.

The CCAT combines assessments of a number of features of public spaces that contribute to a clean environment. It reflects what happens in a location and identifies the effectiveness of facilities and community attitudes and perceptions in promoting clean, sustainable outcomes.

The CCAT provides a systematic subjective rating of four core factors in the location under investigation, including:

i. Context (sense of community and overall 'cleanness' of the location)
The context rating provides an indication of levels of community identity and support for responsible management of the environment and litter prevention. The context rating scale identifies the foundations for building education and intervention programs.

ii. Facilities (quality of infrastructure and BINfrastructure)
The maintenance and provision of facilities in a location having an impact on disposal behaviours is rated, incorporating assessment of infrastructure, litter accumulation points and BINfrastructure - litter bins, cigarette butt bins and recycling bins.

iii. Attitudes and Perception (awareness, opinions and attitudes)
The awareness, opinions and attitudes of community members on environmental issues provides a starting point for change programs, with successful intervention building on demonstrated community resources and competencies.

iv. Actions (indications of disposal activities in area)
Observations of people's actual practices in a location provide a means for checking assumptions and self reports against actual actions and activities.

Each factor consists of composite ratings based on a five-point scale of cleanness with assessments ranging from 'not at all', 'slightly', 'moderate', 'very' and 'extreme' levels of clean[7]. The higher the CCAT score for an aspect of the situation, the cleaner it is likely to be and the greater the likelihood it will remain clean. In areas where litter prevention and resource recovery programs are not working, the systematic use of the tool points to strategic and realistic targets for facilitating change.

Strategic plans for improvements in disposal behaviour can be prioritised from the composite scores for each factor by distilling the contributions of the various features and activities of a location, enabling targeted use

[7] One possible outcome from the Victorian Litter Monitoring Protocol might, for example, be to revise the scale based on statistical analysis of assessments from many sites, and use weightings for the contributions of different factors to composite CCAT scores (such as greater weighting for BINfrastructure factors compared to attitudinal aspects of the CCAT).

of resources. The CCAT provides an ideal tool for monitoring of changes in specific factors associated with disposal actions such as community perceptions and knowledge of litter prevention campaigns. Broader applications of the CCAT can be found in Appendix D.

Objectives of the Litter Monitoring Protocol

EcoRecycle Victoria commissioned the pilot to establish a robust and statistically valid litter monitoring protocol for Victoria, and to provide time series data to assess the impact of interventions on changes in littering patterns and behaviour. The aim of the VLMP is to contribute to long-term reduction in littering by providing a sound and balanced basis for information collection throughout the state, taking into account litter accumulation points as well as locations known to stay 'clean' most of the time.

The littering monitoring protocol needs to provide:

- A sound basis for comparing outcomes that takes into account unique characteristics of regions, cities and locations
- A realistic and efficient procedure for collecting meaningful information in the field to monitor achievements as well as problems associated with littering
- A method to identify priority target areas for interventions to facilitate improvements in litter prevention and management across state regions, cities and locations
- A public record of composite scores for littering actions throughout the state, as well as records of the amount and type of litter in different regions, cities, and sites
- Composite and detailed assessment of the factors influencing littering actions in different regions, cities, and sites
- Clear site classifications with a streamlined process for selecting and adding locations and site types to the sample
- An ability to track progressive changes in community actions, sentiments and attitudes toward litter prevention and interventions
- A quality assured and accessible strategy for building on stakeholder contributions in the development of the Monitoring Protocol

Outcomes from the VLMP will be used to guide an integrated and strategic use of information on the community, its interaction with physical structures (BINfrastructure and infrastructure), as well as educational, incentive and sanctions programs aimed at modifying littering behaviour. Specifically outcomes can be used to:

- Establish current litter management performance levels in Victoria
- Assess the effectiveness of campaigns aimed at litter prevention and increased use of litter and away-from-home recycling bins
- Target and prevent litter accumulation locations as well as recognise positive achievements
- Improve the cost effectiveness of capital works expenditure through targeted improvements in BINfrastructure and facilities to have an impact beyond aesthetic appeal and pride in public places
- Monitor progress with Victoria litter prevention initiatives as we move toward zero waste.

Piloting the Victorian Litter Monitoring Protocol

EcoRecycle Victoria has chosen to pilot the CCAT as a method for assessing littering and to provide a reliable basis for comparison across different locations. It has taken a significant step forward in litter analysis by investigating a protocol as a basis for consistent monitoring of litter throughout the state, including observations of public spaces and behavioural assessments. It commissioned the pilot to establish a robust and statistically valid litter monitoring protocol for Victoria, and to provide time series data to assess the impact of interventions on changes in littering patterns and behaviour.

Method

The monitoring pilot consisted of a two-stage process, comprising an initial confirmation and test of the logistics and applicability of the CCAT, followed by detailed data collection using the refined method constituting the basis for future VLMP assessments. It involved a total of 26 days of data gathering assessments, observations and interviews with a target sample of 220 locations.

Stage 1 involved eight days of assessments with a focus on testing the logistics of undertaking the pilot in and around Melbourne and Geelong. Stage 2 of the pilot involved 18 days of data collection with locations from Melbourne, Geelong and Ballarat added to the sample, and reassessment of 20 of the Melbourne and Geelong locations to provide information on variation in assessments over time.

Information generated from Stage 1 confirmed the most cost-effective methods for observation and data collection, as well as procedures for data recording, checking, entry into the database and analysis.

Procedures were refined to ensure balanced data collection from different site types, the best use of staff time and accurate representation of littering and litter. During Stage 1 there was considerable variation in the pedestrian traffic in sites at different times during the day, with peaks in people consuming and disposing of items, so an effort was made to visit site types at times when they were likely to be busiest.

Stage 2 assessments were conducted during June and July 2003 and included revisits to some of the pilot sites from Stage 1 to enable reliability checks on the information collection procedures. The information gathered from the sites included some basic observations of disposals (both littering and bin use) in the site, public attitudes and perceptions, characteristics of sites and the effects they had on public place behaviour.

Sample

EcoRecycle Victoria selected the sample for the VLMP pilot from the frame of all Local Government Authorities (LGA's) in the Melbourne Statistical Division (MSD) and Greater Geelong and Ballarat LGA's as defined by the ABS 2001 Census of Statistics & Housing.

Table 1 shows the frame of locations, that is, the list of all possible LGA's available for inclusion in the VLMP pilot from which the sample of LGA's was selected.

The selection of locations for the VLMP pilot was based predominately on geography and population size. That is, LGA's were selected to represent many aspects of the MSD including a range of population sizes as well as inner and outer metropolitan areas and LGA's from diverse geographic map co-ordinates. The selection of locations is based predominately on population and geographic considerations at the LGA level of detail as obtained from the ABS, 2001 Census of Population and Housing.

Table 1 Frame Location (LGA's by no of persons) 2001 ABS Census of Population & Housing

LGA Name	*Total Persons (no.)*	*Total persons as a proportion of total (%)*
Greater Geelong (C)	**184,331**	5.1%
Casey (C)	176,075	4.8%
Brimbank (C)	163,472	4.5%
Monash (C)	156,898	4.3%
Boroondara (C)	150,233	4.1%
Knox (C)	141,912	3.9%
Whitehorse (C)	140,751	3.9%
Yarra Ranges (S)	137,539	3.8%
Hume (C)	131,585	3.6%
Moreland (C)	131,359	3.6%
Kingston (C)	128,171	3.5%
Mornington Peninsula (S)	125,378	3.5%
Greater Dandenong (C)	124,536	3.4%
Darebin (C)	123,848	3.4%
Glen Eira (C)	118,138	3.3%
Banyule (C)	114,222	3.1%
Whittlesea (C)	114,082	3.1%
Frankston (C)	110,179	3.0%
Manningham (C)	107,920	3.0%
Moonee Valley (C)	106,116	2.9%
Maroondah (C)	96,461	2.7%
Stonnington (C)	87,412	2.4%
Wyndham (C)	85,176	2.3%
Bayside (C)	84,097	2.3%
Hobsons Bay (C)	80,432	2.2%
Port Phillip (C)	80,157	2.2%
Ballarat (C)	**80,045**	2.2%
Yarra (C)	68,018	1.9%
Melbourne (C)	67,784	1.9%
Maribyrnong (C)	59,770	1.6%
Nillumbik (S)	58,161	1.6%
Melton (S)	51,823	1.4%
Cardinia (S)	45,404	1.3%
Total	*3,631,485*	100.0%

Selections of VLMP sites were made to reflect information requirements for the protocol on particular site types and locations within regions. Some VLMP site types were selected more often than others, eg, shopping centres vs beaches, due to their more frequent occurrence in the locations selected.

The random sample of VLMP sites selected in a LGA was influenced by the availability of each site type within the chosen locations and monitored over time. For example a beach site type might have been randomly selected to be assessed in Knox but there are no beaches in that LGA. Consequently the beach site type was replaced by the next available site type in Knox.

Future analysis of the results for the sample may provide for inferences about sites other than those selected and socio-economic indices may be applied to the selected locations to build a more comprehensive account of factors associated with littering in communities in and around Victoria over time.

Selected Sample

The regions or statistical districts and the LGA's selected in this pilot using the location frame listed in Table 2, were:

Melbourne Statistical District (MSD)

- Bayside
- Casey
- Darebin
- Greater Dandenong
- Hume
- Knox
- Manningham
- Melbourne
- Melton

City of Greater Geelong Statistical District

- Greater Geelong

City of Greater Ballarat Statistical District

- Ballarat

The LGA's selected from the frame of locations have the following relevant features which, although they did not form criteria for selection, provide important considerations in assessing a wide cross section of different locations in the VLMP pilot:

- Knox[8], Melton and Casey reflect the growth corridors of the outer metropolitan MSD for the eastern, south eastern and western regions of Melbourne[9]
- Hume represents one of the northern co-ordinates of outer metropolitan MSD
- Darebin and Manningham represent the more established and traditional inner-metropolitan suburban areas. Darebin also incorporates many multicultural aspects, which is an important element of the MSD profile
- Bayside was selected primarily because of its high local tourism and seaside culture

[8] A number of challenges face the municipality of Knox, including an ageing population in the north of the municipality and a rapidly developing growth corridor in the south. Other challenges include management of community infrastructure, protection of the local environment. These comments extracted from www.knox.vic.gov.au.

[9] Knox, Melton and Casey were not assessed in Stage 1 of the pilot but were included in Stage 2.

- City of Melbourne was included because of its unique character and represents the economic hub of the state with its high commerce and retail trade component
- Greater Dandenong is included because it represents the industrial sector of the MSD and has a different socio-economic composition compared to the other LGA's
- Geelong and Ballarat represent major provincial centres in the rural sectors of the state

Review of Site Classification and Selection

During the pilot, an up-to-date site classification system was established after a review of current site classification and selection procedures. The review ensured that the sample of site types selected for assessment and monitoring were appropriate for representing public places in Victoria.

The descriptions of the types and number of sites to be surveyed across the state using the revised methodology have been summarised in Appendix B.

The sample frame for the type, number and location of sites was determined in consultation with EcoRecycle Victoria and the Environment Protection Authority with the use of census data and population information as the basis for sampling. To provide some continuity with prior measures of litter in Victoria, similar site types were used to those measured in previous litter counts but it was not possible to match locations. However, unlike the earlier sample frame, there was no need to over-represent sites from each of the rural regions in the final sample.

Site Types

The VLMP site classification system was based on the classification system used in the Victorian Litter Count Methodology and the LBS where site types are broken into two groups – core sites[10] (shops, waterfronts, markets, etc) used for comparing littering on a city-wide basis, and special sites[11] (events, festivals, tourist spots, etc).

Most of the focus for gathering information using the VLMP was on core site types in order to allow for comparisons between site types most commonly found in cities and towns. The VLMP sample also explored some site types not previously included in the LBS series which were deemed to have become important since the original sample for LBS was created – namely, outdoor smoking areas (important as smokers can only smoke in outdoor settings designated for this purpose, usually with butt BINfrastructure positioned to help smokers to do the right thing[12]). Other sites assessed for the first time included railway easements, building sites, school sites and roadside areas.

The process of site selection also involved a review of previous site classifications and some definitions were refined to clarify the features included with each site type so that the sites in the VLMP could be easily recognised in locations around Victoria. The site types considered, used and added to the VLMP are shown in Table 2. Notably many of the special sites were not assessed during the pilot due to the time of year, ie, mid-winter in Victoria.

[10] Core sites are sites that can be found in most towns and can be readily accessed at different times of the year.
[11] Special sites are less frequently found in all towns or cities. Wherever possible, special sites will be included in the protocol design but the collection of information from some special sites such as events or festivals is dependent upon timing factors.
[12] Under the NPC a recent study of smoking sites in the City of Melbourne showed strong tendencies for many smokers to be doing the right thing and using butt bins.

Table 2 Site Types for Consideration in the VLMP

Core Site Types	Additional Sites	Special Sites
Shops	Smoking	Events
Malls	Roadside stops	Festivals (food and wine)
Parks	Roadsides	Festivals (music)
Public buildings	Building sites	Tourist spots
Waterfronts	Food courts	Resorts
Beaches	Indoor transport	Sporting & recreation ovals
Markets	Easements (Rail)	
Transport		

Using the VLMP, future expansion of site types may occur, with modification and refinement to the CCAT methodology applicable to special sites, eg, resorts and events, which usually attract the public in warmer weather.

Sites Types Selected and Sampled

The site selection process involved identifying a preferred set of target site types for each LGA in order to provide a sound basis for comparisons. EcoRecycle Victoria contacted Regional Waste Management Groups and asked for location suggestions that could be assessed in the selected LGA's. The final selection of VLMP sites in each of the LGA's was therefore based on the statistically preferred profile, input from the regions and convenience in terms of cost effective information gathering during the pilot.

In each LGA, site types chosen for assessment were selected from any of the suburbs listed within the LGA's borders with the criterion that, where possible, the travel distance between site types was kept to a minimum whilst attempting to meet the preferred sample profile. Consequently not all the preferred site types were assessed in every LGA.

The preferred VLMP sample set for Stage 1 and Stage 2 comprised a total of 220 site assessments. Additionally, during the pilot, there was an allowance for a return second assessment for 20 of those sites[13]. Consequently the total number of preferred VLMP assessments in the final target sample was 240.

In the actual sample of assessed sites, a total 260 assessments were conducted including extra visits and assessments in 20 sites to provide a larger sample for reliability testing during the pilot.

The composition of the preferred and actual sample for all site types in the VLMP pilot is shown Table 3. It shows the number of preferred site types targeted for assessment in the VLMP for Stage 1 and Stage 2 and the total number of preferred site types for return assessments.

[13] Test–retest reliability assessments were carried out to determine the extent to which the rating of factors included in the VLMP varied over reasonably short periods of time.

Table 3 Preferred and Actual Site Types in VLMP Sample

	Preferred Number of Site Types Targeted				
Category	Stages		Total		Actual
Site Type	One	Two	Sub total	Plus Returns	VLMP
Shops	11	15	26	33	38
Transport	9	11	20	25	31
Smoking areas	10	12	22	22	18
Park	8	10	18	22	25
Schools	9	10	19	20	25
Malls	8	9	17	19	19
Railway easements	5	12	17	18	19
Public buildings	4	10	14	14	18
Waterfronts	4	8	12	12	13
Markets	3	8	11	11	8
Building sites	3	4	7	7	2
Beaches	5	2	7	7	8
Roadside stops	4	3	7	7	4
Car parks	0	7	7	7	12
Landmark	2	4	6	6	11
Events	2	2	4	4	4
Waterfront precincts	3	0	3	3	5
Precinct areas	0	3	3	3	0
Roadside	0	0	0	0	0
Total Site Types Assessed	**90**	**130**	**220**	**240**	**260**

Most of the targets for each site type were met or exceeded during the pilot, apart from building sites, markets, smoking areas, roadside stops, and precinct areas.

Precinct areas were not assessed separately in the pilot as they were found to consist of site types that were located next to each other and did not therefore require an extra assessment to be made. Comparison of precincts may be made by combining the results of site types located together in the precinct area.

In the Melbourne Statistical District sample it was also not possible to meet the targets set for roadside stops and smoking area site types because of a lack of those types in the LGA areas visited. Markets were especially difficult to access during the winter months with coordination of assessments often unable to be made on the same days teams were in those LGA's.

Attempts were made to assess a number of building sites but only two assessments were completed; information from these assessments was not meaningful however and has not been included in final VLMP outcomes. CCAT assessment was not particularly useful in relation to building sites due to the fact that the general public has no legitimate access to the sites, thereby limiting the number of people using the site and performing disposal behaviours. Furthermore, infrastructure and other ratings were not relevant as the rating scale applies to infrastructure useable by members of the public.

Photograph 1 shows one of the two building sites where the CCAT was used in attempting to make a meaningful assessment. Apart from the wire BINfrastructure, there is little else in the site type to be assessed

using the CCAT scale. Finally, actions on a building site seem to be more related to individual interpretation and enforcement of industry best practice rather than how the public interacts with the site in terms of its context and facilities.

Photograph 1 Building Sites Assessed by CCAT

Some recent work through the Victorian Stormwater Action Protocol (VSAP) has identified a separate model for assessing building sites which could be examined to determine its suitability as a monitoring mechanism for assessing litter, other environmentally undesirable actions and good practices associated with building sites.

Areas Selected and Sampled

Characteristics for the site types assessed in the actual VLMP sample provided a sound basis for examining the disposal actions and features of sites throughout Victoria. The areas that were sampled comprised sites selected in Melbourne[14], Geelong and Ballarat. Table 4 gives a breakdown of the number of preferred site types targeted in the VLMP assessments (including return visits) for the areas of MSD, Greater Geelong and Greater Ballarat districts, combined over Stage 1 and Stage 2 into total figures for the pilot.

Table 4 also includes the site types assessed for the Highland Regional Waste Management Group (HRWMG) area study which, although not part of the VLMP pilot, has been included to provide a detailed comparison for regional centres. It should be noted that the HRWMG study included assessments conducted at the new site type - roadsides.

Differences between preferred target numbers and actual numbers of site types assessed in each area were small. It was not possible to meet the target set for roadside stops in the VLMP pilot, however five roadside stops were assessed as part of the HRWMG study enabling results to be examined for this site type beyond the limited number found as part of the VLMP.

Slight shortfalls in the number of smoking areas and market site types were found for MSD and Geelong where the reason for the difficulties in reaching targets were similar - a lack of those types in the LGA areas and difficulties coordinating team assessments on the same days as markets.

[14] Site types assessed throughout Greater Melbourne have been included in the Melbourne Statistical District (MSD).

Table 4 Breakdown of Preferred and Actual Sample of Site Types in VLMP

	MSD		Geelong		Ballarat		
Category	Visits	VLMP	Visits	VLMP	Visits	VLMP	HRWMG
	Target	Actual	Target	Actual	Target	Actual	Actual
Shops	26	31	6	6	1	1	13
Transport	18	24	6	6	1	1	0
Smoking areas	16	13	5	4	1	1	0
Park	17	19	4	5	1	1	16
Schools	15	21	4	4	1	0	0
Malls	14	14	4	4	0	1	3
Railway easements	13	15	4	4	1	0	0
Public buildings	9	11	4	7	1	0	0
Waterfronts	10	10	3	2	0	1	2
Markets	8	6	2	1	1	1	0
Building Sites	7	2	0	0	0	0	0
Beaches	5	5	2	3	0	0	0
Roadside stops	1	1	5	2	1	1	5
Car parks	6	10	1	1	0	1	0
Landmark	5	9	1	1	0	1	0
Events	4	4	0	0	0	0	0
Waterfront Precincts	2	3	1	2	0	0	0
Precinct sites	3	0	0	0	0	0	0
Roadside							1
Total Sites in Areas Assessed	**179**	**198**	**52**	**52**	**9**	**10**	**40**
Percent of VLMP Sample	**75%**	**76%**	**22%**	**20%**	**4%**	**4%**	

The relative proportion of the final preferred VLMP sample made up from the three target areas - MSD, Geelong and Ballarat was preferred to be 75%, 22% and 4% respectively, based on population parameters and taking into account the return assessments. The achieved proportion in the actual sample was slightly different, with MSD over-represented and Geelong under-represented in the proportions. However the differences in the composition of the preferred sample from the actual were not significant. Consequently, the sample of site types assessed in the pilot VLMP satisfactorily met the statistical features of the preferred sample areas.

Locations Sampled

The 300 assessments reported in the pilot summarises data gathered from 262 locations. The total sample consisted of 222 locations assessed in MSD, Geelong and Ballarat and an additional 40 locations assessed in the HRWMG. A total of 16 LGA's were sampled in the 300 assessments. The locations for site types in the final sample in each LGA included in the VLMP and the HRWMG are presented in Appendix C.

CCAT in the Field

Ratings, Surveys and Observations

The CCAT team has two trained data gatherers with one person taking a lead role as the rater and the other as a surveyor/interviewer. The visibility of data collection during the VLMP meant that members of the public would often ask the raters what they were doing. If time allowed the rater would survey the person or otherwise, direct the person to the surveyor. Somewhat surprisingly many members of the public waited while one interview was being finished in order to participate themselves. When asked why, the explanation offered by these members of the public usually involved an interest in litter prevention and/or their local area.

Surveying

During a twenty-five minute session in a particular site the interviewer would approach as many people as possible to participate. Surveyors were trained to avoid personal bias in selecting people to survey and used a convenience approach to "randomly" select and request interviews from people using the site.

Photograph 2 Surveyors at Work

Interviewers aimed to gather as many interviews as possible in the 25 minute time period allocated to each location which, if busy, resulted in around 7 people being approached and 3-4 interviews being completed. While rating and interviewing in a location, both team members were trained to record disposal actions.

Photograph 3 Surveys with Groups of People

Survey Issues

Brief interviews took approximately four minutes to complete and included a series of items related to key components of the CCAT. Context items included questions on the sense of community attached to the location, as well as interviewee's views on how clean it was and how comfortable they felt in the site.

Participants were also asked to give their views on the performance of the facilities and how effective they thought the BINfrastructure was in reducing litter and encouraging people to do the right thing.

Items regarding their perception of litter in the site and how important it was to maintain a clean area were also included, as were some general questions on environmental issues such as litter ending up in stormwater drains. People were asked about litter prevention and its impact on the environment, in particular its effect on local waterways or the bay as shown in Photograph 4.

Photograph 4 Litter Entering Stormwater System

An additional advantage of the survey format of the CCAT is its ability to track the community's knowledge of educational or advertising campaigns aimed at increasing awareness of the impact of waste on the environment.

Observations of Actions

The target of litter reduction and prevention campaigns in Victoria is to reduce the frequency of littering actions. The CCAT includes a basic record of incidents of both bin use and other positive disposals (such as recycling or picking up litter from the street) as well as littering or inappropriate disposals such as dumping of trader waste into a public litter bin.

Actions are recorded during the 25 minute assessment session by both the rater and the surveyor who selectively attend to different parts of the location and who coordinate their tracking of disposals and other activities.

Systematic Approach to Rating

All CCAT ratings were made on a scale from 1 to 5, focusing on the level of cleanness of all features in the location, so that the higher the score the cleaner the assessment of the factor. After becoming familiar with the site, raters used an area of 160 square metres for assessment. Raters were trained to follow a structured format to reduce the impact and potential bias of visual litter. For example, at first glance, the location in Photograph 5 seems likely to score very highly on the CCAT assessments as it appears clean. On closer examination however, an infrastructure feature formed a litter accumulation point as shown in Photograph 6.

Photograph 5 A Clean Location

In order to account for such anomalies, the structured format used takes into account particular features of a location including infrastructure and BINfrastructure.

Photograph 6 CCAT Identifies Features Leading to Litter Accumulation

Individual assessments were made of the cleanliness and functionality of infrastructure (if present) - for example, furniture, entrances, defined open space, landscaping and boundary markers. Bins and BINfrastructure were also rated in relation to servicing and maintenance, performance, position, presentation and function. Rater's

assessments of a sense of ownership or community, and safety and cleanliness of common areas were also included as part of the assessment.

Common areas were also assessed in terms of how free they were from dumping, bill posting, graffiti, with an overall 'clean' rating completed. Raters also completed a 'clean' count (litter count) in a 48 square metre area around the bins and noted anything of interest in the location.

Inter-rater Agreement

The level of agreement between two independent CCAT raters in a location was determined using an inter-rater reliability protocol which involved two raters assessing the same site at the same time with no discussion of the ratings until after data was entered into the database. A total of 11 locations had inter-rater assessments completed and comparisons were made by calculating the concordance rate confirmed using a Spearman's correlation. The concordance rating showed that in 82% of instances, the two raters agreed exactly on the rating. If adjacent values were included in the concordance rating, then in 99% of instances, raters agreed within 1 ranking difference on either side.

A two-tailed Spearman's correlation was also performed on the inter-rater data and was found to be significant in each of the 11 instances with correlation coefficients ranging from 0.99 to 0.84, with all but one of the coefficients above 0.90. Litter counts performed by two raters at the same site were also assessed for concordance with a two-tailed Spearman's correlation showing a significant correlation within each site.

Photograph 7 Raters at Work

Context

Raters compared their own assessments for sense of community with those ratings made by people surveyed in the location. Raters identified indicators of a strong sense of attachment, identity and community involvement with a location using signs, pictures or names inferring a sense of belonging, particularly important when no one in the location was available for interview. Photograph 8 shows two locations where there was a high rating for context.

Photograph 8 High Context Community Involvement

Locations rated low on the context factor tended to be more littered, had high levels of graffiti and indications of antisocial behaviour such as drug use or vandalism as shown in Photograph 9.

Photograph 9 Low Context Graffiti, Drug Use and Litter in BBQ Area

Photograph 10 Highly Littered Low Context

As part of the context rating, litter counts provide a basis for understanding the background levels of cleanliness in a location and indicate accumulation points as well as the effectiveness of cleaning and maintenance strategies. In the VLMP, litter count scores were converted to CCAT ratings based on the

outcomes for different site types. As a 'clean' rating, the counts form an integral part of the context where people use public spaces and, as Photograph 9 demonstrates, the importance of assessing individual factors influencing actions.

Dumping in Sites

In various locations, dumping of domestic and commercial waste was apparent and was rated as part of the context where disposal actions take place. Some sites such as railway easements and roadside stops were more likely to attract illegal and domestic dumping, and as shown in Photograph 11, if not cleaned up, convey the message that it is acceptable to litter in the area.

Photograph 11 Dumping Sites

Facilities

BINfrastructure

Simply providing more bins has not proved a simple solution for litter prevention. While access to bins is an important factor in developing appropriate disposal behaviour, a number of bin features have an impact on people's actions in public places.

The CCAT includes a number of factors associated with BINfrastructure that have an impact on whether the bins provided in public space are effective in encouraging increased use and reduced littering. The bins in Photograph 12 provide an example of a system rated fairly highly using the CCAT.

Photograph 12 Effective Recycling & Litter BINfrastructure

The recycling bin has clear simple instructions on what to recycle; the colour yellow matches what most people expect indicates recycling; the signage is clear and the configuration of bins appears easy to use and distinguishes clearly between the litter bin and the recycling bin. The BINfrastructure allows for reasonable access to pedestrian traffic coming from different directions to both bins and the size of openings suits the use of the bins by people in the location. Bins appear to be well maintained, with clean, chip-free paint and reasonably clean surfaces in and around the bins.

In contrast, similar investment in BINfrastructure (public place recycling and litter bins) was not rated as highly due to the factors associated with the bins. As shown in Photograph 13, the signs are small, hard to read and the cleanliness of the bins impacts on the legibility of the signs as well as the actions of people approaching the bins. The doll stuck to the top of the bin and the angle of the litter bin (which has been hit by a car) are both indicators of a lack of maintenance and general concern for the presentation of bins. The poor cleanliness and maintenance of these bins results in confusion as to which bin to use and detracts from the overall appearance of the site.

Photograph 13 Low CCAT BINfrastructure

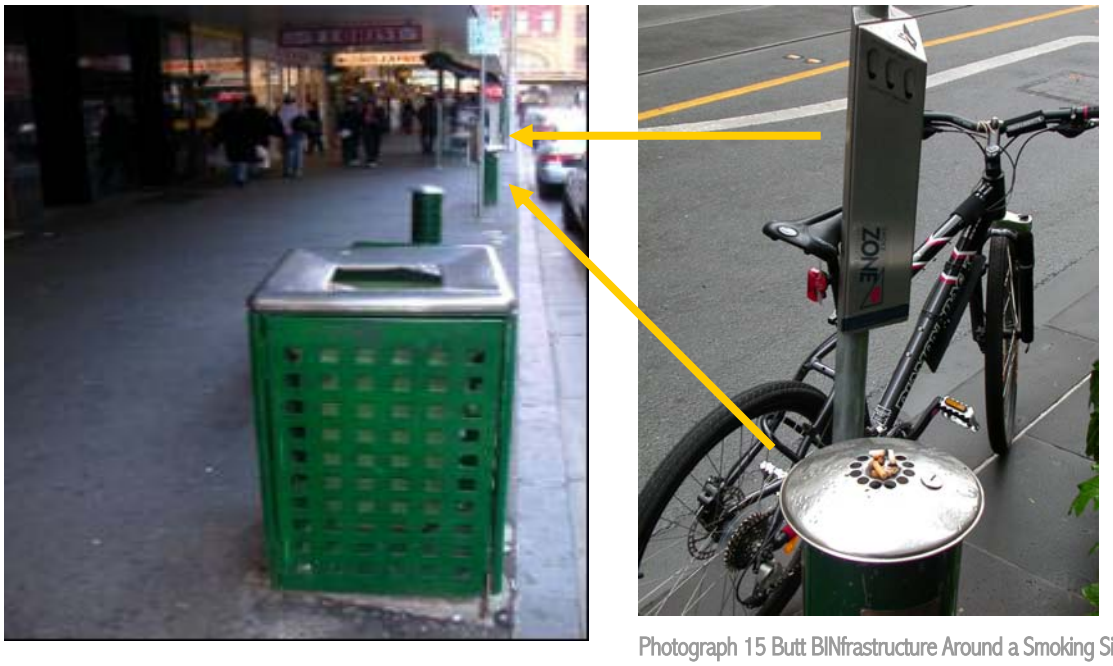
Other factors assessed in BINfrastructure include the extent to which the area around bins is maintained. For example, in Photograph 14, the opening of the bin cage forms a litter accumulation point between the side of the bin and the cage. In this case, maintenance needs to be improved, particularly when the bin is emptied as the litter inside the cage falls out and may not be retrieved. Alternatively, Infrastructure may be easy to use but may not effectively contain litter from wind or small pieces may drop through the holes on the bottom of the container. For these reasons, the CCAT ratings for BINfrastructure for both bins in Photograph 14 would be low.

Photograph 14 Low CCAT BINfrastructure

Butt BINfrastructure in Smoking Locations

Butt bins have become a common feature of public spaces and recent evidence has shown a trend for smokers to be more likely to use butt BINfrastructure than previously. The VLMP has included smoking areas in the site sample to assess the effects of smokers being moved outdoors to smoke and the adequacy of BINfrastructure to match their disposal needs.

Some councils have redesigned bins and retro-fitted to provide ashtrays for smokers while others have used ashtrays to specifically encourage smokers to do the right thing. However butt BINfrastructure does not always work, particularly when implemented using a 'shotgun' approach as shown in Photograph 15.



Photograph 15 Butt BINfrastructure Around a Smoking Site

In this location there are three different types of ashtray. This seemed to create a deal of confusion as in the far background, a water fountain that also looks like an ashtray has been used to extinguish cigarettes. The litter in the doorway in Photograph 16 suggests that the nearby ashtrays were not working as they were not

conveniently positioned for smokers. The design of ashtrays impacts on litter as the butts on the bin may become litter as a result of wind despite smoker positive disposal actions as the litter is not securely contained.

Photograph 16 Disposal of Cigarette Butts

Smokers often use particular areas as customary smoking locations and litter in these areas can be avoided if there is a suitable and convenient option for disposal of butts as shown in Photograph 17.

Photograph 17 Butt BINfrastructure at Work

CCAT results can be used to help alter the outdoor environment to encourage smokers to a site proximate to ashtrays and bins, making correct disposals an easier option leading to less litter.

Where there is a lack of BINfrastructure or ashtrays people use the nearest available alternative to contain litter, often creating accumulation points. In the location shown in Photograph 18, there were no nearby bins but site facilities included a fire hydrant with an opening and an ashtray attached to its side. In this case, the BINfrastructure probably needs to include a bin and ashtray and, potentially, a public place recycling bin as it seems that the location has become a focal point for consuming items. Ironically, the litter accumulation point in this case is a clear fire hazard as shown in Photograph 19. The containment of the litter in a 'bin like' manner demonstrates actions that form a basis for doing the right thing and if a bin was installed, then more positive disposals would be likely to occur.

Photograph 18 Using Infrastructure for Bin-Like Disposals

Photograph 19 Litter Contained Inside Fire Hydrant

Interaction between BINfrastructure and infrastructure in a location plays a critical role in litter prevention and management. While it is relatively easy to see the role that BINfrastructure has in affecting community littering, it can be more difficult to take a more holistic focus to account for other factors influencing disposal behaviour which help people to maintain a clean environment.

Infrastructure

The infrastructure in a location impacts on the actions of people using that place. For example the transport site in Photograph 20 illustrates the effects of open space landscaping and the lack of appropriate BINfrastructure on disposal actions. People in the site who consume items and smoke have taken the option of containing their litter by using the nearby planter which has become a litter accumulation point.

Photograph 20 Bin-Like Disposal at a Transport Site

Landscaping

In the photograph below, the landscaping received a low CCAT rating - plants and landscaping features are clearly meant to be in the planter box which is functioning as designed and is now being used as a bin. There is also litter around the base of this landscaping feature.

Photograph 21 Low CCAT landscaping

In this example, landscaping features not being used for the purposes designed and the problem of litter accumulation results in a low CCAT rating for both function and cleanness.

Some landscaping operates effectively as a garden area but may not be well maintained or cared for and, as a consequence, seems to attract litter. This type of landscaping also becomes a litter accumulation point as shown in Photograph 22.

In a low CCAT location, landscaping may have plants that are still alive, but there is no mulch cover or it is very sparse with weeds and litter found in the garden beds. Signs of poor maintenance and care attract even more litter to the area and graffiti tends to occur as can be seen on the tree trunk on the left in the photograph.

Photograph 22 Unmaintained Landscaping Attracts Litter

As shown in Photograph 23, landscaping that is well maintained and kept clean clearly establishes the expected behaviour from people using a location.

Photograph 23 High CCAT Landscaping

This landscaping, although it is fairly plain, has no weeds, and has been neatly maintained with clear borders and areas that are well defined. It is a good example of how simple strategies can be used to achieve functional outcomes and create an expectation of people doing the right thing.

Entrances

Entrances provide an effective portal to a location and lets the public know they are arriving in one area after leaving another, acting as a break or boundary between sites. The impact of an entrance on people using a location is supported by other aspects of infrastructure in the area including landscaping and boundary markers. Entrances play an important role in setting the expectations of disposal behaviour for an area. Clean, well maintained entrances are associated with clean litter free locations as shown in Photograph 24 and Photograph 25.

These locations received high CCAT ratings. In the photograph on the left, stairs clearly lead the pedestrian into the library and are structured to effectively move people to the site while restricting access to the landscaped areas. The sign on the top of the library provides sufficient information to direct pedestrians appropriately to the door of the building.

The entrance to the shopping strip site in Photograph 25 is located off a pedestrian crossing, has a smooth surface leading off the road and has boundary markers on either side to provide an effective portal. This entrance was rated as operating effectively although the pavement surface is not well maintained and there is little information (signage) in the location to describe where the pathway is leading.

Photograph 24 High CCAT Entrance

Photograph 25 Entrance to Shops

Entrances receiving a lower CCAT rating convey different messages about expected actions than those in the entrances in Photograph 24 and Photograph 25. Although the entrances in Photograph 26 below are clearly identifiable as portal points, the surface is rough - almost hazardous - and no information is available about the site. There is therefore little encouragement for people to do the right thing with their litter.

Photograph 26 Low CCAT Entrances

Location and safety influence the assessment of an entrance which is often enhanced by the use of boundary markers to establish a sense of place associated with an entrance.

Boundary Markers

Boundary markers play an important role in setting the transition from one public area or space to another depending how well they are designed and maintained.

Photograph 27 and Photograph 28 show two distinctly different levels of boundary markers in two separate areas. In the first two photographs, there is clearly a lack of care and concern associated with the public space to the extent that public safety may be threatened by dangerous or poorly maintained boundary markers. Typically, these types of boundary markers become litter accumulation points.

Photograph 27 Low CCAT Boundary Markers

Photograph 28 Higher CCAT Boundary Markers

In Photograph 28, still functioning boundary markers, although highly rusted, slightly bent and detracting from the aesthetic appeal of the location, are rated as adequate. Fully functioning, well maintained, clean and unchipped boundary markers would rate even more highly.

Furniture

Public place furniture serves the community by providing places to rest and recreate in public spaces. In the picture on the left, the seat is highly chipped, scratched and covered in graffiti; the picture on the right also shows chipping with highly scratched paintwork. The protruding nails represent a potential hazard and, while both pieces of furniture can still be used for the purpose for which they were designed, the CCAT rating for both would be low.

Photograph 29 Two Examples Low CCAT furniture

Furniture that is maintained to a higher standard conveys to the public the importance of their comfort in an area and, as a consequence, a higher expectation of them in regard to their disposal actions. In Photograph 30 the furniture appears in good condition, paint is unchipped and there is relatively little graffiti.

Photograph 30 Higher CCAT Furniture

The Importance of Systematic Assessment Using CCAT

Using a purely visual inspection, or relying solely on litter counts, can be deceptive in relation to how clean a site really is.

For example, at first glance, the location in Photograph 31 appears to be a very clean site however the systematic approach used in the CCAT, where the location is divided into sub components, identifies the relative contribution of each factor to the overall assessment of the location.

Photograph 31 Identifying Litter

On closer inspection, the furniture and landscaping are highly littered with evidence of limited maintenance. There is also some indication that the BINfrastructure might need to be adjusted to better suit the disposal actions in the area. The site is really only 'slightly' clean and the influence that the landscaping furniture has on disposals in this area can be effectively distilled, identifying the littered objects hidden in the site and bringing the issues needing to be addressed into the open.

Outcomes

Data Gathering

During the study, the average temperature was 17 degrees Celsius, ranging from 15 to 20 degrees. The weather was unusually sunny and dry for winter in Melbourne. When it was raining, ratings, surveys and observations were conducted in outdoor areas where there was some protection from direct wind and rain. In many locations the weather, whilst unpleasant, did not stop people from using public spaces - for example, surveys were conducted with six people on Sandringham beach on a cold, wet and windy Saturday during the VLMP data collection.

Data gathering was fairly evenly spread from Monday to Saturday with a couple of Sundays included in the sample to provide coverage of activities at the busiest times. A total of 300 CCAT assessments were made from a total of 262 locations including the 40 locations in HRWMG which were assessed only once (40 assessments) and the 222 locations in the VLMP with 38 locations revisited during both Stage 1 and 2 of the project (260 assessments).

Public Disposal Actions

Disposal actions were recorded during the assessment of 196 locations with no disposal actions recorded in the remaining 104 locations. The lack of disposal actions in some locations was due to the nature of the particular site type - for example in school sites, very few people were consuming items so the possibility of observing a disposal was very small. Also, the time of year when data was collected (winter in Melbourne) reduced the likelihood of people sitting outside consuming items.

Throughout the state, 685 observations of disposal behaviour were made which included both positive and negative disposal actions. The maximum number of observations of positive disposal actions in a session was 21, with an average number of three positive actions observed per location. In total, there were 511 environmentally appropriate disposal actions recorded by the raters who also noted 174 environmentally inappropriate disposal actions. The maximum number of littering actions seen in any one assessment session was 6, with an average of just under two littering acts recorded per location where actions were observed. Three quarters of the total observed actions in the locations surveyed in the VLMP involved people doing the right thing with used items.

In order to compare actions in different locations the relationship between positive and negative actions in a location was represented on the five-point CCAT rating scale. The ratings range from '1' indicating that the actions recorded in the location were not at all clean and involved a clear majority of littering, whilst a rating of '5' indicated the actions in the location were extremely positive and at the more environmentally responsible end of the continuum.

The outcomes for the VLMP provide data on the relationship between disposal actions in a location and the Location CCAT rating which is based on a composite of average ratings for Context, Facilities and Attitudes and Perceptions, ie, it does not include Actions which exists as a separate factor for this purpose. The Location CCAT rating provides a summary score for a location that is comparable to other locations. Results have been presented to establish a state-wide benchmark of CCAT data from locations in Melbourne, Geelong, Ballarat and the HRWMG. Further analysis comparing regions and cities throughout Victoria, as well as summary scores for site types, has also been reported. Individual results for locations are not presented

here but are available on request form Nick Chrisant at Eco Recycle Victoria. Exact descriptions of the locations assessed in each city are provided in Appendix C.

State-wide CCAT

CCAT scores from all 300 assessment sessions have been averaged to provide summary results for the state on each of the factors that constitute the CCAT, as well as the summary score for Location CCAT as shown in Figure 5. As with the individual site results, summary scores are represented on a five-point scale from '1' (not at all clean) through to '5' (extremely clean).

The average level of disposal actions is at a Level 3 indicating that most people assessed in most locations are attempting to, and interested in doing the right thing. There is some way to go though before everyone is on board in relation to the disposal of their used items, and a Level 5 for disposal actions is attained.

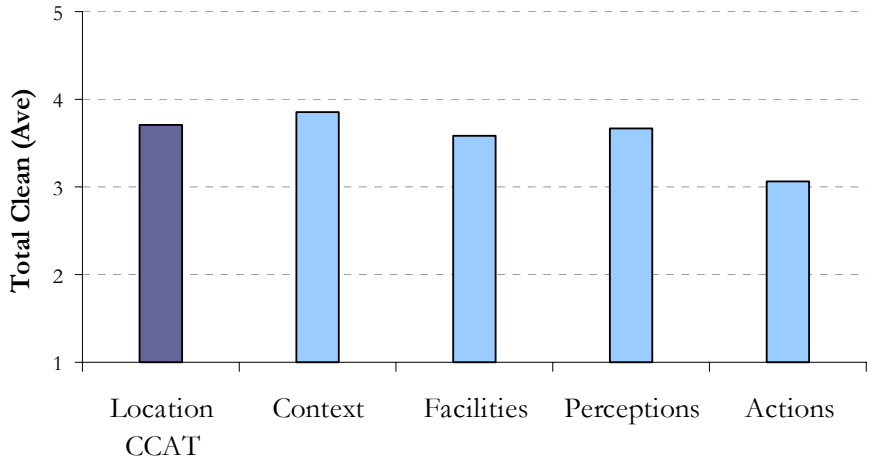


Figure 5 Average Summary Ratings Across the State

As stated, the Location CCAT represents an average of the ratings for Context, Facilities and Attitudes and Perceptions and summarises the factors influencing the disposal actions in a site. Throughout Victoria, the average Location CCAT was between Level 3 (moderately clean) and Level 4 (very clean). The level for Actions was somewhat lower than that of the Location CCAT, indicating that people's intentions do not match their espoused attitudes and assessments as closely as they might.

The highest factor rating was for Context, which assessed the sense of community and overall cleanness of a site. The state-wide average for Context was just below Level 4 (very clean).

The next highest CCAT factor was for Attitudes and Perceptions - the assessment of public attitudes and perceptions of litter prevention, the level of performance in terms of the facilities, as well as general views on how clean people's actions should be in the area and how important it is to keep the location clean.

The score for Attitudes and Perceptions, averaged out across the state, is almost as strong as the Context rating, showing that the community has a clear sense of ownership and involvement in the locations assessed, believing people in those locations should act responsibly and be provided with the appropriate facilities to prevent littering from occurring.

The score for the Facilities component of the CCAT, consisting of ratings of the function and cleanness of the infrastructure and the BINfrastructure, averaged out across the state to a lower level than the other two factors of Context and Attitudes and Perceptions.

The Actions rating was at a moderate level across the state (Level 3) which was lower compared to other summary scores.

Key CCAT Components

Two of the CCAT factors are comprised of some key sub components. Facilities ratings consist of ratings for infrastructure and BINfrastructure while ratings for public perceptions of a location relate to community views on the adequacy of bins in a location and the place itself.

The average scores on the CCAT scale for the components that form the Facilities and Attitudes and Perception groups of CCAT assessments have been presented in Figure 6 where the summary rating for Infrastructure and BINfrastructure are shown alongside the ratings for the components contributing to the overall Attitudes and Perceptions score – namely, the public's ratings of the adequacy of facilities to prevent litter and attitudes toward the location itself.

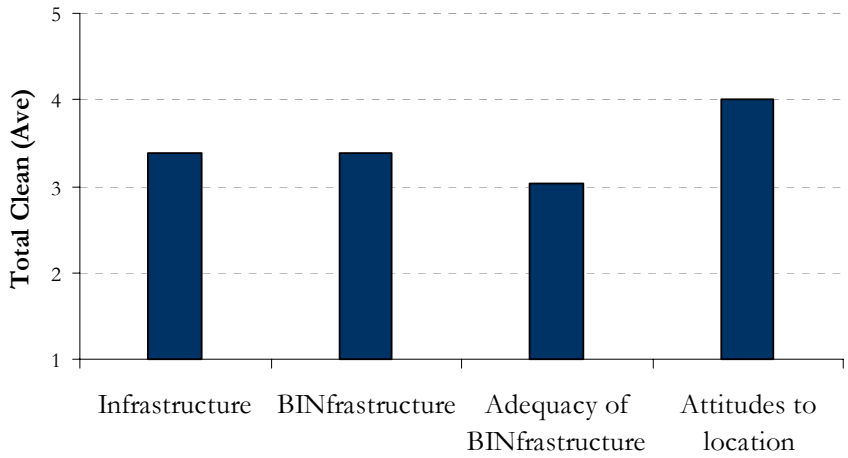


Figure 6 State-wide Average of Facilities and Perception Components

The ratings for Facilities components indicate a consistent rating of Infrastructure and BINfrastructure in locations around the state at just above a moderate level of performance, function and cleanness.

Figure 6 shows that the stronger component was the public's attitudes toward the location where they consistently indicated that acting to maintain the local area as a clean and environmentally friendly place was a high priority. Notably the level of attitudes and importance of clean actions in the location were rated more highly than the actual levels of actions observed in those locations (see Actions rating in Figure 5).

The factor contributing least to the overall Attitudes and Perceptions rating was the public's views on the adequacy of the BINfrastructure facilities for preventing littering in the location. The low rating indicates a perception that more and improved bins should be better positioned in order to improve the overall cleanliness of the location.

CCAT in CD Regions

The location CCAT and overall ratings for the CCAT factors were analysed on a regional basis where overall results for Melbourne could be compared to the overall results for the VLMP locations in Ballarat (10 sites) and the VLMP outcomes for Geelong, as well as the results for the HRWMG which are presented in Figure 7. Similar and consistent levels of all factors were found across regions with little variation in outcomes with Location CCAT scores being very similar. [15]

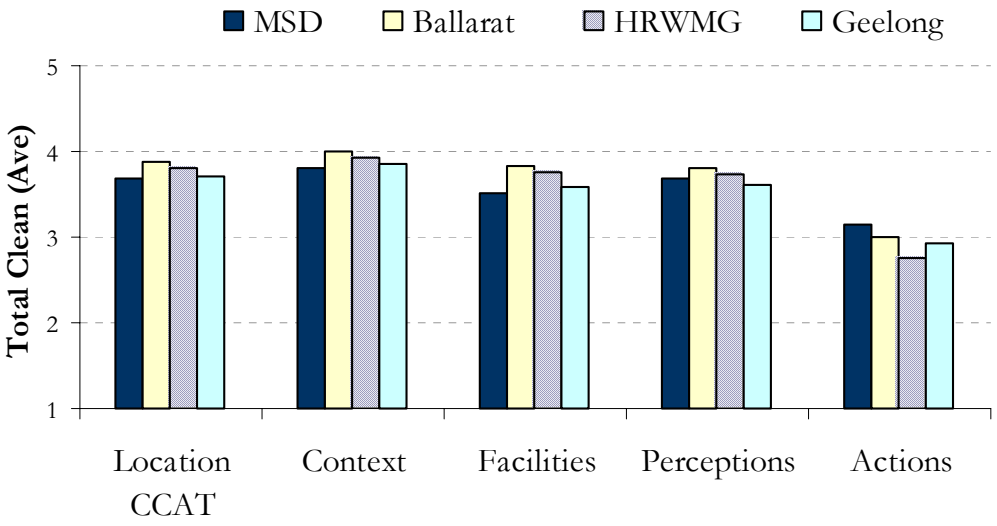


Figure 7 CCAT Summary Scores Across Census Districts.

Exploration of the variations in ratings were undertaken to identify trends rather than robust differences at this stage in the VLMP pilot. The rating level for Actions was slightly higher in and around Melbourne than in all the regional centres, indicating a tendency for people in Melbourne and surrounding suburbs to be more likely to be seen doing the right thing with their litter than people in country areas. However there was a trend for Actions in all regions to be lower than the ratings for all other factors.

The strongest features in the CCAT profile involved Context, with a sense of community strong for all regions. In Melbourne, ratings of Attitudes and Perceptions and Facilities were at lower levels than those for Context. People in the suburbs of Melbourne tended to have a strong sense of community and perceived their locations to be better equipped than the more objective ratings indicated. A similar pattern of results was found for the locations assessed in Greater Geelong.

[15] The 'perceptions' label in the figure below (and subsequent figures) refers to the CCAT category, Attitudes and Perceptions.

Key CCAT Components in Regions

The key components of the CCAT profiles for the Facilities (Infrastructure and BINfrastructure) and Attitudes and Perceptions (Adequacy of BINfrastructure and Attitudes toward the Location) factors for each region have been summarised in Figure 8.

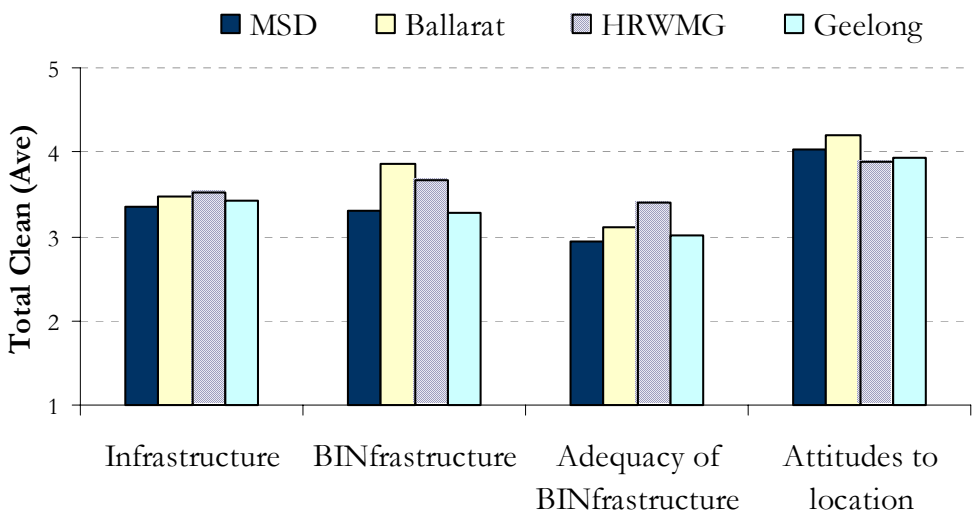


Figure 8 Regional Averages of CCAT Components of Facilities and Perceptions

Ratings for the two components of Facilities - Infrastructure and BINfrastructure - showed different patterns of results with ratings for infrastructure being scored at similar levels across all regions. Ratings for BINfrastructure were more varied, with assessments of the bins in Ballarat and the HRWMG showing higher levels of performance than those found in Melbourne and Geelong.

A similar trend for the components of Attitudes and Perceptions across regions was also evident with very little variation in attitudes toward the location but greater variation in assessments of the adequacy of bins. In Melbourne and Geelong where ratings of bin performance were lower than elsewhere, community perceptions of the BINfrastructure were also lower than the other regions. It appeared that both the trained raters and the community using the public spaces were coming to similar conclusions on the general adequacy of bins.

It is interesting to note that the HRWMG scored highly on perceived adequacy of BINfrastructure, yet scored lowest on the Actions rating. The reverse is evident for the Melbourne Statistical District which scores comparatively highly on the Actions ranking and comparatively low on how adequate people perceived the BINfrastructure to be. In the case of the HRWMG, this probably indicates a need for further education and promotional strategies to facilitate people's awareness of their own behaviour and building on existing foundations for doing the right thing whereas in Melbourne community expectations of BINfrastructure might be at a higher level than in the HRWMG locations.

CCAT City Profile – A Case Example

CCAT results for local government areas (LGA's) in the MSD, Greater Geelong and Greater Ballarat areas have been presented to show the variations between cities. Table 5 gives a further breakdown of the summary scores and their components for each city or shire that was analysed during the VLMP. The results in this table provide a comparative basis for examining the factors contributing to CCAT scores. LGA's where the Location CCAT is low can identify the particular components of the CCAT contributing to this rating which need to be improved if actions are to change.

To illustrate the use of the CCAT results at the LGA level of analysis, note the outcomes for the City of Casey in Table 5. The City of Casey has one of the lowest Location CCAT scores compared to other cities. A detailed examination of the factors included in the summary rating reveals that ratings for Facilities are comparatively low, whilst ratings for Context and Attitudes and Perceptions are close to those for other cities. These results suggest that there is a solid sense of community and interest in supporting clean public spaces in the City, but that there may be a need to review the maintenance and function of Facilities in exploring the components of the CCAT scores for the City.

The Facilities component rating for Infrastructure was below that for many other LGA's and the rating for the BINfrastructure component is the second lowest of all LGA ratings, indicating some problems with physical amenities and bins provided in public spaces in the City.

The Attitudes and Perceptions component showed that community attitudes toward keeping the City clean were amongst the highest for all LGA's, suggesting the public view litter prevention as very important in their local area. The other component of Attitudes and Perceptions involved assessments of the adequacy of the BINfrastructure which rated as the third lowest outcomes for all LGA's, suggesting that the community viewed the bins in the City as largely inadequate.

The agreement between outcomes of ratings from trained raters' assessment of Facilities - in particular BINfrastructure and public perception of inadequate bins - suggests that, relative to other LGA's, there is a need for improvement in Facilities and, in particular, BINfrastructure. A more detailed examination of the factors assessed in the CCAT ratings of BINfrastructure, such as the number of bins, placement, size of opening, configuration, cleanness, maintenance and servicing would reveal the BINfrastructure features needing attention in the City of Casey.

Also interesting is the Actions assessment which was amongst the highest for a LGA, indicating the community is acting on its intentions to do the right thing by acting in an environmentally responsible manner, despite problems with BINfrastructure. This indicates that any future improvements in BINfrastructure would be likely to demonstrate a positive response fairly quickly.

The City of Dandenong had the same Location CCAT score as the City of Casey (at the low end compared to other cities), yet the explanation for its difficulties was not only apparent in the low ratings of the BINfrastructure but also in a perception that the bins currently provided were inadequate. There was relatively less support from the community for the importance of clean locations throughout the City with the Actions component amongst the lowest for any LGA.

At this stage in the VLMP data collection, the sample size of observed Actions for each LGA is small and in some case, eg, Golden Plains, there were no disposal actions recorded during the HRWMG study. Consequently, Actions have been analysed at the state-wide and regional level and are used only as trend indicators, as in the example using the City of Casey. Exceptions to this are Melbourne CBD, Geelong and

Ballarat, where there were adequate numbers of actions recorded for comparison purposes. More conclusive trends in disposal actions at the city and location level will be possible as the Actions database builds.

Table 5 Averages of Summary Scores and Their Components Across Local Government Areas.

LGA	Location CCAT	Context	Facilities	Atts& Percept	Actions	Infra	BINfra	Adqucy of Bins	Atts to place
Melbourne CBD	3.7	3.9	3.6	3.7	3.6	3.5	3.7	3.1	4.1
Ballarat VLMP	3.9	4.0	3.8	3.8	3.0	3.5	3.9	3.1	4.2
Ballarat HRWMG	3.8	3.9	3.7	3.7	2.8	3.5	3.6	3.4	3.8
Casey	3.5	3.5	3.2	3.6	3.3	3.0	2.8	2.7	4.1
Geelong	3.7	3.9	3.6	3.6	2.9	3.4	3.3	3.0	3.9
Darebin	3.6	3.8	3.4	3.8	3.3	3.3	3.0	2.9	4.1
Dandenong	3.5	3.7	3.4	3.3	2.7	3.3	3.2	2.5	3.7
Manningham	3.7	3.8	3.6	3.7	2.9	3.3	3.6	3.1	4.0
Melton	3.6	3.8	3.5	3.4	2.3	3.3	3.3	2.8	3.7
Bayside	3.7	3.9	3.5	3.9	3.2	3.4	3.0	3.2	4.2
Hume	3.7	3.9	3.6	3.6	2.8	3.3	3.5	2.9	4.0
Hepburn	4.0	4.0	4.0	3.8	2.5	3.8	4.4	3.5	4.1
Central Goldfields	3.9	4.1	3.8	4.0	3.0	3.6	3.9	3.5	4.1
Moorabool	4.0	4.1	3.9	4.2	2.3	3.8	3.5	4.0	4.3
Golden Plains	3.5	3.6	3.3	2.9	0	3.2	2.6	1.6	3.8
Pyrenees	3.7	4.0	3.7	3.4	3.0	3.4	4.0	3.5	3.5
Knox	3.8	3.9	3.7	3.7	3.0	3.4	3.4	2.9	4.1

Melbourne CBD had the highest Location CCAT rating level for all LGA's, along with a high Actions rating. Although Ballarat and Geelong had similar Location CCAT ratings to Melbourne, Action ratings were considerably lower.

Even with the highest Location CCAT rating, there are still areas for improvements to be made in Melbourne CBD, and accessing ratings for particular locations would pinpoint locations throughout the City where improvements could best be directed. The CCAT results for 262 separate locations (including the HRWMG) provided too large a database to be presented in this summary report but specific location results can be obtained by contacting Nick Chrisant at EcoRecycle Victoria.

Overall features associated with the VLMP pilot database were examined to describe the profile of people surveyed and items found littered around Victoria.

VLMP Public Profile

In total, 745 surveys were completed in 238 locations from the VLMP and HRWMG with an average of just over three surveys per 25 minute session for those locations where people were present.

Gender and Age

There were more women than men surveyed with women (n=402) comprising 54% of those surveyed and men 46% (n=343). These gender differences were in the opposite direction to most of the LBS findings which focus on public places in the inner city. The broader range of the VLMP extends out into the suburbs

and regional areas and may well have tapped into a broader demographic than that typically found in capital cities. In any case, while the difference between the number of men and women surveyed is somewhat significant, it did not appear to be associated with trends in the data

The age distribution of those people surveyed is summarised in Figure 9 which shows that almost half of the people surveyed were below the age of 35 years, with the under 17 age group[16] being slightly over-represented compared to previous survey data from the LBS where respondents could be expected to be older in largely inner city locations. The distribution shows a wide representation of people using locations with no particular age group likely to be targeted by surveyors.

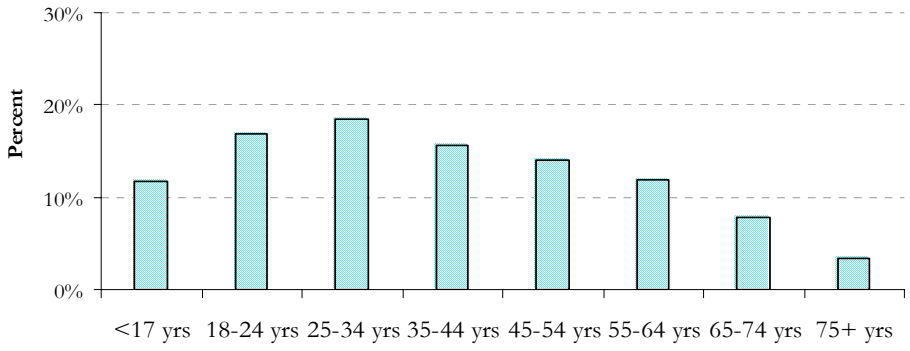


Figure 9 Age Profile for the VLMP

Education and Employment

The highest level of education for people surveyed in the sites has been summarised in Figure 10 which shows that most people surveyed had at least a secondary level of education with approximately one third tertiary educated.

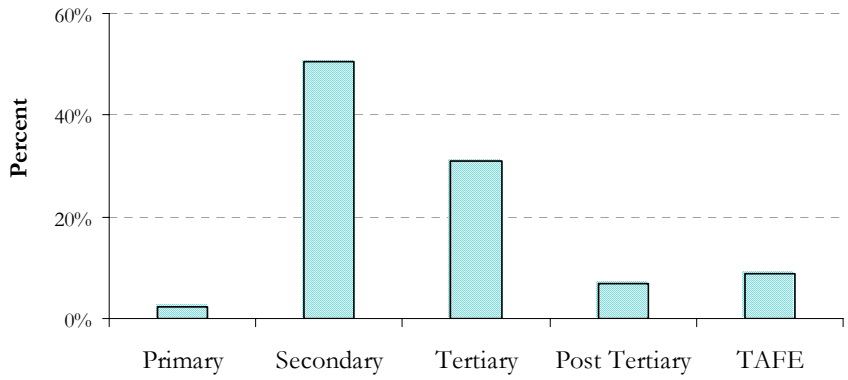


Figure 10 Highest Level of Education

Most of the people surveyed in the VLMP said they were currently employed either full time or part time in paid work as shown in Figure 11.

[16] For survey respondents under 16 years of age, parental permission was gained for participation.

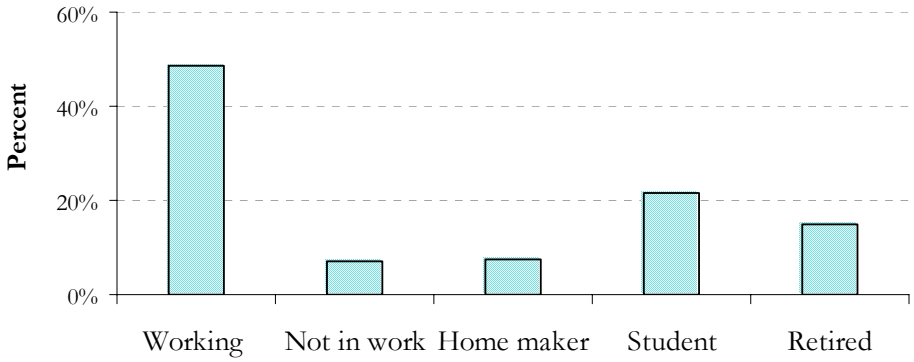


Figure 11 Current Employment

There was a relatively large proportion of students surveyed which may well reflect the suburban focus of much of the data collection with many school children using public places on the way to and from school and during lunch periods.

Residence

The majority (over three quarters) of people interviewed throughout the 263 sites considered themselves local to the area where the interview was conducted as shown in Figure 12.

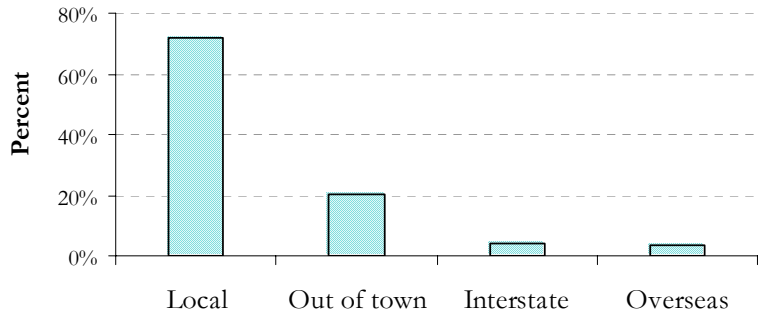


Figure 12 Place of Residence

Therefore, most of the perceptions about the effectiveness of BINfrastructure and other facilities in a location involved survey responses from people who were likely to have a good understanding of the effectiveness of facilities and the level of cleanness associated with the site.

VLMP Items Littered

Litter counts were conducted[17] in all sites to determine the number of items ending up on the ground, in the gutter and littered around sites. The total number of items found in locations was averaged for all sites, the most common items on the ground being confectionery items (including both old and new chewing gum), and cigarette butts as shown in Figure 13.

[17] Litter counts used the standardised method designed by CC, for KAB V & EcoRecycle Victoria based on an area of 48 square metres.

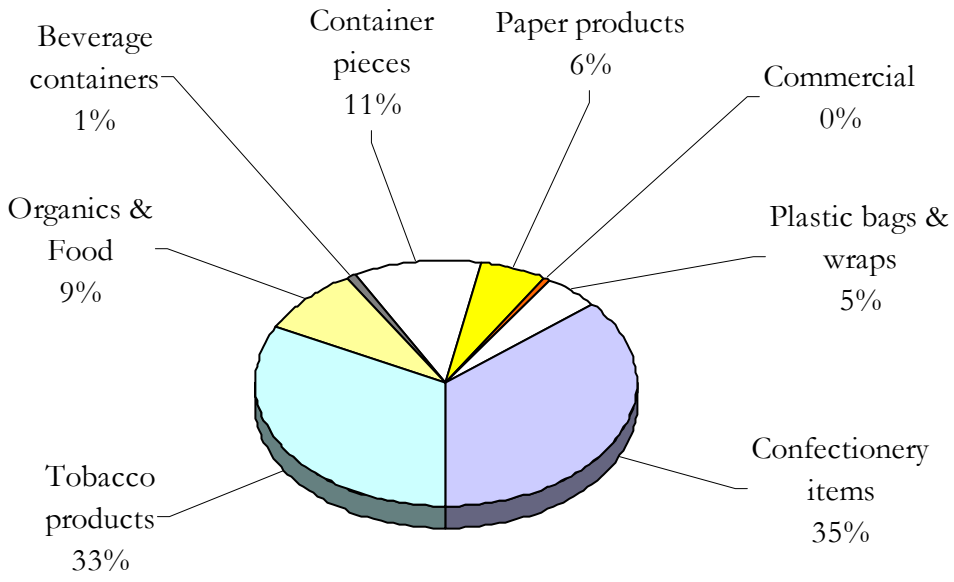


Figure 13 Types of Litter Counted in the VLMP.

Comparatively small amounts of commercial waste and beverage containers were found across the sites where the average number of items counted in a location was 82 with counts of litter ranging from 4 to 331 items in the location where most litter had accumulated.

Litter counts for all locations were used to create a standardised database for converting litter counts into a clean score in line with CCAT ratings scale from a rating from '1' (not at all clean) to '5' (extremely clean). The higher the CCAT rating for a location the less litter was found to accumulate in that site. These ratings were then used to generate average clean ratings for cities and site types, which were used to contribute to the final Context ratings for each location.

Clean ratings indicating the extent of litter found during litter counts have been presented in Figure 14. High clean ratings with relatively fewer items of litter on the ground were recorded for Greater Geelong, Golden Plains, Moorabool and Melbourne.

Low clean ratings were found in the Pyrenees, Cities of Casey, Dandenong, Ballarat and Darebin, indicating the strong presence of litter on the ground, in the gutters and around sites in these areas.

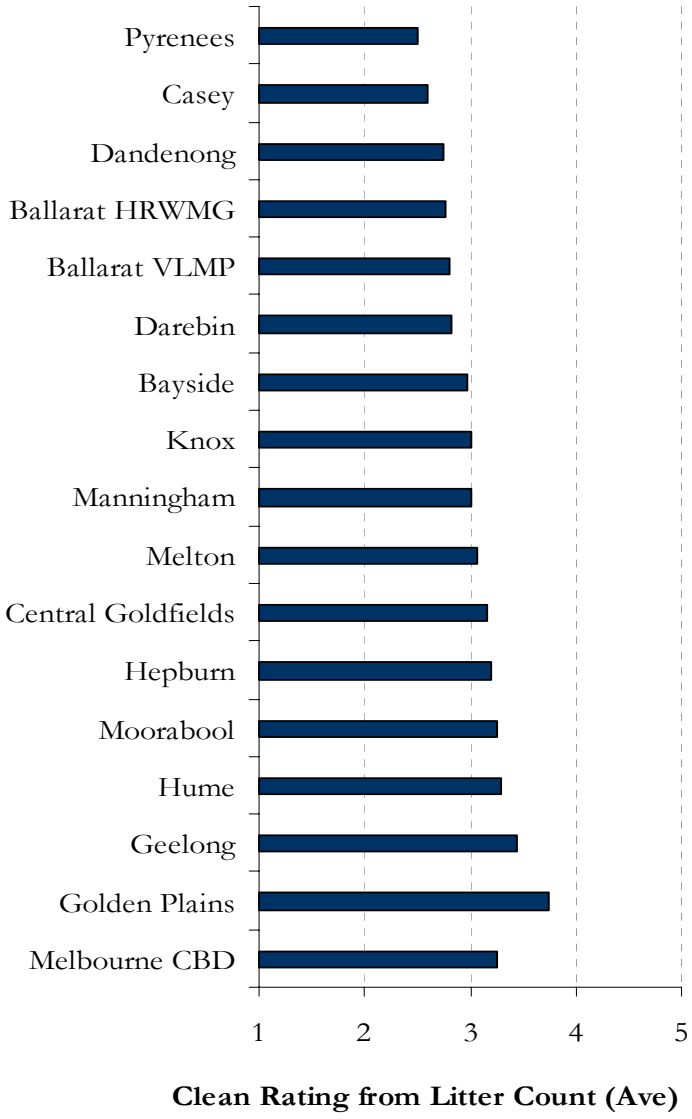


Figure 14 Clean Ratings of Litter Counts in Cities

CCAT Profile for Sites

CCAT profiles were obtained for all site types in the sample with the exclusion of building sites. Summary results have been presented in Figure 15 which shows the Location CCAT scores and ratings for Actions for each site type averaged across the state.

It should be noted that no actions were observed in the roadside site type (which was included in the pilot to test the extent to which CCAT ratings could be conducted on a roadside verge) with assessments largely focussed on the clean ratings and presence of litter. In all other site types people were seen disposing of used items but apart from shops, parks, transport and smoking sites, observation numbers are too small at this stage to make valid comparisons. Actions have been included in the chart below to illustrate the kind of data that might be expected to be available once sufficient numbers have developed in the data base.

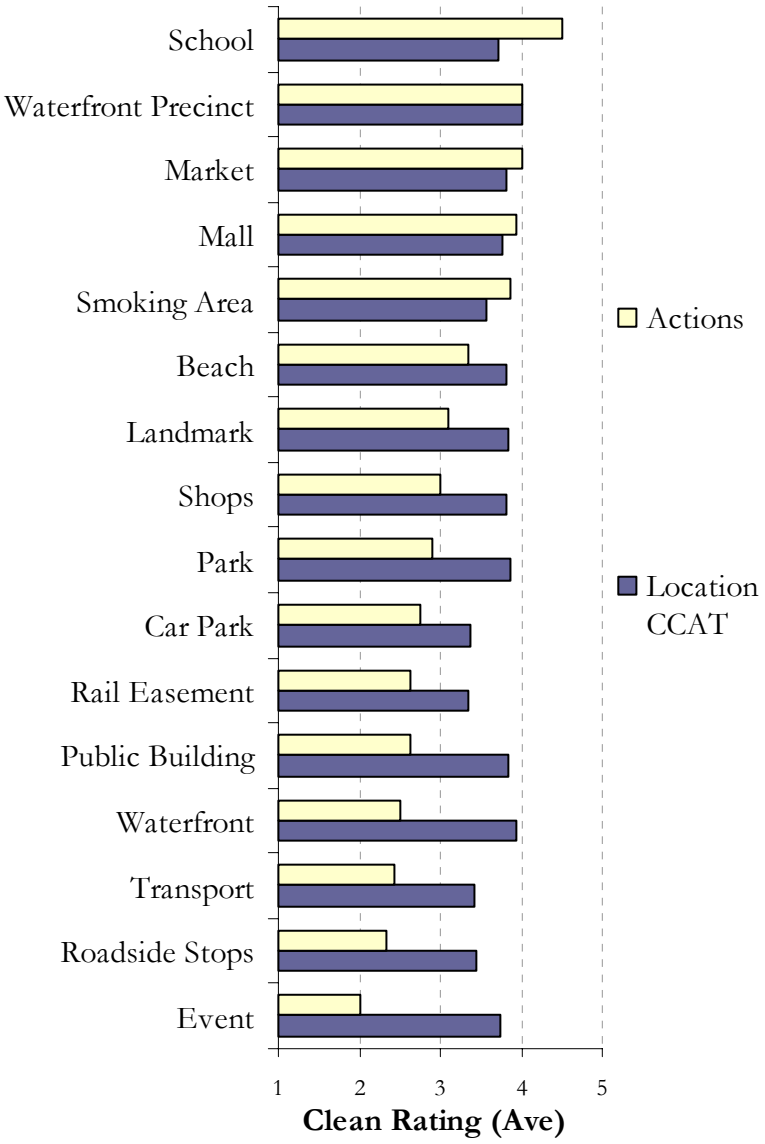


Figure 15 Summary Scores Across Site Types

In terms of Location CCAT ratings, there were no strong differences according to site type, all site types demonstrating levels between '3' (moderately clean) and '4' (very clean). In relation to Actions ratings, smoking sites performed very well, almost at Level 4 (very clean). For this site type, the Actions rating exceeded the Location CCAT, a very pleasing outcome. People in smoking sites tended to have a sense of community, to use the Facilities and to want to maintain a clean location.

Actions for transport sites were at the lowest level of the four site types for which valid numbers were available, with shops and parks in the middle of these two extremes. Unlike smoking sites, in the case of shops, parks and transport sites, the Actions rating did not exceed that for Location CCAT.

The pattern of findings from the CCAT analysis for site types provides a basis for further examination of the differences in ratings for each of the factors and for their components. Although beyond the scope of this initial pilot, early findings may be useful for strategic decision making about what site types to target, what interventions to use and where to best direct resources.

Conclusions

EcoRecycle Victoria has taken a significant step forward in litter analysis by undertaking a pilot of the Victorian Litter Monitoring Protocol as a basis for consistent monitoring of litter throughout the state, including observations of public spaces and basic behavioural assessments.

The pilot has established the foundations for robust and statistically valid litter monitoring in Victoria, and the first set of information has been provided to start a time series data collection that can be used to assess the impact of interventions on changes in littering patterns and actions.

The CCAT has shown good reliability and face validity in providing a holistic assessment of how clean public places are throughout Victorian communities.

In this pilot phase, the VLMP has provided:

- A sound basis for comparing outcomes that takes into account unique characteristics of regions, cities and locations
- A realistic and efficient procedure for collecting meaningful information in the field to monitor achievements as well as problems associated with littering
- A method to identify priority target areas for interventions to facilitate improvements in litter prevention and management across state regions, cities and locations
- A public record of composite scores for littering actions in the state, as well as records of the amount and type of litter in the sites
- Composite and detailed assessment of the factors influencing littering actions in different regions, cities, and sites
- An ability to track progressive changes in community actions, sentiments and attitudes toward litter prevention and interventions
- An accessible strategy for building on stakeholder contributions in the development of the Monitoring Protocol

After conducting an assessment in winter, the benchmarks of disposal actions and the factors influencing littering and bin use have been established and indicate that Victorian public places are operating at moderately clean levels as assessed using CCAT ratings. However these benchmarks should be reconfirmed with assessments conducted during the peak littering season in summer when Victorians use public places in greater numbers.

There is widespread community involvement and support for clean public places and generally the facilities provided have been rated at moderate to high levels. These indicators would benefit from verification under warmer conditions.

The first CCAT assessments show that while current practices are acceptable, there is some distance to go in producing required changes in disposal actions to meet goals set in moving toward zero waste.

Outcomes using the CCAT can form a guide to integrated and strategic use of information on the local community (Context), its interaction with physical structures (Facilities - BINfrastructure and Infrastructure), as well as educational, incentive and sanctions programs aimed at modifying community views (Attitudes and Perceptions) and littering behaviour (Actions).

Specifically, outcomes can be used to:

- Establish current litter management performance levels in Victoria
- Assess the effectiveness of campaigns aimed at litter prevention and increased use of litter and away-from-home recycling bins
- Target and prevent litter accumulation as well as recognise positive achievements
- Improve the cost effectiveness of capital works expenditure through targeted improvements in BINfrastructure and facilities to have an impact beyond simply aesthetic appeal and pride in public places, as important as those factors are
- Monitor progress with Victorian litter prevention initiatives as it moves toward zero waste

Application of VLMP Findings

The VLMP has identified a process for establishing the factors influencing disposal actions in a location. The information generated by CCAT ratings enables deeper insights into actions beyond summary ratings to site specific information, providing targeted direction for interventions and a recognition of those features that are functioning at optimum levels.

CCAT information can be applied in a variety of ways ranging from education programs to organising clean ups and the rescheduling of maintenance services. As with any assessment tool, it is the judicious application of the findings that are important. Because CCAT provides a holistic assessment of an area, the results provide a comprehensive account of what is happening in a location, which can then be applied in different ways.

The most useful application of CCAT findings is through program development and intervention. As well as identifying litter loads, CCAT also identifies sense of community, community attitudes and perceptions, facilities assessments and actions occurring within a site. This information can act as an invaluable resource for program development and facilities management of an area.

CCAT findings are best used as a series of touchstones for local authorities to prioritise developments and changes needed in an area. The task for local authorities is to translate CCAT outcomes into targeted and segmented action for an area.

CCAT can facilitate a multi-faceted approach as it provides a number of access points. For example, ratings may identify that the facilities of an area need to be improved and better maintained whilst at the same time pointing to a low level of knowledge about the impact of litter on the local waterways along with a high sense of community. In this instance, interventions can focus on two levels, firstly addressing the facilities issue while at the same time developing an education/awareness program on the impact of littering on local waterways as part of the facilities implementation process.

Furthermore, CCAT allows for the development of tiered programs and interventions as the findings identify areas needing urgent attention before moving on to other program elements.

A good example of this tiered approach to intervention would be a site where facilities were assessed as being poor, along with a low level of community. CCAT findings can then act as frameworks for developing an integrated and stepwise intervention. Using this example, it would be important to address the facility issues before attempting any other intervention. Once facilities issues were addressed and working, other issues

could then be tackled. In this type of application, key performance areas can be identified from the CCAT findings which can then be used to assess the ongoing performance of interventions and programs.

The CCAT also provides a strategic planning tool to guide long term systematic interventions targeted at low performing site types or areas where community education or attitudes need consistent support.

The VLMP using the CCAT is suitable for use as an accessible broad based holistic data collection method for monitoring the effectiveness of litter prevention programs across Victoria.

On the basis of this report, EcoRecycle Victoria, in conjunction with the VLAA, will assess the viability of using the CCAT scores as an analytical tool for monitoring littering in Victoria over time.

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Appendices

Appendix A: Principles for Sustainable Public Places

The principles which, when included as part of litter prevention programs, maximize the potential for positive outcomes.[18].

Clean equals Clean Prevention starts with clean

Clean environments lead to less littering and more binning. People in areas that are kept clean are less likely to litter.

Accessibility Make it easy

No matter what the system, infrastructure or program, it needs to be accessible, convenient and user friendly. Accessibility will encourage use of facilities and positively influence disposal behaviour.

Responsibility I'm responsible regardless

The same person can behave differently depending on the situation, site characteristics and other contextual factors. People can be encouraged to develop a sense of self responsibility leading to sustainable behaviour across environments.

Act on behaviour Use sanctions and rewards

It is important to respond to people's actions, be they positive or negative. Sanctions and rewards play a central role in shaping, developing and changing disposal behaviour.

Consistency Reduce confusion, create predictability

Ensure that all strategies and programs reinforce similar expectations in all situations. People in different situations need to know what is expected of them to be environmentally responsible.

Involvement Aim to include everyone

Involvement can create a sense of ownership which impacts positively on disposal behaviour. Tailor initiatives to facilitate engagement and promote participation from as many people as possible.

Integration Strive to fit it together

Strategies need to be linked and connected to all stakeholders across the system. Integration allows all strategies (including infrastructure) to work together to form an effective unit.

Demonstrate commitment Walk the talk

Leadership plays an instrumental role in influencing disposal behaviour, however that leadership needs to be sustained, promoting a long term vision and modelling the required actions.

[18] Community Change has recently developed and released an information CD, *Changing Disposal Behaviour* (2003).

Appendix B: Site Type Classification

The VLMP core and special sites were the target populations to be measured by the VLMP pilot. The VLMP site classifications and definitions for the pilot are broadly based on the categories developed by Community Change, BIEC, and KAVB but have been further refined and extended to include a number of additional priority areas identified by EcoRecycle (ie, roadsides, building sites, and railway easements).

The definitions of the VLMP sites are defined below:

Beaches:
The sandy area between the water and a boundary or border that clearly mark areas for recreation. This includes boardwalks adjoining the beach such as St. Kilda beach and exclude parks adjoining beaches such as Brighton beach parkland (included in Parks).

Building Sites:
Building sites include commercial and residential sites ranging from single unit development to multi unit development and include high rise. The reporting of building site activity should be limited to the lock-up stage of a project. The area in front of and around a site (if available to public access) will comprise the boundary for a building site.

Building sites are problematic. The transient nature of the building industry does not provide a good measure for a site but rather a proxy for a developer. That is, if we are aiming at getting a measure of improvements in litter, then the transient nature of building sites will have to be linked to the building developer in order to measure changes over time of a particular developer/builder. Large developers would be preferred to owner builders as the effect of policy changes are likely to be better reflected by developers who are not 'one-offs' but have continuity of business. Otherwise, the measurement of litter at a building site will only be confined to the front/outside of the building site on a public footpath and will not provide a basis for time series data.

Events:
Special occasions often involving large crowds of people attending a venue for a significant activity involving leisure, recreation, or sport, eg, football grand final, cricket, Grand Prix, Melbourne Cup, etc. They include AFL and local VFL football games.

Festivals:
Festivals are special occasions often involving large crowds of people attending functions characterised by food and drink and street entertainment, ie, Moomba Festival, Food and Wine festival, House & Garden Festival, etc. Excludes all sporting events.

Indoor transport terminals:
An indoor transport terminal is defined by a physical barrier/demarcation between the public and the terminal, ie, a gate, a boom gate, a ticket access machine, etc, regardless of whether some of the transport terminal is exposed to the outdoors such as a local train platform. Access to the platform is generally through some form of barrier (whether imaginary or real), which may be simply an unstaffed opening between a corrugated fence line.

Landmarks:
Landmark buildings are characterised as having some significance in terms of the history or culture of the city they belong to but do not have a primary activity associated with tourism activity. Landmark buildings are characterised by sightseeing or tourist activity although not designated as such. The Rialto building for instance is an icon building in Melbourne and attracts visitors for this reason. It also caters for visitors to the public observation deck but the main activity of the building is commercial offices. Similarly the Victorian Parliament building in Melbourne offers site-seeing to visitors but its main activity is government. This site type also includes Federation Square, Myer Music Bowl, and the Arts Centre. Excludes Luna Park in St Kilda as this is a tourist attraction. Access to some of the public space at some of the designated sites may be a problem as the access area in front private buildings may be considered as private property.

Malls:
A pedestrian thoroughfare or sheltered promenade with merchandise and food vendors lining the walkway or street, often with limitations on vehicle access, eg, Bouke St Mall.

Markets:
Open spaces or covered buildings where merchandise and food stalls provide fresh produce and a range of goods to the public, which often include seating and eating areas, eg, Victoria Market Melbourne.

Parks:
Grassy sites with shrubbery or garden beds, children's play equipment, seats and tables, and often with barbecue facilities used for picnicking and recreation.

Public Buildings:
An area around a building open to the public, which often includes places for people to sit and eat and within walking distance of food vendors, eg, Library, GPO, Council buildings, Museum, Courts, War Memorial, Cinema, Hospitals, etc.

Railway easements:
A railway easement is defined as the area immediately outside/in front of a railway station defined by a boundary or a fence, which provides sheltered access to the public. A real or imaginary fence line extending to a point of unauthorised entry is the limit of the easement.

Roadside stops:
A roadside stop is defined as any public wayside and recreational area that border roads, is used for rest breaks often including toilets, barbecue areas, seating, gardens and take away food vendors. A roadside stop is generally located on a highway in a rural area, a highway being defined as any main road outside a town speed limit sign.

Schools:
Organisations involved in providing primary, secondary and tertiary education. This includes all state run and private primary, secondary and tertiary schools as well as universities, and TAFE's. The boundary of a school is defined as the area immediately out front of the fence line on the footpath outside the school boundary. Primary and secondary schools will not include the survey component of the CCAT methodology, this will only apply to tertiary institutions for the VLMP pilot study.

Adult education centres, foreign language schools and special education schools are not included. Also excluded are all schools engaged in providing training in sporting or other recreational or special interest activities, ie, art school, ballet school, drama school, driving school, etc.

Shops:
Shopping Strip Areas for selling goods or services, often with a vehicular thoroughfare in the middle of a shopping strip lined with merchandise and food vendors with wide footpaths and places for people to sit, eg, Chapel Street, Lygon Street, Elizabeth Street, etc. Restaurants and cafes are included in this definition, where they have outdoor seating for patrons.

Smoking areas:
Smoking areas may include a formal or informal area designated outside a building where cigarette consumption is catered for either officially or unofficially by the placement of permanent or impermanent ashtrays (either fixed or personal).

Transport:
Outdoor transport terminals or waiting and transit areas with pedestrian traffic going to and from public transport and often with space for parking and manoeuvring vehicles, eg, all bus stops and tram stops are considered outdoor transport terminals.

Waterfronts:
Areas next to bodies of water (eg, river, lake or pond) often with seats or grassy areas used by the public for recreation and picnicking, eg, Lake Wendouree in Ballarat, Lake Weeroona in Bendigo, Albert Park lake in Melbourne, Yarra river bank Melbourne.

Waterfront precincts:
Characterised by being next to a body of water but the main activity of the precinct is cafes and shops, which caters for a mix of tourism and commercial activity, such as Southbank and the Dockland area in Melbourne. This is distinct from waterfront areas where no commercial or retail activity generally takes place.

Appendix C: Sample Locations

City	Site	Location	Area
Melbourne	Shops	Elizabeth St	Nr Coles Express
		Galleria Plaza, Elizabeth St	.
		Target Centre, Bourke St	.
		Swanston St	Collins & Lt Collins St
		Lt Collins St	.
		Collins St	Centreway
	Mall	Bourke St Mall	Elizabeth St
		Bourke St Mall	Swanston St
	Park	Alexandra Gardens	opp VCA
		Flagstaff Gardens	.
		Gordon Reserve	.
	Waterfront	Queen Victoria Garden	.
		Yarra River	North Side
		Yarra Park	BBQ
	Public Building	State Library	.
	Market	Queen Victoria Market	.
		Southbank Sunday Market	Under bridge
	Event	MCG	Tower 3
		MCG	Tower 2
		Olympic Park	Eastern Entry
		Telstra Dome	Bourke St, entrce 2&3
	Transport	Spencer St Bus Stops	.
		William St	Bourke St & AMP Sqr
		Flinders St Station	.
	Landmark	Melbourne Town Hall	.
		VCA	.
		Rialto Towers	.
		Victoria Arts Centre	.
		City Square	.
		Exhibition centre	.
	Smoking Areas	Melbourne Central, Elizabeth St	.
		Defence Plaza Bourke St	.
		95 Latrobe St	.
		222 Exhibition St	.
		35 Collins St	.
		242 Exhibition St	.
	Railway Easement	Southgate footbridge	.
		Spencer St Station	V-line end
	School	RMIT, Swanston St	.
		RMIT, Bourke St	
	Waterfront Precinct	Southgate at Southbank	
		Docklands	Quayside

Darebin	Shops	High St, Northcote	.
		High Street Preston	.
		Broadway Rd Reservoir	.
	Transport	Northland	Bus Pick Up
		Broadway Rd Reservoir	.
	School	Northcote Secondary	.
		Wales Street Primary	.
	Park	All Nations Park, Northcote	Sprmkt Car Park Entnce
		Fairfield Park	.
		Pender Street Reserve	Collins Street Side
	Market	Preston Market	.
	Mall	Bi-Lo Mall	.
	Railway Easement	Preston Train Station	.
		Reservoir Station	Eastern Side
	Waterfront	Westfield Park	.
		Darebin Parklands	Separation St Entnce
	Car Park	Reservoir Station	.
Geelong	Beach	Rippleside	.
		Eastern Beach	.
	Park	Eastern Beach	.
		Johnston Park	.
		Cameron Park	.
	Waterfront Precinct	Carousel	
	Waterfront	Barwon Valley Park	.
		Balyang Sanctuary	.
	Shops	Market Sqr	.
		Moorabool St	.
		High St Shops Belmont	
		Separation St	.
	Mall	Lt Malop St Mall	.
		Labaun Sqr	.
		Highton Shopping Village	.
	Transport	Moorabool St Bus Stops	.
		Geelong Train Station	.
		Malop St Bus Stops	.
		High St Bus Stops	.
	Public Building	Wool Museum	.
		GPAC	.
		City Hall North side	.
		Geelong Library	.
		Information Centre	.
		City Hall Entrance	
	Smoking Areas	State Government Offices	.
		COGG Offices	.
		Centrelink	.
	Railway Easement	South Geelong Train Station	.
		Lara Train Station	.
		North Geelong Station	.
		North Shore Station	.

	School	Western Hts, Minerva Camps	.
		Herne Hill Primary	.
		Belmont High School	.
		Rosewall Primary School	.
	Car Park	Officeworks	.
	Landmark	Waterworld	.
		Latrobe Terrace	
		Little River	West Side
	Market	Corio Markets	Beckley Park
Dandenong	School	Cleeland Secondary College	.
		Dandenong North Primary	.
		Chisholm TAFE	.
		Springvale Primary School	.
		Dandenong High School	James Street
	Shops	Palm Plaza	.
		Walker St	.
		Douglas St, Noble Park	.
	Mall	Palm Plaza	.
	Transport	McCrae St	.
		Dandenong Train Station	.
	Car Park	McCrae St	.
	Railway Easement	Dandenong Train Station	.
	Public Building	GPO	.
	Park	Dandenong Park	.
		Fotheringham Reserve	.
	Landmark	ATO, Mason St	.
	Market	Dandenong Market	.
Manningham	Transport	Westfield Bus Terminal	.
		Doncaster, Westfield	Bus Pick Up
	School	Templestowe Park Primary	.
	Mall	Macedon Sqr	.
	Car Park	Macedon Sqr	.
	Shops	Blackburn Rd	.
		Templestowe Village	.
	Public Building	Doncaster Library	Nr Westfield Entrance
	Park	Koonung Reserve	.
		Ruffey Lake	.
	Waterfront	Finns Reserve	.
	Smoking Areas	Doncaster, Westfield	.
Melton	Waterfront	Djerriwarrh Creek	
	Shops	Courthouse Shops	.
		High St Melton	South Side
		Bakery Square	.
	School	Victoria University	.
		St Anthony Primary	.
		Melton South Primary School	.
	Transport	Mac's Hotel, Palmerston St	.
		Melton Train Station	.
	Smoking Areas	Woodgrove Plaza	South Entrance
		Woodgrove Plaza	.

	Park	Hannah Watts Park	.
		Mount Carberry Reserve	.
	Railway Easement	Rockbank Station	.
		Melton Train Station	
	Landmark	Clock Tower	.
	Car Park	Coburn Central	Eastern Side
Bayside	Shops	Hampton Shops	.
		Church St, Brighton	.
		Brighton North Shops	Post Office
		Sandringham Shops	.
		Martin Street Gardenvale	.
	Park	Brighton Beach Reserve	.
		Hurlingham Park	.
	Beach	Sandringham Pier Beach	.
		Greenpoint Beach	.
		Brighton Beach	.
		Rickett's Point	.
	School	Brighton Beach Primary	.
		Sandringham Sec College	.
	Car Park	Safeway, Hampton	.
	Railway Easement	Hampton Train Station	North Side
		Middle Brighton Train Station	.
	Public Building	Hampton Library	.
		Sandringham Library	.
		Council Chmbrs Sand'ham	.
	Transport	Hampton Bus Terminal	North Side
		Sandringham Train Station	.
		Church & Male St Bus Stop	.
		Martin St Bus Stops G'vale	.
	Smoking Areas	Coles Waltham & Chalmers St	.
Ballarat	Mall	Bridge Mall	Sturt St End
		Bridge Mall	Nr McDonalds
		Phoenix Mall	Eastern Side
		Phoenix Mall	West Side
	Park	Doveston Multistorey Car Park	.
		Victory Park	.
		DeSoza Park	.
		Durham Park	West Side
		Alfredton Park	.
		Victoria Park	Btn Sturt & Oak Ave
		Botanic Gdns	Picnic Area
		Botanic Gdns	Adventure Playground
		Wendouree West Rec Res	.
	Shops	Sturt St	Book City
		Sebastopol Shops	.
		Midvale Shopping Centre	.
		Bunninyong Shops	.
		Howitt St	.
		Central Sqr	Myer Entrance
		Central Sqr	Target Entrance

	Transport	Lt Bridge St Bus Stop	.
	Roadside Stops	Learmonth Historic Marker	.
	Smoking Areas	Wendouree Village	Nr Library
	Car Park	Wendouree Village	.
	Market	Ballarat Market	.
	Waterfront	Wendouree Parade	Gnarr & McCarthur St
	Landmark	Camp St	.
Hume	Railway Easement	Broadmeadows Train Station	.
	Transport	Broadmdws Statn Bus Stops	.
	Shops	Royal Hotel, Sunbury	.
	Public Building	Broadmeadows Library	.
	Car Park	Broadmeadows Town Centre	.
	Waterfront	Sunbury Historic Bridge	.
	Landmark	George Evans Museum	.
	School	Sunbury College	.
	Park	Sunbury Recreation Reserve	.
	Mall	Link Arcade, Sunbury	.
Casey	Shops	Berwick Village	.
		Webb St, Narre Warren	.
	Railway Easement	Narre Warren Train Station	Car Park side
		Berwick Train Station	.
	Waterfront	Akoonah Park, Berwick	Secretary Office
	School	Berwick Secondary College	Bus Pick Up
	Park	Wilson Botanic Park	.
	Public Building	Narre Warren Library	.
	Car Park	Berwick Market Place	.
		Clydesdale Mall/Crnbne Prk	.
		Cranbourne Park Shop Centre	Lamb & Greaves St
	Transport	Fountain Gate Bus Stops	.
	Smoking Areas	Clydesdale Mall/Cranbourne Park	.
		Cranbourne Park Carpark	Safeway
	Mall	Clydesdale Sqr Cranbourne	.
Knox	Shops	Corner Boronia & Erica	.
		Mountain Highway Bayswater	Valentine Street
	School	Bayswater Secondary College	.
		Rowville Secondary College	.
	Park	Guy Turner Reserve	BBQ
		Bayswater Park	BBQ
	Transport	Boronia Station	.
	Railway Easement	Boronia Station	Eastern Side
		Bayswater Station	West Side
	Car Park	Boronia Jnction/Safeway Car Park	.
	Public Building	Boronia Library	.
		Knox Library	.
	Smoking Areas	Myer Knox City	Stud Rd Ent Level 1
	Building Sites	31 Sandford Close	.
		46 Bailey James Court	.
	Waterfront	Carribean Gardens	Japanese Gardens
	Mall	Wantirna Mall	.

Hepburn	Shops	Creswick Shops, Midland Hwy	.
		Daylesford Shops, Vincent St	.
	Park	Hepburn Springs	Sulphur Springs
		Sailors Falls	.
	Waterfront	Lake Daylesford	Chatsfield Reserve
Central Goldfields	Roadside Stops	Bristol Hill Lookout	
	Shops	Clarendon St Shps, Maryborough	.
		Tuaggra St, Maryborough	Safeway
	Park	Prince's Park	.
		Information Centre	.
	Waterfront	Goldfields Reservoir	BBQ
Moorabool	Roadside Stops	Bacchus Marsh Entrance	.
		Western Hwy, Ballan	.
	Shops	Main St, Bacchus Marsh	.
	Park	Maddingley Park	Playground
Golden Plains	Roadside Stops	Flagstaff Hill	.
		Scarsdale Roadside Stop	.
	Park	Community Pk	.
		Haddon Reserve	Reservoir
Pyrenees	Roadside Stops	Trawalla Roadside Stop	
	Park	Bicentennial Park	.
	Shops	Neil St Shops, Beaufort	.
		Sunraysia Highway, Avoca	Nr Post Office

Appendix D: Broader Application of CCAT

Beyond simply providing information on numbers of items littered on the ground, this method provides insight into factors influencing disposal actions demonstrating:

1. The need to assess litter free locations around Victoria to determine "what works" and recognise successes while continuing to focus on problem locations and source materials

2. A recognition that disposal behaviour ranges from inappropriate actions such as littering, illegal dumping, bill posting and graffiti through to appropriate use of facilities, carry-in-carry-out programs and public place recycling stations

3. Systematic identification of the effects of public place facilities as well as more detailed insight into the impact of BINfrastructure[19] on littering and bin use

4. An integrated approach to developing solutions that take into account all factors affecting litter prevention, from source control though to clean up and sanctions for inappropriate disposal behaviours

5. An acceptance of the need to use well validated systematic approaches in the assessment and evaluation of programs

6. A set of principles to guide the design of effective litter management and prevention programs for sustainable public places, providing information on how best to combat litter and promote positive bin use - in particular locations described in Appendix A

To date, the CCAT has been used for evaluating outcomes in a Victorian Stormwater Action Program test of best practice evaluations of stormwater management and litter prevention education in Snell Grove in Victoria. The project is an initiative of the Cooperative Research Centre for Catchment Hydrology at Monash University working in association with Moonee Ponds Creek Litter Initiative and Moreland City Council in an 18-month test of monitoring protocols for non-structural stormwater interventions. So far, the method has provided a review of the sources of litter as well as identifying targets for interventions at both the trader level and general public involvement in stormwater quality management. CCAT results have assisted educators to tailor generic stormwater education campaigns to the characteristics of the local community and public space conditions of Snell Grove.

The Highlands Regional Waste Management Group (HRWMG), as part of its Regional Litter Reduction Strategy Plan, has used the CCAT to establish baseline indicators for its Urban Litter Management Strategy by having locations in all of its constituent member's local government areas assessed. The results have been linked to the costs of litter management, cleanup and the general maintenance associated with public spaces in council areas across the highlands region[20].

Preliminary CCAT results have also been tested against DBI measures of disposal behaviour in an in-depth analysis of locations throughout the City of Melbourne to help explain some to the findings in relation to differences in behaviour that occur in outdoor smoking sites in Melbourne.

[19] BINfrastructure© is a term coined by CC in Melbourne (2002) to describe the characteristics of public place infrastructure applying to litter, recycling and butt bins. Readers are encouraged to use the term provided they cite the source appropriately.
[20] The final report from benchmarking is to be finalised in September 2003 but 'Highlands' CCAT results have been included in this report.

Under the NPC, the Victorian Jurisdictional Recycling Group (JRG) has supported a cooperative program between four Alpine Resort Management Boards (RMB[21]), CC and North East Victorian and Gippsland Regional Waste Management Group, to use the CCAT for assessing public place recycling and litter prevention in tourist resorts under a variety of extreme conditions. This innovative project will help to improve environmental outcomes in relation to litter, stormwater pollution and catchment management, as well as resource recovery in a fragile environment and will contribute to urban design projects and Pride of Place.

The CCAT is suitable for use by local government representatives, community volunteers, accredited contractors and agency representatives who successfully complete training in the use of the procedures. It overcomes some of the significant limitations of traditional approaches to litter assessment that have an over-reliance on outcome measures – for example, litter counts. It also addresses some of limitations of the DBI which make it inaccessible as a broad based data collection method.

[21] Falls Creek RMB, Mt Buller RMB, Mt Hotham RMB, and Mt Baw Baw RMB